

Hanwha Corporation and Subsidiaries

Consolidated Financial Statements

December 31, 2019

Hanwha Corporation and Subsidiaries

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December 31, 2019 and 2018

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Independent Auditor's Report

(English Translation of a Report Originally Issued in Korean)

To the Board of Directors and Shareholders of
Hanwha Corporation

Opinion

We have audited the accompanying consolidated financial statements of Hanwha Corporation and its subsidiaries (collectively referred to as the "Group"), which comprise the consolidated statement of financial position as at December 31, 2019, and the consolidated statement of comprehensive income, consolidated statement of changes in equity and consolidated statement of cash flows for the year then ended, and notes to the consolidated financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Group as at December 31, 2019, and its consolidated financial performance and its consolidated cash flows for the year then ended in accordance with International Financial Reporting Standards as adopted by the Republic of Korea (Korean IFRS).

Basis for Opinion

We conducted our audit in accordance with Korean Standards on Auditing. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Consolidated Financial Statements* section of our report. We are independent of the Group in accordance with the ethical requirements of the Republic of Korea that are relevant to our audit of the consolidated financial statements and we have fulfilled our other ethical responsibilities in accordance with the ethical requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements of the current period. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Valuation of Premium Reserve

Why it is determined to be a key matter

The Group calculates premium reserves in accordance with the premium and liability reserve calculation manual under the Regulation on Supervision of Insurance Business for settling future insurance claims arisen from the existing contracts at the end of reporting period. Estimation of premium reserve requires assumptions such as interest rate and risk rate defined under Article 6-12 of the Regulation on Supervision of the Insurance Business.

Premium reserve is calculated by level premium method, in which the premiums are guaranteed to remain the same throughout the contract. It reserves excess premium when level premium exceeds risk premium in the beginning of the contract to cover the premium shortage at the end of the contract when risk premium exceeds level premium.

Premium reserve recognized in the consolidated statement of financial position is ₩ 93,148,148 million as at the end of reporting period.

The calculation of premium reserve might cause a misstatement due to involvement of various types of contract information and complex models. We determined valuation of premium reserve to be a key audit matter taking into account such complexity.

How our audit addressed the key audit matter

We performed following audit procedures to address the key audit matter.

- We reviewed the accounting policy to calculate premium reserve by the management and assessed the appropriateness of calculation method.
- We examined the contracts details in insurance contract system agree to those in premium reserve calculation system.
- We compared detail of premium reserve and underlying data of premium reserve calculation to the corresponding data in reserve calculation table to determine the data is identical, and the test is performed on a sample basis.
- We assessed reserve calculation logic of reserve calculation table on a sample basis.
- We independently recalculated value of premium reserve and compared it with the presented value by the Group on a sample basis
- We assessed the accuracy of estimated interest rate and crediting rate of premium reserve, on a sample basis, by agreeing the support documents and disclosed information to inputs configured in premium reserve calculation system.
- We reconciled the premium reserve amount on the final premium reserve closing data with the one on the financial closing data.

Other Matters

The consolidated financial statements of the Company for the year ended December 31, 2018, were audited by Deloitte Anjin LLC who expressed an unqualified opinion on those statements on March 20, 2019.

Auditing standards and their application in practice vary among countries. The procedures and practices used in the Republic of Korea to audit such financial statements may differ from those generally accepted and applied in other countries.

Responsibilities of Management and Those Charged with Governance for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with Korean IFRS, and for such internal control as management determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Group's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Group or to cease operations.

Those charged with governance are responsible for overseeing the Group's financial reporting process.

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Korean Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with Korean Standards on Auditing, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

The engagement partner on the audit resulting in this independent auditor's report is Youngseok Bae, Certified Public Accountant.

Seoul, Korea
March 17, 2020

This report is effective as of March 17, 2020, the audit report date. Certain subsequent events or circumstances, which may occur between the audit report date and the time of reading this report, could have a material impact on the accompanying consolidated financial statements and notes thereto. Accordingly, the readers of the audit report should understand that there is a possibility that the above audit report may have to be revised to reflect the impact of such subsequent events or circumstances, if any.

Hanwha Corporation and Subsidiaries
Consolidated Statements of Financial Position
December 31, 2019 and 2018

<i>(in millions of Korean won)</i>	Notes	2019	2018
Assets			
Current assets			
Cash and cash equivalents	7,8,9	₩ 3,512,676	₩ 2,944,541
Financial assets at fair value through profit or loss	9,11,59	11,171	15
Financial assets at fair value through other comprehensive income	9,11,59	50	156
Financial assets at amortized cost	9,59	9,998	-
Trade and other receivables	9,10,55	4,164,467	4,244,879
Other financial assets	7,9,12,13,55,59	772,973	711,140
Other current assets	15,25	2,313,811	1,844,018
Current tax assets		24,694	15,431
Inventories	14	3,915,788	3,879,808
Assets held for sale (included assets of disposal group)	58	517,058	80,534
		<u>15,242,686</u>	<u>13,720,522</u>
Non-current assets			
Financial assets at fair value through profit or loss	9,11,59	150,982	155,203
Financial assets at fair value through other comprehensive income	9,11,59	17,107	23,669
Trade and other receivables	9,10,55	182,632	93,866
Other financial assets	7,9,12,13,55,59	270,826	211,341
Investments in associates and joint venture	5	2,248,532	2,102,268
Investment property	17	752,650	814,188
Property, plant and equipment	16	11,462,113	11,480,140
Intangible assets	18	2,521,752	2,059,497
Right-of-use assets	60	492,256	-
Other non-current assets	15	188,110	154,906
Deferred tax assets	53	411,248	365,769
		<u>18,698,208</u>	<u>17,460,847</u>
Assets for financial business			
Cash and cash equivalents	26,27	1,062,273	2,114,197
Financial assets at fair value through profit or loss	26,28,29,59	25,420,904	20,164,936
Financial assets at fair value through other comprehensive income	26,28,29,59	26,316,338	23,457,239
Financial assets at amortized cost	26,28,29	62,284,778	60,480,040
Investments in associates and joint venture	5	253,667	153,432
Property, plant and equipment	33	1,741,442	1,681,989
Investment property	33	2,441,589	2,404,677
Intangible assets	33	360,819	317,169
Right-of-use assets	60	82,726	-
Derivative financial assets	26,31,59	459,013	493,277
Current tax assets		148,679	13,728
Deferred tax assets	53	22,191	251,653
Other financial assets	26,30,55	2,283,505	2,056,028
Other assets	32	3,339,279	3,368,153
Separate account assets	38	22,128,081	21,410,690
		<u>148,345,284</u>	<u>138,367,208</u>
Total assets		<u>₩ 182,286,178</u>	<u>₩ 169,548,577</u>
Liabilities			
Current liabilities			
Trade and other payables	9,19,55,59	₩ 3,010,231	₩ 3,005,321
Borrowings and debentures	9,20	7,240,643	7,062,482
Other financial liabilities	9,13,21,59,60	900,098	786,101
Other current liabilities	22,25	4,163,119	3,459,705
Provisions	24	450,710	364,124
Current tax liabilities		132,132	185,279
Liabilities in disposal groups held for sale		105,778	6,989
		<u>16,002,711</u>	<u>14,870,001</u>
Non-current liabilities			
Trade and other payables	9,19,55,59	266,051	164,078
Borrowings and debentures	9,20,55,59	6,886,500	5,799,913
Other financial liabilities	9,13,21,59,60	863,787	326,550
Other non-current liabilities	22	1,215,863	1,278,849
Net defined benefit liabilities	23	1,663,876	1,554,394
Provisions	24	332,284	279,589
Deferred tax liabilities	53	1,175,581	1,239,858
		<u>12,403,942</u>	<u>10,643,231</u>

Hanwha Corporation and Subsidiaries
Consolidated Statements of Financial Position
December 31, 2019 and 2018

(in millions of Korean won)

	Notes	2019	2018
Liabilities for financial business			
Withheld liabilities	26,37	1,233,940	1,151,598
Insurance contract liabilities	34,35	99,268,148	94,572,120
Policyholder's equity adjustments	36	429,442	172,509
Current tax liabilities		6,051	294,262
Deferred tax liabilities	53	315,870	213,749
Derivative financial liabilities	26,31,59	737,831	565,918
Net defined benefit liabilities	39	200,035	173,403
Provisions	40	72,809	58,802
Other financial liabilities	26,41,59,60	10,502,301	7,684,399
Other liabilities	42	208,597	160,541
Separate account liabilities	35,38	22,640,530	22,035,009
		<u>135,615,554</u>	<u>127,082,310</u>
Total liabilities		<u>164,022,207</u>	<u>152,595,542</u>
Equity			
Share capital	43	489,550	489,550
Capital surplus	43	485,853	496,385
Capital adjustments	44	20,268	23,339
Accumulated other comprehensive loss	45	(171,060)	(484,146)
Retained earnings	46	3,600,706	3,660,257
Equity attributable to owners of the Parent Company		<u>4,425,317</u>	<u>4,185,385</u>
Non-controlling interest		<u>13,838,654</u>	<u>12,767,650</u>
Total equity		<u>18,263,971</u>	<u>16,953,035</u>
Total liabilities and equity		<u>W 182,286,178</u>	<u>W 169,548,577</u>

The above consolidated statements of financial position should be read in conjunction with the accompanying notes.

Hanwha Corporation and Subsidiaries
Consolidated Statements of Comprehensive Income
Years Ended December 31, 2019 and 2018

<i>(in millions of Korean won)</i>	Notes	2019	2018
Revenue			
Revenue from non-financial business	25,47,55	₩ 23,850,444	₩ 23,517,759
Revenue from financial business	47,55	26,671,909	25,348,457
Adjustment amount for profit or loss (Overlay Adjustment)	47	(109,954)	(126,063)
		<u>50,412,399</u>	<u>48,740,153</u>
Cost of sales			
Cost of sales from non-financial business	25,48,50,55	20,440,927	20,205,466
Cost of sales from financial business	48,50,55	25,860,675	24,781,743
Adjustment amount for profit or loss (Overlay Adjustment)	48,50	357,751	(507,978)
		<u>46,659,353</u>	<u>44,479,231</u>
		3,753,046	4,260,922
Gross profit			
Selling and administrative expenses	49,50,55	2,627,329	2,454,774
		1,125,717	1,806,148
Operating profit			
Other income	51,55	807,485	842,142
Other expenses	51,55	1,480,884	1,425,396
Finance income	9,26,52	58,885	75,194
Finance costs	9,26,52	496,860	419,079
Share of net profit of associates and joint venture accounted for using the equity method	5	238,996	420,831
Profit before income tax		<u>253,339</u>	<u>1,299,840</u>
Income tax expense	53	22,285	500,500
		<u>₩ 231,054</u>	<u>₩ 799,340</u>
Profit for the year			
Profit is attributable to:			
Owners of the Parent Company		₩ 89,962	₩ 468,400
Non-controlling interests		141,092	330,940
		<u>₩ 231,054</u>	<u>₩ 799,340</u>
Other comprehensive income (loss)			
<i>Items that may be reclassified subsequently to profit or loss</i>			
Gain on valuation of debt instruments at fair value through other comprehensive income		649,138	25,017
Share in other comprehensive income (loss) of associates		(17,979)	9,967
Gain (loss) on valuation of derivatives qualifying cash flow hedge		(129,056)	6,340
Translation of foreign currency financial statements		144,753	(10,921)
Other comprehensive income of separate accounts		41,596	35,293
Adjustment amount for profit or loss (overlay adjustment)		291,255	(228,927)
<i>Items that will not be reclassified to profit or loss</i>			
Remeasurements of net defined benefit liability		(33,415)	(66,485)
Loss on valuation of equity instruments at fair value through other comprehensive income		(14,126)	(144,576)
Gain on valuation of financial liabilities at fair value through profit or loss (credit risk change)		436	865
		<u>932,602</u>	<u>(373,427)</u>
Other comprehensive income (loss) for the year, net of tax			
		<u>₩ 1,163,656</u>	<u>₩ 425,913</u>
Total comprehensive income for the year			
		<u>₩ 1,163,656</u>	<u>₩ 425,913</u>
Total comprehensive income for the year is attributable to:			
Owners of the Parent Company		₩ 387,885	₩ 264,895
Non-controlling interests		775,771	161,018
		<u>₩ 1,163,656</u>	<u>₩ 425,913</u>
Earnings per share (in Korean won)			
Basic earnings per ordinary share	54	₩ 1,051	₩ 6,541
Basic earnings per preferred share	54	₩ 1,101	6,591

The above consolidated statements of comprehensive income should be read in conjunction with the accompanying notes.

Hanwha Corporation and Subsidiaries
Consolidated Statements of Changes in Equity
Years Ended December 31, 2019 and 2018

(in millions of Korean won)

	Share capital	Capital surplus	Capital adjustments	Accumulated other comprehensive income (loss)	Retained Earnings	Non-controlling interests	Total
Balance at January 1, 2018	₩ 489,550	₩ 547,154	₩ 38,295	₩ 101,197	₩ 3,365,096	₩ 11,423,454	₩ 15,964,746
Adjustments from changes in accounting policies	-	-	-	(414,726)	(120,648)	(464,566)	(999,940)
Profit for the year	-	-	-	-	468,400	330,940	799,340
Other comprehensive income (loss)	-	-	-	-	-	-	-
Loss on valuation of financial assets at fair value through other comprehensive income	-	-	-	(61,329)	-	(58,230)	(119,559)
Gain on valuation of debt instruments measured at fair value	-	-	-	105	-	760	865
Share in other comprehensive income of associates	-	-	-	4,540	-	5,427	9,967
Gain on valuation of derivatives qualifying cash flow hedge	-	-	-	2,762	-	3,578	6,340
Translation of foreign currency financial statements	-	-	-	(13,276)	-	2,355	(10,921)
Remeasurements of net defined benefit liability	-	-	-	-	(32,888)	(33,597)	(66,485)
Other comprehensive income of separate accounts	-	-	-	15,622	-	19,671	35,293
Adjustment amount for profit or loss (overlay adjustment)	-	-	-	(119,041)	-	(109,886)	(228,927)
Gain on disposal of financial assets at fair value through other comprehensive income	-	-	-	-	14,780	26,275	41,055
Dividends	-	-	-	-	(56,276)	(166,254)	(222,530)
Capital transactions within the Group	-	(50,769)	-	-	-	1,824,833	1,774,064
Other changes in equity	-	-	(14,956)	-	21,793	(37,110)	(30,273)
Balance at December 31, 2018	₩ 489,550	₩ 496,385	₩ 23,339	₩ (484,146)	₩ 3,660,257	₩ 12,767,650	₩ 16,953,035
Balance at January 1, 2019	₩ 489,550	₩ 496,385	₩ 23,339	₩ (484,146)	₩ 3,660,257	₩ 12,767,650	₩ 16,953,035
Profit for the year	-	-	-	-	89,962	141,092	231,054
Other comprehensive income (loss)	-	-	-	-	-	-	-
Gain on valuation of financial assets at fair value through other comprehensive income	-	-	-	246,364	-	402,774	649,138
Gain (loss) on valuation of financial assets at fair value through other comprehensive income (equity instruments)	-	-	-	(22,924)	-	8,798	(14,126)
Gain on valuation of financial liabilities at fair value through profit or loss (credit risk change)	-	-	-	74	-	362	436
Share in other comprehensive income of associates	-	-	-	(21,597)	-	3,618	(17,979)
Loss on valuation of derivatives qualifying cash flow hedge	-	-	-	(56,479)	-	(72,577)	(129,056)
Translation of foreign currency financial statements	-	-	-	32,650	-	112,103	144,753
Remeasurements of net defined benefit liability	-	-	-	-	(15,163)	(18,252)	(33,415)
Other comprehensive income of separate accounts	-	-	-	19,573	-	22,023	41,596
Adjustment amount for profit or loss (overlay adjustment)	-	-	-	115,425	-	175,830	291,255
Dividends	-	-	-	-	(62,085)	(177,537)	(239,622)
Capital transactions within the Group	-	31,541	-	-	-	593,564	625,105
Other changes in equity	-	(42,073)	(3,071)	-	(72,265)	(120,794)	(238,203)
Balance at December 31, 2019	₩ 489,550	₩ 485,853	₩ 20,268	₩ (171,060)	₩ 3,600,706	₩ 13,838,654	₩ 18,263,971

The above consolidated statements of changes in equity should be read in conjunction with the accompanying notes.

Hanwha Corporation and Subsidiaries
Consolidated Statements of Cash Flows
Years Ended December 31, 2019 and 2018

(in millions of Korean won)

	Note	2019	2018
Cash flows from operating activities			
Cash used in operations	57	W (234,904)	W (148,872)
Interest and dividends received from financial business		3,644,292	3,448,972
Interest paid for financial business		(130,723)	(100,031)
Income taxes paid		(760,744)	(450,868)
Net cash inflow from operating activities		2,517,921	2,749,201
Cash flows from investing activities			
Acquisition of property, plant and equipment		(1,706,707)	(1,530,513)
Proceeds from disposal of property, plant and equipment		62,780	201,956
Acquisition of intangible assets		(224,975)	(262,690)
Proceeds from disposal of intangible assets		12,979	28,275
Acquisition of investment property		(35,448)	(20,684)
Proceeds from disposal of investment property		196,004	37,187
Acquisition of investments in associates		(151,979)	(166,909)
Proceeds from disposal of investments in associates		28,693	21,247
Acquisition of financial assets at fair value through profit or loss		(4,998,418)	(5,374,655)
Proceeds from disposal of financial assets at fair value through profit or loss		3,894,177	3,586,205
Acquisition of financial assets at fair value through other comprehensive income		(7,903,212)	(6,389,566)
Proceeds from disposal of financial assets at fair value through comprehensive income		6,710,951	7,955,795
Acquisition of financial assets at amortized cost		(376,913)	(1,880,366)
Proceeds from disposal of financial assets at amortized cost		1,333,549	122,395
Proceeds from disposal of assets classified as held for sale		37,587	111,431
Increase in other financial assets		(1,240,446)	(533,733)
Decrease in other financial assets		423,958	1,094,508
Interests received		75,853	77,908
Dividends received		96,418	499,869
Decrease in cash from changes in scope of consolidation		(241,851)	(224,594)
Others		19,398	(5,286)
Net cash outflow from investing activities		(3,987,602)	(2,632,220)
Cash flows from financing activities			
Increase in borrowings and debentures		9,372,322	5,829,985
Repayment of borrowings and debentures		(8,122,106)	(4,375,137)
Change in other financial liabilities		7,145	(44,350)
Change in non-controlling interests		437,425	1,106,779
Interests paid		(468,600)	(469,688)
Dividends paid		(62,085)	(56,276)
Lease payments paid		(172,358)	-
Net cash inflow from financing activities		991,743	1,991,313
Net increase (decrease) in cash and cash equivalents			
		(477,938)	2,108,294
Cash and cash equivalents at the beginning of the financial year		5,058,738	2,894,554
Exchange gains on cash and cash equivalents		7,583	55,890
Cash and cash equivalents classified as disposal group		(13,434)	-
Cash and cash equivalents at the end of the year in the consolidated statement of financial position		W 4,574,949	W 5,058,738

The above consolidated statements of cash flows should be read in conjunction with the accompanying notes.

Hanwha Corporation and Subsidiaries

Notes to the Consolidated Financial Statements

December 31, 2019 and 2018

1. General Information

Hanwha Corporation (the "Company") as the parent company, in accordance with Korean International Financial Reporting Standard (Korean IFRS) 1110 *Consolidated Financial Statements* was established on October 28, 1952, and is engaged in the manufacturing and selling of explosives and trading business. The Company has manufacturing facilities in the cities of Yeosu, Daejeon, Boeun, Gumi, Changwon and Asan and several business offices.

On June 24, 1976, the Company listed its stock on the Korea Exchange. Through several capital increases, the share capital of the Company as at December 31, 2019, amounted to ₩ 489,550 million. As at December 31, 2019, the Company's major shareholders consist of the following:

	Ordinary share (Number of shares)	Preferred share (Number of shares)	Total (Number of shares)	Percentage of ownership (%)
Kim Seung-Youn	16,977,949	1,470,000	18,447,949	18.84
Kim Dong-Kwan	3,330,000	860,654	4,190,654	4.28
H-Solution	3,150,000	1,101,450	4,251,450	4.34
Cheonan Bukil Institute and others	5,093,548	10,402	5,103,950	5.21
Treasury share	5,880,000	-	5,880,000	6.01
Others	40,527,238	19,508,788	60,036,026	61.32
	<u>74,958,735</u>	<u>22,951,294</u>	<u>97,910,029</u>	<u>100.00</u>

2. Significant Accounting Policies

2.1 Basis of Preparation

The Group maintains its accounting records in Korean won and prepares statutory financial statements in the Korean language (Hangul) in accordance with International Financial Reporting Standards as adopted by the Republic of Korea (Korean IFRS). The accompanying consolidated financial statements have been condensed, restructured and translated into English from the Korean language financial statements.

Certain information attached to the Korean language financial statements, but not required for a fair presentation of the Group's financial position, financial performance or cash flows, is not presented in the accompanying consolidated financial statements.

The Group has prepared the consolidated financial statements in accordance with Korean IFRS.

The principal accounting policies are set out below. Accounting policies used in preparing the consolidated financial statements for the current year are identical to those used for the previous year, except for the effects of introduction of standards or interpretations as explained below.

The financial statements have been prepared on a historical cost basis, except for the following:

- Certain financial assets and liabilities (including derivative instruments), certain classes of

Hanwha Corporation and Subsidiaries

Notes to the Consolidated Financial Statements

December 31, 2019 and 2018

- property, plant and equipment and investment property – measured at fair value
- assets held for sale – measured at fair value less costs to sell, and
- defined benefit pension plans – plan assets measured at fair value

The preparation of financial statements requires the use of critical accounting estimates. Management also needs to exercise judgement in applying the Group's accounting policies. The areas involving a higher degree of judgment or complexity, or areas where assumptions and estimates are significant to the consolidated financial statements are disclosed in Note 3.

2.2 New and amended standards adopted by the Group

The Group has applied the following standards and amendments for the first time for their annual reporting period commencing January 1, 2019.

- Enactment of Korean IFRS 1116 *Leases*

Korean IFRS 1116 *Leases* replaces Korean IFRS 1017 *Leases*. Under the new standard, with implementation of a single lease model, lessee is required to recognize assets and liabilities for all lease which lease term is over 12 months and underlying assets are not low value assets. A lessee is required to recognize a right-of-use asset and a lease liability representing its obligation to make lease payments.

With implementation of Korean IFRS 1116 *Lease*, the Group has changed accounting policy. The Group has adopted Korean IFRS 1116 retrospectively, as permitted under the specific transitional provisions in the standard, and recognized the cumulative impact of initially applying the standard as at January 1, 2019, the date of initial application. The Group has not restated comparatives for the 2018 reporting period. The impact of the adoption of the leasing standard and the new accounting policies are disclosed in Note 60.

- Amendment to Korean IFRS 1109 *Financial Instruments – Prepayment Features with Negative Compensation*

The narrow-scope amendments made to Korean IFRS 1109 *Financial Instruments* enable entities to measure certain prepayable financial assets with negative compensation at amortized cost. When a modification of a financial liability measured at amortized cost that does not result in the derecognition, a modification gain or loss shall be recognized in profit or loss. The amendment does not have a significant impact on the financial statements.

- Amendments to Korean IFRS 1019 *Employee Benefits – Amendment, Curtailment or Settlement of the Plan*

The amendments require that an entity shall calculate current service cost and net interest for the remainder of the reporting period after a plan amendment, curtailment or settlement based on updated actuarial assumptions from the date of the change. The amendments also require that a reduction in a surplus must be recognized in profit or loss even if that surplus was not previously recognized because of the impact of the asset ceiling. The amendment does not have a significant

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impact on the financial statements.

- Amendments to Korean IFRS 1028 *Investments in Associates and Joint Ventures – Long-term Interests in Associates and Joint Ventures*

The amendments clarify that an entity shall apply Korean IFRS 1109 to financial instruments in an associate or joint venture to which the equity method is not applied. The amendments also clarify that Korean IFRS 1109 requirements are applied to long-term interests that form part of the entity's net investment in an associate or joint venture before applying the impairment requirements of Korean IFRS 1028. The amendment does not have a significant impact on the financial statements.

- Enactment to Interpretation of Korean IFRS 2123 *Uncertainty over Income Tax Treatments*

The interpretation explains how to recognize and measure deferred and current income tax assets and liabilities where there is uncertainty over a tax treatment, and includes guidance on how to determine whether each uncertain tax treatment is considered separately or together. It also presents examples of circumstances where a judgement or estimate is required to be reassessed. The enactment does not have a significant impact on the financial statements.

- Annual Improvements to Korean IFRS 2015 – 2017 Cycle:

• Amendments to Korean IFRS 1103 *Business Combination*

The amendments clarify that when a party to a joint arrangement obtains control of a business that is a joint operation, and had rights to the assets and obligations for the liabilities relating to that joint operation immediately before the acquisition date, the transaction is a business combination achieved in stages. In such cases, the acquirer shall remeasure its entire previously held interest in the joint operation. The amendment does not have a significant impact on the financial statements.

• Amendments to Korean IFRS 1111 *Joint Agreements*

The amendments clarify that when a party that participates in, but does not have joint control of, a joint operation might obtain joint control of the joint operation in which the activity of the joint operation constitutes a business. In such cases, previously held interests in the joint operation are not remeasured. The amendment does not have a significant impact on the financial statements.

• Amendments to Paragraph 57A of Korean IFRS 1012 *Income Tax*

The amendment is applied to all the income tax consequences of dividends and requires an entity to recognize the income tax consequences of dividends in profit or loss, other comprehensive income or equity according to where the entity originally recognized those past transactions or events. The amendment does not have a significant impact on the financial statements.

• Korean IFRS 1023 *Borrowing Costs*

The amendments clarify that if a specific borrowing remains outstanding after the related qualifying

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asset is ready for its intended use (or sale), it becomes part of general borrowings. The amendment does not have a significant impact on the financial statements.

2.3 New standards and interpretations not yet adopted by the Group

The following new accounting standards and interpretations have been published that are not mandatory for December 31, 2019 reporting periods and have not been early adopted by the Group.

- Amendments to Korean IFRS 1001 *Presentation of Financial Statements* and Korean IFRS 1008 *Accounting Policies, Changes in Accounting Estimates and Errors – Definition of Material*

The amendments clarify the explanation of the definition of material and amended Korean IFRS 1001 and Korean IFRS 1008 in accordance with the clarified definitions. Materiality is assessed by reference to omission or misstatement of material information as well as effects of immaterial information, and to the nature of the users when determining the information to be disclosed by the Group. These amendments should be applied for annual periods beginning on or after January 1, 2020, and earlier application of permitted. The Group does not expect that these amendments have a significant impact on the financial statements.

- Amendments to Korean IFRS 1103 *Business Combination – Definition of a Business*

To consider the integration of the required activities and assets as a business, the amended definition of a business requires an acquisition to include an input and a substantive process that together significantly contribute to the ability to create outputs and excludes economic benefits from the lower costs. An entity can apply a concentration test, an optional test, where substantially all of the fair value of gross assets acquired is concentrated in a single asset or a group of similar assets, the assets acquired would not represent a business. These amendments should be applied for annual periods beginning on or after January 1, 2020, and earlier application of permitted. The Group does not expect that these amendments have a significant impact on the financial statements.

2.4 Consolidation

The Group has prepared the consolidated financial statements in accordance with Korean IFRS 1110 *Consolidated Financial Statements*.

(1) Subsidiaries

Subsidiaries are all entities over which the Group has control. The Group controls an entity when the Group is exposed to, or has rights to, variable returns from its involvement with the entity and has the ability to affect those returns through its power to direct the activities of the entity. Subsidiaries are fully consolidated from the date on which control is transferred to the Group. They are deconsolidated from the date that control ceases.

The acquisition method of accounting is used to account for business combinations by the Group. The consideration transferred is measured at the fair values of the assets transferred, and

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identifiable assets acquired and liabilities and contingent liabilities assumed in a business combination are measured initially at their fair values at the acquisition date. The Group recognizes any non-controlling interest in the acquired entity on an acquisition-by-acquisition basis either at fair value or at the non-controlling interest's proportionate share of the acquired entity's net identifiable assets. All other non-controlling interests are measured at fair values, unless otherwise required by other standards. Acquisition-related costs are expensed as incurred.

The excess of consideration transferred, amount of any non-controlling interest in the acquired entity and acquisition-date fair value of any previous equity interest in the acquired entity over the fair value of the net identifiable assets acquired is recorded as goodwill. If those amounts are less than the fair value of the net identifiable assets of the business acquired, the difference is recognized directly in the profit or loss as a bargain purchase.

Intercompany transactions, balances and unrealized gains on transactions between group companies are eliminated. Unrealized losses are also eliminated unless the transaction provides evidence of an impairment of the transferred asset. Accounting policies of subsidiaries have been changed where necessary to ensure consistency with the policies adopted by the Group.

The Group treats transactions with non-controlling interests that do not result in a loss of control as transactions with equity owners of the Group. A change in ownership interest results in an adjustment between the carrying amounts of the controlling and non-controlling interest to reflect their relative interest in the subsidiary. Any difference between the amount of the adjustment to non-controlling interest and any consideration paid or received is recognized in a separate reserve within equity attributable to owners of the Parent Company.

When the Group ceases to consolidate for a subsidiary because of a loss of control, any retained interest in the subsidiary is remeasured to its fair value with the change in carrying amount recognized in profit or loss.

(2) Associates

Associates are entities over which the Group has significant influence but not control or joint control. Investments in associates are accounted for using the equity method of accounting, after initially being recognized at cost. Unrealized gains on transactions between the Group and its associates are eliminated to the extent of the Group's interest in the associates. If the Group's share of losses of an associate equals or exceeds its interest in the associate (including long-term interests that, in substance, form part of the Group's net investment in the associate), the Group discontinues recognizing its share of further losses. After the Group's interest is reduced to zero, additional losses are provided for, and a liability is recognized, only to the extent that the Group has incurred legal or constructive obligations or made payments on behalf of the associate. If there is an objective evidence of impairment for the investment in the associate, the Group recognizes the difference between the recoverable amount of the associate and its book amount as impairment loss. If an associate uses accounting policies other than those of the Group for like transactions and events in similar circumstances, if necessary, adjustments shall be made to make the associate's accounting policies conform to those of the Group when the associate's financial statements are used by the Group in applying the equity method.

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(3) Joint Arrangements

A joint arrangement, wherein two or more parties have joint control, is classified as either a joint operation or a joint venture. A joint operator recognizes its direct right to the assets, liabilities, revenues and expenses of joint operations and its share of any jointly held or incurred assets, liabilities, revenues and expenses. Interests in joint ventures are accounted for using the equity method, after initially being recognized at cost in the consolidated statement of financial position.

(4) Business Combination

Acquisitions of businesses are accounted for using the acquisition method. The consideration transferred in a business combination is measured at fair value, which is calculated as the sum of the fair values of the assets transferred by the Group, the liabilities incurred by the Group to the former owners of the acquiree and the equity interests issued by the Group in exchange for control of the acquiree. Acquisition-related costs are generally recognized in profit or loss as incurred.

At the acquisition date, the identifiable assets acquired and liabilities and contingent liabilities assumed are recognized at their fair value at the acquisition date, except that:

- Deferred tax assets or liabilities and liabilities or assets related to employee benefit arrangements are recognized and measured in accordance with Korean IFRS 1012 and Korean IFRS 1019, respectively;
- Liabilities or equity instruments related to share-based payment arrangements of the acquiree or share-based payment arrangements of the Group entered into to replace share-based payment arrangements of the acquiree are measured in accordance with Korean IFRS 1102 at the acquisition date.
- Assets (or disposal groups) that are classified as held for sale in accordance with Korean IFRS 1105 are measured in accordance with that standard.

Goodwill is measured as the excess of the sum of: 1) the consideration transferred and 2) the fair value of the acquirer's previously held equity interest in the acquiree (if any) over the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed. If, after reassessment, the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed exceeds the sum of: 1) the consideration transferred and 2) the fair value of the acquirer's previously held interest in the acquiree (if any), the excess is recognized immediately in profit or loss as a bargain purchase.

When the consideration transferred by the Group in a business combination includes assets or liabilities resulting from a contingent consideration arrangement, the contingent consideration is measured at its acquisition-date fair value and included as part of the consideration transferred in a business combination. Changes in the fair value of the contingent consideration that qualify as measurement-period adjustments are adjusted retrospectively, with corresponding adjustments against goodwill. Measurement-period adjustments are adjustments that arise from additional information obtained during the 'measurement period' (which cannot exceed one year from the acquisition date) about facts and circumstances that existed at the acquisition date.

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The subsequent accounting for changes in the fair value of the contingent consideration that do not qualify as measurement-period adjustments depends on how the contingent consideration is classified. Contingent consideration that is classified as equity is not remeasured at subsequent reporting dates and its subsequent settlement is accounted for within equity. Contingent consideration that is classified as an asset or a liability is remeasured at subsequent reporting dates, with the corresponding gain or loss being recognized in profit or loss.

When a business combination is achieved in stages, the Group's previously held equity interest in the acquiree is remeasured to fair value at the acquisition date and the resulting gain or loss, if any, is recognized in profit or loss (if applicable, other comprehensive income). Amounts arising from interests in the acquiree prior to the acquisition date that have previously been recognized in other comprehensive income are reclassified to profit or loss where such treatment would be appropriate if those interests were disposed of.

If the initial accounting for a business combination is incomplete by the end of the reporting period in which the combination occurs, the Group reports provisional amounts for the items for which the accounting is incomplete. Those provisional amounts are adjusted during the measurement period (see above), or additional assets or liabilities are recognized, to reflect new information obtained about facts and circumstances that existed at the acquisition date that, if known, would have affected the amounts recognized at that date.

2.5 Goodwill

Goodwill resulting from an acquisition of a business is carried at cost, as established at the date of acquisition of the business, less accumulated impairment losses, if any.

For the purpose of impairment testing, goodwill is allocated to each of the Group's cash-generating units ("CGUs") (or group of CGUs) that is expected to benefit from the synergies of the combination.

A CGU to which goodwill has been allocated is tested for impairment annually or more frequently when there is an indication that the unit may be impaired. If the recoverable amount of the CGU is less than its carrying amount, the impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the unit and then to other assets of the unit on a pro rata basis based on the carrying amount of each asset in the unit. Any impairment loss for goodwill is recognized directly in profit or loss. An impairment loss recognized for goodwill is not reversed in subsequent periods.

On disposal of the relevant CGU, the attributable amount of goodwill is included in the determination of the profit or loss on disposal.

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2.6 Revenue Recognition

The Group has applied Korean IFRS 1115. According to Korean IFRS 1115, all types of contracts are recognized by applying a five-step revenue recognition model (① Contract Identification — ② Performance Obligations Identification — ③ Transaction Price Calculation — ④ Transaction Price Allocations to Performance Obligations — ⑤ Revenue Recognition When Satisfied with Performance Obligations).

(1) Identify performance obligations

1. Performance obligation satisfied at a point in time

The Group recognizes revenue when the goods or services are transferred to the customer. In addition, the Group exports a variety of finished goods or merchandises by Incoterms Group C condition (CIF and others). Since the seller provides logistics service after passing the control to the customer, the Group identifies the relative logistics service (including insurance) as separate performance obligation.

2. Performance obligation satisfied over time

Under Korean IFRS 1115, if performance obligations satisfy one or more of the three condition of paragraph 35, performance obligations would be identified as over-time, otherwise as point in time. The time of revenue recognition can be changed if the Group's performance obligations satisfy the three condition of paragraph 35.

(2) Allocate transaction price

The Group allocates the transaction price to the separate performance obligations in one contract based on the relative stand-alone selling price of each separate performance obligation. For estimating stand-alone selling price of each performance obligation, the Group uses the method of 'Market price adjustment approach' and others.

(3) Variable transaction price

The price the customer promises due to the return right granted by the Group in accordance with the contract of sale of the goods with the customer may change. In accordance with Korean IFRS 1115, the variable cost is estimated using a method that expects to be able to better anticipate the consideration to be entitled to the right to receive the expected or probable price of the right to receive the right. It recognizes revenue by including the variable price in the transaction price only to the extent that it is highly unlikely that it will carry out a significant portion of the cumulative revenue amount that has already been recognized.

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(4) Insurance premium

Insurance premiums received in advance are deferred as unearned revenue at the time of receipt. As the contract matures, a proportionate portion of the insurance premium is recognized as revenue over the coverage period. Overdue insurance premiums are not recognized at the end of the reporting period.

(5) Interest income

Interest income is recognized using the effective interest method according to the time passed. The effective interest method is a method of calculating the amortized cost of a financial asset or a financial liability and of allocating the interest income or interest expense over the relevant period.

The effective interest rate is the rate that exactly discounts estimated future cash payments or receipts through the expected life of the financial instrument or, when appropriate, a shorter period to the net carrying amount of the financial asset or financial liability. When calculating the effective interest rate, an entity shall estimate cash flows considering all contractual terms of the financial instrument but shall not consider future credit losses. The calculation includes all fees and points paid or received between parties to the contract that are an integral part of the effective interest rate, transaction costs, and all other premiums or discounts. There is a presumption that the cash flows and the expected life of a group of similar financial instruments can be estimated reliably. However, in those rare cases when it is not possible to estimate reliably the cash flows or the expected life of a financial instrument, the Group uses the contractual cash flows over the full contractual term of the financial instrument.

When a loan and receivable is impaired, the Group reduces the carrying amount to its recoverable amount and continues unwinding the discount as interest income. Interest income on impaired loan and receivables is recognized using the original effective interest rate.

(6) Dividend income

Dividend income is recognized when the right to receive payment is established.

2.7 Leases

(1) Application of modified retrospective approach

The Group has changed its accounting policy for leases. The impact of the new accounting policies is disclosed in Note 60.

As at December 31, 2018, leases of property, plant and equipment where the Group, as lessee, had substantially all the risks and rewards of ownership were classified as finance leases. Finance leases were capitalized at the lease's inception at the fair value of the leased property or, if lower, the present value of the minimum lease payments. The corresponding lease payments, net of finance charges, were included in other financial liabilities. Each lease payment was allocated between the liability and finance cost. The finance cost was charged to profit or loss over the lease period so as to produce a constant periodic rate of interest on the remaining balance of the liability

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for each period. The property, plant and equipment acquired under finance leases were depreciated over the asset's useful life, or over the shorter of the asset's useful life and the lease term if there is no reasonable certainty that the Group will obtain ownership at the end of the lease term.

Leases in which a significant portion of the risks and rewards of ownership were not transferred to the Group as lessee were classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) were charged to profit or loss on a straight-line basis over the period of the lease.

(2) Lessee accounting

The Group leases various offices, warehouses and cars. Lease contracts are typically made for fixed periods of 1 to 10 years, but may have extension options as described in (3) below.

Contracts may contain both lease and non-lease components. However, the Group applies the practical expedient which has elected not to separate non-lease components from lease components, and instead account for each lease component and any associated non-lease components as a single lease component.

Lease terms are negotiated on an individual basis and contain a wide range of different terms and conditions. The lease agreements do not impose any covenants, but leased assets may not be used as security for borrowing purposes.

Until the 2018 financial year, leases of property, plant and equipment were classified as either finance or operating leases. Payments made under operating leases (net of any incentives received from the lessor) were charged to profit or loss on a straight-line basis over the period of the lease.

From January 1, 2019, leases are recognized as a right-of-use asset and a corresponding liability at the date at which the leased asset is available for use by the Group.

Assets and liabilities arising from a lease are initially measured on a present value basis. Lease liabilities include the net present value of the following lease payments:

- Fixed payments (including in-substance fixed payments), less any lease incentives receivable
- Variable lease payment that are based on an index or a rate, initially measured using the index or rate as at the commencement date
- Amounts expected to be payable by the Group (the lessee) under residual value guarantees
- The exercise price of a purchase option if the Group (the lessee) is reasonably certain to exercise that option, and
- Payments of penalties for terminating the lease, if the lease term reflects the Group (the

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lessee) exercising that option

Lease payments to be made under reasonably certain extension options are also included in the measurement of the lease liability.

The lease payments are discounted using the interest rate implicit in the lease. If that rate cannot be determined, the lessee's incremental borrowing rate is used, being the rate that the lessee would have to pay to borrow the funds necessary to obtain an asset of similar value in a similar economic environment with similar terms and conditions.

To determine the incremental borrowing rate, the Group:

- where possible, uses recent third-party financing received by the individual lessee as a starting point, adjusted to reflect changes in financing conditions since third party financing was received, and
- makes adjustments specific to the lease, for example term, country, currency and security

The Group is exposed to potential future increases in variable lease payments based on an index or rate, which are not included in the lease liability until they take effect. When adjustments to lease payments based on an index or rate take effect, the lease liability is reassessed and adjusted against the right-of-use asset.

Right-of-use assets are measured at cost comprising the following:

- the amount of the initial measurement of lease liability
- any lease payments made at or before the commencement date less any lease incentives received
- any initial direct costs, and
- restoration costs

The right-of-use asset is depreciated over the shorter of the asset's useful life and the lease term on a straight-line basis. If the Group is reasonably certain to exercise a purchase option, the right-of-use asset is depreciated over the underlying asset's useful life.

Payments associated with short-term leases of equipment and vehicles and leases of low-value assets are recognized on a straight-line basis as an expense in profit or loss. Short-term leases are leases with a lease term of 12 months or less. Low-value assets comprise IT-equipment and small items of office furniture.

(3) Extension and termination options

Extension and termination options are included in a number of property and equipment leases. These terms are used to maximize operational flexibility in terms of managing contracts. The majority of extension and termination options held are exercisable only by the Group and not by

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the respective lessor.

2.8 Foreign Currency Translation

Items included in the financial statements of each of the Group's entities are measured using the currency of the primary economic environment in which each entity operates (the "functional currency"). The consolidated financial statements are presented in Korean won, which is the Parent Company's functional and presentation currency.

Foreign currency transactions are translated into the functional currency using the exchange rates at the dates of the transactions. At the end of each reporting period, monetary items denominated in foreign currencies are retranslated at the rates prevailing at that date. Non-monetary items carried at fair value that are denominated in foreign currencies are retranslated at the rates prevailing at the date when the fair value was determined. Non-monetary items that are measured in terms of historical cost in a foreign currency are not retranslated.

2.9 Borrowing Costs

Borrowing costs directly attributable to the acquisition, construction or production of qualifying assets, which are assets that necessarily take a substantial period to get ready for their intended use or sale, are added to the cost of those assets until the assets are substantially ready for their intended use or sale.

To the extent that variable-rate borrowings are used to finance a qualifying asset and are hedged in an effective cash flow hedge of interest rate risk, the effective portion of the derivative is recognized in other comprehensive income and reclassified to profit or loss when the qualifying asset impacts profit or loss. To the extent that fixed rate borrowings are used to finance a qualifying asset and are hedged in an effective fair value hedge of interest rate risk, the capitalized borrowing costs reflect the hedged interest rate.

Investment income earned on the temporary investment of specific borrowings pending their expenditure on qualifying assets is deducted from the borrowing costs eligible for capitalization.

All other borrowing costs are recognized in profit or loss in the period in which they are incurred.

2.10 Government Grants

Government grants are not recognized until there is a reasonable assurance that the Group will comply with the conditions attaching to them and that the grants will be received.

The benefit of a government loan at a below-market rate of interest is treated as a government grant, measured as the difference between proceeds received and the fair value of the loan based on prevailing market interest rates.

Government grants related to assets are presented in the consolidated statements of financial position by deducting the grant from the carrying amount of the asset. The related grant is recognized in profit or loss over the life of a depreciable asset as a reduced depreciation expense.

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Government grants related to income are recognized in profit or loss on a systematic basis over the period in which the Group recognizes as expenses the related costs for which the grants are intended to compensate. Government grants that are receivable as compensation for expenses or losses already incurred or for the purpose of giving immediate financial support to the Group with no future related costs are recognized in profit or loss in the period in which they become receivable.

2.11 Employee Benefits and Termination Benefits

Contributions to defined contribution retirement benefit plans are recognized as an expense when employees have rendered service entitling them to the contributions.

For defined benefit retirement benefit plans, the cost of providing benefits is determined using the projected unit credit method, with actuarial valuations being carried out at the end of each reporting period. Remeasurement, comprising the actuarial gains and losses, the effect of the changes to the asset ceiling (if applicable) and the return on plan assets (excluding interest), is reflected immediately in the consolidated statements of financial position with a charge or credit recognized in other comprehensive income in the period in which it occurs. Remeasurement recognized in other comprehensive income is reflected immediately in retained earnings and will not be reclassified to profit or loss. Past service costs are recognized in profit or loss on the earlier of (1) the date of the plan amendment or curtailment and (2) the date that the Group recognizes restructuring-related costs. The Group recognized gains and losses on the settlement of a defined benefit plan when the settlement occurs.

Net interest is calculated by applying the discount rate to the net defined benefit liability or asset. Defined benefit costs are composed of service cost (including current service cost, past service cost as well as gains and losses on curtailments and settlements), net interest expense (income) and remeasurement.

The Group presents the service cost and net interest expense (income) components in profit or loss and the remeasurement component in other comprehensive income. Curtailment gains and losses are accounted for as past service costs.

The post-employment benefit obligation recognized in the consolidated statements of financial position represents the actual deficit or surplus in the Group's defined benefit plans. Any surplus resulting from this calculation is limited to the present value of any economic benefits available in the form of refunds from the plans or reductions in future contributions to the plans.

A liability for a termination benefit is recognized at the earlier of when the entity can no longer withdraw the offer of the termination benefit or when the entity recognizes any related restructuring costs.

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2.12 Current and Deferred Tax

Income tax expense represents the sum of the current tax and deferred tax.

(1) Current tax

The tax currently payable is based on taxable profit for the year. Taxable profit differs from profit reported in the consolidated statements of comprehensive income because of items of income or expense that are taxable or deductible in other years and items that are non taxable or deductible. The Group's liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the end of the reporting period.

A provision is recognized for those matters for which the tax determination is uncertain, but it is considered probable that there will be a future outflow of funds to a tax authority. The provisions are measured at the best estimate of the amount expected to become payable. The assessment is based on the judgement supported by previous experience in respect of such activities and in certain cases based on specialist independent tax advice.

(2) Deferred tax

Deferred tax is the tax expected to be payable or recoverable on differences between the carrying amounts of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit, and is accounted for using the liability method. Deferred tax liabilities are generally recognized for all taxable temporary differences. Deferred tax assets are generally recognized for all deductible temporary differences to the extent that it is probable that taxable profits will be available against which those deductible temporary differences can be utilized. Such deferred tax assets and liabilities are not recognized if the temporary difference arises from goodwill or from the initial recognition (other than in a business combination) of other assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit.

Deferred tax liabilities are recognized for taxable temporary differences associated with investments in subsidiaries and associates and interests in joint ventures, except where the Group is able to control the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future. Deferred tax assets arising from deductible temporary differences associated with such investments and interests are only recognized to the extent that it is probable that there will be sufficient taxable profits against which the benefits of the temporary differences can be utilized and they are expected to reverse in the foreseeable future.

The carrying amount of deferred tax assets is reviewed at the end of each reporting period and reduced to the extent that it is no longer probable that sufficient taxable profits will be available to allow all or part of the assets to be recovered.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply in the period in which the liability is settled or the asset is realized based on tax rates (and tax laws) that have been enacted or substantively enacted by the end of the reporting period. The measurement of deferred tax liabilities and assets reflects the tax consequences that would follow from the manner in which the Group expects, at the end of the reporting period, to recover or settle the

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carrying amount of its assets and liabilities.

Deferred tax assets and liabilities are offset if, and only if, the Group has a legally enforceable right to set off current tax assets against current tax liabilities and the deferred tax assets and liabilities relate to income taxes levied by the same taxation authority on either the same taxable entity or different taxable entities, which intend either to settle current tax liabilities and assets on a net basis or to realize the assets and settle the liabilities simultaneously in each future period in which significant amounts of deferred tax liabilities or assets are expected to be settled or recovered.

Deferred tax assets and liabilities originated from investment properties are measured under the assumption that the book amount of investment properties is to be retrieved by sales. Therefore, if there is no solid evidence to state otherwise, the measurement of deferred tax assets and liabilities reflect the tax effect from sale of investment properties. However, if the sole purpose of the investment properties is to earn economic value overtime through depreciation rather than selling, above assumption does not meet.

(3) Current and deferred taxes for the year

Current and deferred taxes are recognized in profit or loss, except when they relate to items that are recognized in other comprehensive income or directly in equity, in which case the current and deferred taxes are also recognized in other comprehensive income or directly in equity. Where current tax or deferred tax arises from the initial accounting for a business combination, the tax effect is included in the accounting for the business combination.

2.13 Property, Plant and Equipment

Property, plant and equipment are stated at cost, less subsequent accumulated depreciation and accumulated impairment losses. The cost of an item of property, plant and equipment is directly attributable to its purchase or construction, which includes any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. It also includes the initial estimate of the costs of dismantling and removing the item and restoring the site on which it is located.

Subsequent costs are recognized in carrying amount of an asset or as a separate asset if it is probable that future economic benefits associated with the assets will flow into the Group and the cost of an asset can be measured reliably. Routine maintenance and repairs are expensed as incurred.

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The Group does not depreciate land. Depreciation expense is computed using the straight-line method based on the estimated useful lives of the assets as follows:

	Useful lives
Buildings	5 - 65 years
Structures	5 - 55
Machinery	2 - 20
Vehicles	1 - 12
Tools and equipment	1 - 20
Others	1 - 30

If each part of an item of property, plant and equipment has a cost that is significant in relation to the total cost of the item, it is depreciated separately.

The Group reviews the depreciation method, the estimated useful lives and the residual values of property, plant and equipment at the end of each annual reporting period. If expectations differ from previous estimates, the changes are accounted for as a change in an accounting estimate.

An item of property, plant and equipment is derecognized upon disposal or when no future economic benefits are expected to arise from the continued use of the asset. Any gain or loss arising on derecognition of the property (calculated as the difference between the net disposal proceeds and the carrying amount of the asset) is included in profit or loss in the period in which the property is derecognized.

2.14 Investment Property

Investment properties are properties held to earn rentals or for capital appreciation. Investment properties are measured initially at cost, including transaction costs. Subsequent to initial recognition, investment properties are reported at cost, less accumulated depreciation and accumulated impairment losses.

Subsequent costs are recognized in the carrying amount of an asset or as a separate asset if it is probable that future economic benefits associated with the assets will flow into the Group and the cost of an asset can be measured reliably. Routine maintenance and repairs are expensed as incurred.

While land is not depreciated, all other investment property is depreciated based on the respective assets' estimated useful lives ranging from 20-40 years using the straight-line method.

The estimated useful lives, residual values and depreciation method are reviewed at the end of each reporting period, with the effect of any changes in estimate accounted for on a prospective basis.

An investment property is derecognized upon disposal or when the investment property is permanently withdrawn from use and no future economic benefits are expected from the disposal.

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Any gain or loss arising on derecognition of the property (calculated as the difference between the net disposal proceeds and the carrying amount of the asset) is included in profit or loss in the period in which the property is derecognized.

2.15 Intangible Assets

(1) Intangible assets acquired separately

Intangible assets with finite useful lives that are acquired separately are carried at cost, less accumulated amortization and accumulated impairment losses, and amortization is recognized on a straight-line basis over their estimated useful lives. The estimated useful life and the amortization method are reviewed at the end of each reporting period, with the effect of any changes in estimate being accounted for on a prospective basis. Intangible assets with indefinite useful lives that are acquired separately are carried at cost, less accumulated impairment losses.

	Useful lives
Industrial property right	7 - 10 years
Development costs	3 - 5
Others	5 - 30

(2) Internally generated intangible assets - research and development expenditure

Expenditure on research activities is recognized as an expense in the period in which it is incurred.

Expenditure arising from development (or from the development phase of an internal project) is recognized as an intangible asset if, only if, the development project is designed to produce new or substantially improved products and the Group can demonstrate the technical and economic feasibility and measure reliably the resources attributable to the intangible asset during its development.

The amount initially recognized for internally generated intangible assets is the sum of the expenditure incurred from the date when the intangible asset first meets the recognition criteria. Where no internally generated intangible asset can be recognized, development expenditure is recognized in profit or loss in the period in which it is incurred.

Subsequent to initial recognition, internally generated intangible assets are reported at cost, less accumulated amortization and accumulated impairment losses.

(3) Intangible assets acquired in a business combination

Intangible assets that are acquired in a business combination are recognized separately from goodwill and are initially recognized at their fair value at the acquisition date (which is regarded as their cost). Subsequent to initial recognition, intangible assets acquired in a business combination are reported at cost, less accumulated amortization and accumulated impairment losses.

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(4) Derecognition of intangible assets

An intangible asset is derecognized on disposal or when no future economic benefits are expected from its use. Gains or losses arising from derecognition of an intangible asset, measured as the difference between the net disposal proceeds and the carrying amount of the asset, are recognized in profit or loss when the asset is derecognized.

(5) Patent and Trademark

Patent and trademark are initially recognized at cost and amortized using the straight-line method over the estimated useful lives.

2.16 Impairment of Tangible and Intangible Assets Other Than Goodwill

At the end of each reporting period, the Group reviews the carrying amounts of its tangible and intangible assets to determine whether there is any indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss (if any). When it is not possible to estimate the recoverable amount of an individual asset, the Group estimates the recoverable amount of the CGU to which the asset belongs. Where a reasonable and consistent basis of allocation can be identified, corporate assets are also allocated to individual CGUs; otherwise, they are allocated to the smallest group of CGUs for which a reasonable and consistent allocation basis can be identified.

Intangible assets with indefinite useful lives and intangible assets not yet available for use are tested for impairment at least annually and whenever there is an indication that an asset may be impaired.

Recoverable amount is the higher of net fair value or value in use. If the recoverable amount of an asset (or a CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or the CGU) is reduced to its recoverable amount and the reduced amount is recognized in profit or loss.

Where an impairment loss subsequently reverses, the carrying amount of the asset (or the CGU) is increased to the revised estimate of its recoverable amount so that the increased carrying amount does not exceed the carrying amount that would have been determined had no impairment loss been recognized for the asset (or the CGU) in prior years. A reversal of an impairment loss is recognized immediately in profit or loss.

2.17 Inventories

Inventories are stated at the lower of cost or net realizable value. Cost of inventories is measured using the specific identification method or the moving-weighted average method, and consists of the purchase price, cost of conversion and other costs incurred in bringing the inventories to their present location and condition. Net realizable value represents the estimated selling price for inventories, less all estimated costs of completion and costs necessary to make the sale.

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When inventories are sold, the carrying amount of those inventories is recognized as an expense (cost of sales) in the period in which the related revenue is recognized. The amount of any write-down of inventories to net realizable value and all losses of inventories are recognized as an expense in the period the write-down or loss occurs. The amount of any reversal of any write-down of inventories, arising from an increase in net realizable value, is recognized as a reduction in the amount of inventories recognized as an expense in the period in which the reversal occurs.

2.18 Provisions

Provisions are recognized when the Group has a present obligation (legal or constructive) as a result of a past event, it is probable that the Group will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

The amount recognized as a provision is the best estimate of the consideration required to settle the present obligation at the end of the reporting period, taking into account the risks and uncertainties surrounding the obligation. When a provision is measured using the cash flows estimated to settle the present obligation, its carrying amount is the present value of those cash flows (where the effect of the time value of money is material). The discount rate used is a pretax rate that reflects current market assessments of the time value of money and the risks specific to the liability. Where discounting is used, the increase in the provision due to the passage is recognized in profit or loss as borrowing cost.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, a receivable is recognized as an asset if it is virtually certain that reimbursement will be received and the amount of the receivable can be measured reliably.

At the end of each reporting period, the remaining provision balance is reviewed and assessed to determine if the current best estimate is being recognized. If the existence of an obligation to transfer economic benefit is no longer probable, the related provision is reversed during the period.

2.19 Financial Assets

All regular way purchases or sales of financial assets are recognized and derecognized on a trade-date basis. Regular way purchases or sales are purchases or sales of financial assets that require delivery of assets within the time frame established by regulation or convention in the marketplace.

All recognized financial assets are measured subsequently in their entirety at either amortized cost or fair value depending on the classification of the financial assets.

(1) Classification of financial assets

Debt instruments that meet the following conditions are measured subsequently at amortized cost:

- The financial asset is held within a business model whose objective is to hold financial assets in order to collect contractual cash flows.
- The contractual terms of the financial asset give rise on specified dates to cash flows that are

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solely payments of principal and interest on the principal amount outstanding.

Debt instruments that meet the following conditions are measured subsequently at FVTOCI:

- The financial asset is held within a business model whose objective is achieved by both collecting contractual cash flows and selling the financial assets.
- The contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

By default, all other financial assets are measured subsequently at FVTPL. Despite the foregoing, the Group may make the following irrevocable election or designation at initial recognition of a financial asset:

- The Group may irrevocably elect to present subsequent changes in fair value of an equity investment in other comprehensive income if certain criteria are met (see (1-3) below).
- The Group may irrevocably designate a debt investment that meets the amortized cost or FVTOCI criteria as measured at FVTPL if doing so eliminates or significantly reduces an accounting mismatch (see (1-4) below).

1-1) Amortized cost and effective interest method

The effective interest method is a method of calculating the amortized cost of a debt instrument and allocating interest income over the relevant period. For financial assets other than purchased or originated credit-impaired financial assets (i.e., assets that are credit impaired on initial recognition), the effective interest rate is the rate that exactly discounts estimated future cash receipts (including all fees and points paid or received that form an integral part of the effective interest rate, transaction costs and other premiums or discounts), excluding ECLs, through the expected life of the debt instrument, or, where appropriate, a shorter period, to the gross carrying amount of the debt instrument on initial recognition. For purchased or originated credit-impaired financial assets, a credit-adjusted effective interest rate is calculated by discounting the estimated future cash flows, including ECLs, to the amortized cost of the debt instrument on initial recognition.

The amortized cost of a financial asset is the amount at which the financial asset is measured at initial recognition, minus the principal repayments, plus the cumulative amortization using the effective interest method of any difference between that initial amount and the maturity amount, adjusted for any loss allowance. The gross carrying amount of a financial asset is the amortized cost of the financial asset before adjusting for any loss allowance.

Interest income is recognized using the effective interest method for debt instruments measured subsequently at amortized cost and at FVTOCI. For financial assets other than purchased or originated credit-impaired financial assets, interest income is calculated by applying the effective interest rate to the gross carrying amount of a financial asset, except for financial assets that have subsequently become credit impaired (see below). For financial assets that have subsequently become credit impaired, interest income is recognized by applying the effective interest rate to the

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amortized cost of the financial asset. If, in subsequent reporting periods, the credit risk on the credit impaired-financial instrument improves so that the financial asset is no longer credit impaired, interest income is recognized by applying the effective interest rate to the gross carrying amount of the financial asset.

For purchased or originated credit-impaired financial assets, the Group recognizes interest income by applying the credit-adjusted effective interest rate to the amortized cost of the financial asset from initial recognition. The calculation does not revert to the gross basis even if the credit risk of the financial asset subsequently improves so that the financial asset is no longer credit impaired.

Interest income is recognized in profit or loss and is included in the "finance income - interest income according to the effective interest rate method" line item (Note 52).

1-2) Debt instruments classified as at FVTOCI

Fair value is determined using the valuation techniques described in Note 59. The corporate bonds are initially measured at fair value plus transaction costs. Subsequently, changes in the carrying amount of these corporate bonds as a result of foreign exchange gains and losses, impairment gains or losses and interest income calculated using the effective interest method are recognized in profit or loss. The amounts that are recognized in profit or loss are the same as the amounts that would have been recognized in profit or loss if these corporate bonds had been measured at amortized cost. All other changes in the carrying amount of these corporate bonds are recognized in other comprehensive income and accumulated under the heading of investments revaluation reserve. When these corporate bonds are derecognized, the cumulative gains or losses previously recognized in other comprehensive income are reclassified to profit or loss.

1-3) Equity instruments designated as at FVTOCI

On initial recognition, the Group may make an irrevocable election (on an instrument-by-instrument basis) to designate investments in equity instruments as at FVTOCI. Designation at FVTOCI is not permitted if the equity investment is held for trading or if it is a contingent consideration recognized by an acquirer in a business combination.

A financial asset is held for trading if:

- it has been acquired principally for the purpose of selling in the near term;
- on initial recognition, it is part of a portfolio of identified financial instruments that the Group manages together and has evidence of a recent actual pattern of short-term profit taking; or
- it is a derivative (except for a derivative that is a financial guarantee contract or a designated and effective hedging instrument).

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Investments in equity instruments at FVTOCI are initially measured at fair value plus transaction costs. Subsequently, they are measured at fair value, with gains and losses arising from changes in fair value recognized in other comprehensive income and accumulated in the investments revaluation reserve. The cumulative gain or loss is not reclassified to profit or loss on disposal of the equity investments, instead it is transferred to retained earnings.

Dividends on these investments in equity instruments are recognized in profit or loss in accordance with Korean IFRS 1109, unless the dividends clearly represent a recovery of part of the cost of the investment. Dividends are included in the 'finance income' line item (Note 52) in profit or loss.

1-4) Financial assets at FVTPL

Financial assets that do not meet the criteria for being measured at amortized cost or FVTOCI are measured at FVTPL. Specifically:

- Investments in equity instruments are classified as at FVTPL, unless the Group designates an equity investment that is neither held for trading nor a contingent consideration arising from a business combination as at FVTOCI on initial recognition (see (1-3) above).
- Debt instruments that do not meet the amortized cost criteria or the FVTOCI criteria (see (1-1) and (1-2) above) are classified as at FVTPL. In addition, debt instruments that meet either the amortized cost criteria or the FVTOCI criteria may be designated as at FVTPL upon initial recognition if such designation eliminates or significantly reduces a measurement or recognition inconsistency (so called 'accounting mismatch') that would arise from measuring assets or liabilities or recognizing the gains and losses on them on different bases.

Financial assets at FVTPL are measured at fair value at the end of each reporting period, with any fair value gains or losses recognized in profit or loss to the extent they are not part of a designated hedging relationship. The net gain or loss recognized in profit or loss includes dividends earned on the financial asset in the 'other non-operating income and expenses'. Meanwhile, interests on financial assets at FVTPL are recognized in 'finance income-other' (Note 52). The fair value is determined as described in Note 59.

(2) Foreign exchange gains and losses

The carrying amount of financial assets that are denominated in a foreign currency is determined in that foreign currency and translated at the spot rate at the end of each reporting period. Specifically:

- For financial assets measured at amortized cost that are not part of a designated hedging relationship, exchange differences are recognized in profit or loss in the 'other non-operating income and expenses' line item.

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- For debt instruments measured at FVTOCI that are not part of a designated hedging relationship, exchange differences on the amortized cost of the debt instrument are recognized in profit or loss in the 'other non-operating income and expenses'. Other exchange differences are recognized in other comprehensive income in the investments revaluation reserve.

- For financial assets measured at FVTPL that are not part of a designated hedging relationship, exchange differences are recognized in profit or loss in the 'other non-operating income and expenses' line item.

- For equity instruments measured at FVTOCI, exchange differences are recognized in other comprehensive income in the investments revaluation reserve.

(3) Impairment of financial assets

The Group recognizes a loss allowance for ECLs on investments in debt instruments that are measured at amortized cost or at FVTOCI, lease receivables, trade receivables and contract assets, as well as on financial guarantee contracts. The amount of ECLs is updated at each reporting date to reflect changes in credit risk since initial recognition of the respective financial instrument.

The Group always recognizes lifetime ECL for trade receivables, contract assets and lease receivables. The ECLs on these financial assets are estimated using a provision matrix based on the Group's historical credit loss experience, adjusted for factors that are specific to the debtors, general economic conditions and an assessment of both the current as well as the forecast direction of conditions at the reporting date, including time value of money where appropriate.

For all other financial instruments, the Group recognizes lifetime ECL when there has been a significant increase in credit risk since initial recognition. Lifetime ECL represents the ECLs that will result from all possible default events over the expected life of a financial instrument.

3-1) Significant increase in credit risk

In assessing whether the credit risk on a financial instrument has increased significantly since initial recognition, the Group compares the risk of a default occurring on the financial instrument at the reporting date with the risk of a default occurring on the financial instrument at the date of initial recognition. In making this assessment, the Group considers both quantitative and qualitative information that is reasonable and supportable, including historical experience and forward-looking information that is available without undue cost or effort.

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In particular, the following information is taken into account when assessing whether credit risk has increased significantly since initial recognition:

- an actual or expected significant deterioration in the financial instrument's external (if available) or internal credit rating;
- significant increases in credit risk on other financial instruments of the same debtor

Despite the foregoing, the Group assumes that the credit risk on a financial instrument has not increased significantly since initial recognition if the financial instrument is determined to have low credit risk at the reporting date. A financial instrument is determined to have low credit risk if: (1) the financial instrument has a low risk of default, (2) the debtor has a strong capacity to meet its contractual cash flow obligations in the near term, and (3) adverse changes in economic and business conditions in the longer term may, but will not necessarily, reduce the ability of the borrower to fulfil its contractual cash flow obligations.

The Group regularly monitors the effectiveness of the criteria used to identify whether there has been a significant increase in credit risk and revises them as appropriate to ensure that the criteria are capable of identifying significant increase in credit risk before the amount becomes past due.

3-2) Definition of loss event

The Group assumes to be a loss event when debtor fails to perform contractual agreements in the past experience for the purpose of internal managing credit risk.

3-3) Credit-impaired financial assets

Financial assets are impaired when detrimental evidences show that the present value of estimated future cash flow decreases. These evidences include, but not limited to:

- significant financial difficulty of issuer or obligor; or
- a breach of contract, such as a default or delinquency in interest or principal payments.

3-4) Write-off policy

The Group writes off financial assets when the assets are determined to be no longer recoverable by borrower's financial difficulty, such as bankruptcy. Financial assets written-off can be object of collectable process with adequate legal procedure.

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3-5) Measurement and recognition of ECLs

The measurement of ECLs is a function of the probability of default, loss-given default (i.e., the magnitude of the loss if there is a default) and the exposure at default. The assessment of the probability of default and loss-given default is based on historical data adjusted by forward-looking information as described above. As for the exposure at default, for financial assets, this is represented by the assets' gross carrying amount at the reporting date.

For financial assets, the ECL is estimated as the difference between all contractual cash flows that are due to the Group in accordance with the contract and all the cash flows that the Group expects to receive, discounted at the original effective interest rate.

For a financial guarantee contract, as the Group is required to make payments only in the event of a default by the debtor in accordance with the terms of the instrument that is guaranteed, the expected loss allowance is the expected payments to reimburse the holder for a credit loss that it incurs, less any amounts that the Group expects to receive from the holder, the debtor or any other party.

The Group recognizes an impairment gain or loss in profit or loss for all financial instruments with a corresponding adjustment to their carrying amount through a loss allowance account, except for investments in debt instruments that are measured at FVTOCI, for which the loss allowance is recognized in other comprehensive income and accumulated in the investment revaluation reserve, and does not reduce the carrying amount of the financial asset in the separate statements of financial position.

(4) Derecognition of financial assets

The Group derecognizes a financial asset only when the contractual rights to the cash flows from the asset expire or when it transfers the financial asset and substantially all the risks and rewards of ownership of the asset to another entity. If the Group neither transfers nor retains substantially all the risks and rewards of ownership and continues to control the transferred asset, the Group recognizes its retained interest in the asset and an associated liability for amounts it may have to pay. If the Group retains substantially all the risks and rewards of ownership of a transferred financial asset, the Group continues to recognize the financial asset and also recognizes a collateralized borrowing for the proceeds received.

On derecognition of a financial asset measured at amortized cost, the difference between the asset's carrying amount and the sum of the consideration received and receivable is recognized in profit or loss. In addition, on derecognition of an investment in a debt instrument classified as at FVTOCI, the cumulative gain or loss previously accumulated in the investments revaluation reserve is reclassified to profit or loss. In contrast, on derecognition of an investment in equity instrument which the Group has elected on initial recognition to measure at FVTOCI, the cumulative gain or loss previously accumulated in the investments revaluation reserve is not reclassified to profit or loss but is transferred to retained earnings.

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2.20 Financial Liabilities and Equity Instruments

(1) Classification as debt or equity

Debt and equity instruments are classified as either financial liabilities or as equity in accordance with the substance of the contractual arrangement and the definitions of a financial liability and an equity instrument.

(2) Equity instruments

An equity instrument is any contract that evidences a residual interest in the assets of an entity after deducting all of its liabilities. Equity instruments issued by the Group are recognized as the proceeds received, net of direct issuance costs.

Repurchase of the Group's own equity instruments is recognized and deducted directly in equity. No gain or loss is recognized in profit or loss on the purchase, sale, issue or cancellation of the Group's own equity instruments.

(3) Compound instruments

The component parts of compound instruments are classified separately as financial liabilities and equity in accordance with the substance of the contractual arrangements and the definitions of a financial liability and equity instrument. At the date of issue, the fair value of the liability component is estimated using the prevailing market interest rate for a similar non-convertible instrument. The conversion option classified as equity is determined by deducting the amount of the liability component from the fair value of the compound instrument as a whole. This is recognized and included in equity, net of income tax effects, and is not subsequently remeasured.

(4) Financial liability

All financial liabilities are measured subsequently at amortized cost using the effective interest method or at FVTPL. However, financial liabilities that arise when a transfer of a financial asset does not qualify for derecognition or when the continuing involvement approach applies, and financial guarantee contracts are issued by the Group, are measured in accordance with the specific accounting policies set out below.

(5) Financial liabilities at FVTPL

Financial liabilities are classified as at FVTPL when a financial liability is a contingent consideration that may be paid by an acquirer as part of a business combination to which Korean IFRS 1103 applies or held for trading, or it is designated as at FVTPL.

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A financial liability is classified as held for trading if:

- it has been acquired principally for the purpose of repurchasing in the near term;
- on initial recognition, it is part of a portfolio of identified financial instruments that the Group manages together and has a recent actual pattern of short-term profit taking; or
- it is a derivative that is not designated and effective as a hedging instrument.

A financial liability other than a financial liability held for trading or a contingent consideration that may be paid by an acquirer as part of a business combination may be designated as at FVTPL upon initial recognition if:

- such designation eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise;
- the financial liability forms part of a group of financial assets or financial liabilities or both, which is managed and its performance is evaluated on a fair value basis, in accordance with the Group's documented risk management or investment strategy, and information about the grouping is provided internally on that basis; or
- it forms part of a contract containing one or more embedded derivatives, and Korean IFRS 1109 permits the entire combined contract (asset or liability) to be designated as at FVTPL.

Financial liabilities at FVTPL are measured at fair value, with any gains or losses arising on changes in fair value recognized in profit or loss to the extent that they are not part of a designated hedging relationship (see Hedge accounting policy). The net gain or loss recognized in profit or loss incorporates any interest paid on the financial liability and is included in the 'other income or expenses' line item in consolidated statements of comprehensive income.

However, for financial liabilities that are designated as at FVTPL, the amount of change in the fair value of the financial liability that is attributable to changes in the credit risk of that liability is recognized in other comprehensive income, unless the recognition of the effects of changes in the liability's credit risk in other comprehensive income would create or enlarge an accounting mismatch in profit or loss. The remaining amount of change in the fair value of liability is recognized in profit or loss. Changes in fair value attributable to a financial liability's credit risk that are recognized in other comprehensive income are not subsequently reclassified to profit or loss; instead, they are transferred to retained earnings upon derecognition of the financial liability.

Gains or losses on financial guarantee contracts issued by the Group that are designated by the Group as at FVTPL are recognized in profit or loss.

(6) Financial liabilities measured subsequently at amortized cost

Financial liabilities that are not (1) contingent consideration of an acquirer in a business combination, (2) held for trading or (3) designated as at FVTPL are measured subsequently at amortized cost using the effective interest method.

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The effective interest method is a method of calculating the amortized cost of a financial liability and allocating interest expense over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash payments, including all fees and points paid or received (that form an integral part of the effective interest rate) transaction costs and other premiums or discounts through the expected life of the financial liability, or (where appropriate) a shorter period, to the net carrying amount on initial recognition.

(7) Financial guarantee contracts

A financial guarantee contract is a contract that requires the issuer to make specified payments to reimburse the holder for a loss it incurs because a specified debtor fails to make payments when due in accordance with the terms of debt instruments.

Financial guarantee contract liabilities are initially measured at their fair values and, if not designated as at FVTPL, are subsequently measured at the higher of:

- the amount of loss allowance, as determined in accordance with Korean IFRS 1109 (see “Financial assets” above) or
- the amount initially recognized, less cumulative amortization recognized in accordance with Korean IFRS 1115.

(8) Foreign exchange gains and losses

For financial liabilities that are denominated in a foreign currency and are measured at amortized cost at the end of each reporting period, the foreign exchange gains and losses are determined based on the amortized cost of the instruments. These foreign exchange gains and losses are recognized in the ‘other income or expenses’ line item in consolidated statements of comprehensive income for financial liabilities that are not part of a designated hedging relationship. For those which are designated as a hedging instrument for a hedge of foreign currency risk, foreign exchange gains and losses are recognized in other comprehensive income and accumulated in a separate component of equity.

The fair value of financial liabilities denominated in a foreign currency is determined in that foreign currency and translated at the spot rate at the end of the reporting period. For financial liabilities that are measured as at FVTPL, the foreign exchange component forms part of the fair value gains or losses and is recognized in profit or loss for financial liabilities that are not part of a designated hedging relationship.

(9) Derecognition of financial liabilities

The Group derecognizes financial liabilities when, the Group's obligations are discharged, cancelled or have expired. The difference between the carrying amount of the financial liability derecognized and the consideration paid and payable is recognized in profit or loss.

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When the Group exchanges with the existing lender one debt instrument for another one with substantially different terms, such exchange is accounted for as an extinguishment of the original financial liability and the recognition of a new financial liability. Similarly, the Group accounts for substantial modification of terms of an existing liability or part of it as an extinguishment of the original financial liability and the recognition of a new liability.

2.21 Derivative Financial Instruments

The Group enters into a variety of derivative financial instruments to manage its exposure to interest rate and foreign exchange rate risk, including foreign exchange forward contracts, interest rate swaps and cross-currency swaps.

Derivatives are initially recognized at fair value at the date the derivative contract is entered into and are subsequently remeasured to their fair value at the end of each reporting period. The resulting gain or loss is recognized in profit or loss immediately, unless the derivative is designated and effective as a hedging instrument; in such case, the timing of the recognition in profit or loss depends on the nature of the hedge relationship.

A derivative with a positive fair value is recognized as a financial asset, and a derivative with a negative fair value is recognized as a financial liability. The Group does not offset a derivative financial instrument unless there is a legal right or intention to offset. A derivative is presented as a non-current asset or a non-current liability if the remaining maturity of the instrument is more than 12 months and it is not expected to be realized or settled within 12 months. Other derivatives are presented as current assets or current liabilities.

The Group recognizes changes in the fair value of derivatives that are designated as hedging instruments and changes in the fair value of the hedged item in profit or loss.

2.22 Accounting related to the Greenhouse Gas Emission Rights Cap and Trade Scheme

The Group classifies the emission rights as intangible assets. Emission rights allowances the government allocated free of charge are measured at nil, and emission rights allowances purchased are measured at cost, which the Group paid to purchase the allowances. If emission rights the government allocated free of charge are sufficient to settle the emission rights allowances allotted for vintage year, the emission liabilities are measured at nil. However, for the emission liabilities that exceed the allowances allocated free of charge, the shortfall is measured at best estimate at the end of the reporting period.

2.23 Deferred Acquisition Costs

Acquisition costs arising from annuity contracts and long-duration contracts sold after April 1, 2004, excluding any excess amount over estimated acquisition costs (contracts sold after April 1, 2010, excluding the amount exceeding the standard deviation deduction amount), are deferred and amortized evenly over the premium payment period. When the period of premium payment is longer than seven years, the amortization period of deferred acquisition costs is seven years. When the contract is cancelled, any unamortized portion as at the cancellation date (or the date it becomes invalid in case the contract becomes ineffective before cancellation date) is fully

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amortized in the fiscal year in which such cancellation occurs. However, contracts sold after April 1, 2013, has been deferred by limit of a larger amount of paid insurance premium and standard deviation deduction amount (actual medical insurance and saving life insurance 70~100%, application by contract year, product, channel by the year ended 2017) and are unable to exceed 100% of the standard deviation deduction amount.

2.24 Classification of Insurance Contracts and Investment Contracts

A Contract under which on party (the “insurer”) accepts significant insurance risk from another party (the “policyholder”) by agreeing to compensate the policyholder if a specified uncertain future event (the “insured event”) adversely affects the policyholder is classified as insurance contract. A contract that does not expose the insurer to significant insurance risk, but exposes the financial risk, is classified as investment contract. If the contracts are classified as insurance, the contracts remain insurance contracts until all rights and obligations are extinguished or expire. After classifying the contracts by assessing its quantitative significance, insurance contracts and investment contracts in accordance with Korean IFRS 1104 *Insurance Contracts*, and investment contracts without discretionary participation feature are accounted for as financial instruments in accordance with Korean IFRS 1109 *Financial Instruments*.

2.25 Insurance Contract Liabilities

The Group estimated reserves for future expense, such as premium, reserve for outstanding claims, and reserve for policyholder's' dividend and others, for insurance contract. The principal contents are as follows:

(1) Premium reserve

Premium reserves represent the difference between the present value of estimated insurance benefits and the present value of net premiums to be collected after the end of reporting period for long-term and annuity insurance contracts in effect as at the end of reporting period.

(2) Reserve for outstanding claims

As at the end of reporting period, for the contract that an insured event has occurred but the amount of claims payable is not yet determined, the Group records the reserve for the estimated amounts to be paid additional expenses arising from litigation, arbitration and claim investigation, expected to be incurred in the process of resolving an insured event are included in the reserves and the expected compensation income is deducted from the reserves.

(3) Reserve for unearned premium

Reserve for unearned premium refers to the premiums due, but whose recognition is deferred

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(4) Reserve for minimum guaranteed benefit

Reserve for minimum guarantee benefit refers to amounts that guarantee a certain level of insurance. It is calculated by considering the future loss in accordance with Detailed Regulation on Supervision of Insurance Business.

The Group calculated it applying the change in accumulation base of reserve for minimum guaranteed benefit in accordance with the amendment to the Regulation on Insurance Supervision during 2019, and this change in accounting policy has no effect on the consolidated statement of financial position as at December 31, 2018 and January 1, 2018 and consolidated statement of comprehensive income for the year ended December 31, 2018.

(5) Reserve for policyholders' dividends

In compliance with the Supervisory Regulation, the Group reserves represent amounts payable to policyholders due to mortality gains, interest gains and expense gains.

(6) Reserve for policyholders' profit dividend

Pursuant to relevant laws and contracts, the Group may provide an excess participating policyholder dividend reserve in accordance with the operating results of related insurance products. The reserve may be used to pay participating policyholder dividends or additional dividends.

(7) Reserve for losses on dividend insurance

Reserve for losses on dividend insurance can be provided within 30 percent of excess participating policyholders' dividend reserve. It covers the loss of the participating insurance within five years, and after covering the loss, the remaining reserve would be available for dividends to participating policy-holders.

2.26 Liability Adequacy Test

The Group assesses at the end of each reporting period whether its recognized insurance liabilities are adequate, using current estimates of future cash flows for its premium reserve and unearned premium reserve. If that assessment shows that the carrying amount of its insurance liabilities is inadequate in the light of the estimated future cash flows, the entire deficiency is recognized in the consolidated statement of comprehensive income.

2.27 Claim Handling Cost

Claim handling costs are charged to income as incurred based on the estimated liability for compensation owed to contract holder or third parties damaged by the contract holders. Claims handling costs are expenses dealing with accident, and they are accompanying expenses of insurance payments. The Group accumulates expected payments of loss adjustment in the insurance contract liabilities.

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2.28 Compensation Receivables

Compensation receivables are calculated by multiplying the average recovery ratio for the last three years from the prior year's reporting period date to the amount of net claims for the three years according to the Regulation on Supervision Insurance Business, based on the estimated amount collectible through sales of collateralized assets or exercise of subrogation rights or any other rights which have been acquired in the course of settling the claims already paid as at settlement of accounts.

2.29 Reinsurance Contracts

In accordance with Korean IFRS 1104 *Insurance Contracts*, the Group does not offset reinsurance assets against the related insurance liabilities and income or expense from reinsurance contracts against the expense or income from the related insurance contracts. The Group considers whether its reinsurance assets are impaired at the end of each reporting period. If a contractor's reinsurance asset is impaired, the contractor shall reduce its carrying amount accordingly and recognize that impairment loss in profit or loss.

2.30 Policyholders' Equity Adjustment

Changes in the fair value of AFS financial assets, share of other comprehensive income of subsidiaries and associates, and others are allocated to policy holders' equity and shareholders' equity in accordance with Regulation on Insurance Supervisory. The amount of policyholder's equity is recorded as policyholders' equity adjustment.

2.31 Separate Account Assets and Liabilities

Separate accounts represent assets and liabilities that are maintained by an insurance entity and are established primarily for the purpose of funding fixed and variable annuity contracts, variable life insurance contracts, variable universal insurance contracts, group annuity contracts, and similar activities.

The Insurance Business Law governs the structure of separate account, and the Regulation on Insurance Supervision has developed certain regulations with respect to separate accounts. The regulation on Insurance Supervision indicates that a separate account is legally segregated from the insurer's general account, and the assets in the separate accounts are generally restricted from being charged with liabilities arising out of any other business of the insurer.

Separate accounts are currently used to support group severance and variable insurance policies. In sponsoring a group severance insurance plan, the Group generally assumes the risk of investment gains or losses and guarantees the contract holder a specified interest rate. A variable insurance contract is contractual arrangement that combines some features of an investment company, such as when the contract holder assumes the risk of investment gains or losses, with certain traditional insurance features, such as when the insurance company assumes the risk of mortality and administrative expenses. The fair value of the contract holder's account varies with the investment experience of the specific portfolio of securities, the securities held in the separate accounts.

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A separate account is not a legal entity, but an accounting entity with accounting records for variable or fixed-benefit contract assets, liabilities, income and expenses segregated as a discrete operation within the insurance company. The variable contract separate accounts do not affect the results of the insurance company's other separate accounts and its general account.

2.32 Reserve for Credit Losses

The Group is required to appropriate, as a reserve for credit losses, a difference between the allowance of credit losses in accordance with Korean IFRS 1039 *Financial Instruments: Recognition and Measurement* and that under the Supervisory Regulations on Insurance Business if the allowance in accordance with Korean IFRS is less than that in accordance with the Supervisory Regulations on Insurance Business. The reserve for credit losses is included in retained earnings and is allowed to reduce to the reserve amount required by the related financial regulation if the reserve for credit losses is over the required reserve. If there is an accumulated deficit, the reserve for credit losses is not appropriated until the undisposed accumulated deficit is disposed.

2.33 Catastrophe Reserves

The Group annually accumulates the appropriate amount not less than 35 percent not more than 100 percent of the net premium written multiplied by the adjusted rate, within the limit 50 percent (auto insurance: 40% / guarantee insurance: 150%) of the earned premium of the reporting period in order to make up for the exceptionally large claims in the future.

Also, when the combined loss ratio of each insurance product exceeds 120% (fire), 110% (marine, auto and casualty), 140% (guarantee), 80% (foreign direct, assumed reinsurance inward), respectively, the reserve can be reversed within the limit of excess amount.

2.34 Financial Soundness Reserve

In accordance with Article 6-11 Clause 3 of the Supervisory Regulation on Supervision Insurance Business, newly established in 2019, the Group appropriates the financial soundness reserves within retained earnings in an amount more than the difference between the targeted insurance contract liability subject to adequacy test and the greater of tested amounts of insurance contract liability as at December 31, 2019 and insurance contract liability to be tested at the end of the reporting period. The excess of financial soundness reserves over the required reserve at the end of the reporting period should not be reversed. If there is an accumulated deficit, the financial soundness reserve is not appropriated until the undisposed accumulated deficit is disposed.

2.35 Approval of Issuance of the Financial Statements

The consolidated financial statements 2019 were approved for issue by the Board of Directors on February 25, 2020 and are subject to change with the approval of shareholders at their Annual General Meeting.

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3. Critical Accounting Estimates and Assumptions

In the application of the Group accounting policies, which are described in Note 2, management is required to make judgments, estimates and assumptions about the carrying amounts of assets and liabilities that are not readily apparent from other sources. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results may differ from these estimates.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimate is revised if the revision affects only that period or in the period of the revision and future periods if the revision affects both current and future periods.

(1) Important decision applied in accounting policies

1) Capitalization of borrowing costs

As noted in Note 2, the Company capitalizes borrowing costs related to the acquisition, construction or production of the qualifying assets as part of the cost of such assets.

2) Evaluation of business model

The classification and measurement of financial assets is based on contractual cash flow characteristics and business model (see Note 2 'Financial Assets' section). The business model is determined to reflect how groups of financial assets are managed together to meet specific business objectives. These assessments include judgements that reflect all relevant evidence. The relevant evidences include how the performance of an asset is assessed and measured, risks that could affect the performance of an asset, and the way those risks are managed, and compensation of the asset manager. When a financial asset measured at amortized cost or FVTOCI was derecognized before maturity, the Group observed to determine whether if it is consistent with the objective of the business model for financial asset management. Observations are part of our ongoing assessment of whether the business model for the remaining financial assets is appropriate and if not appropriate, there has been a change in the business model and a consequent change in the classification of financial assets. No such changes were required during the indicated period.

3) Significant increase in credit risk

As described in Note 2, the loss allowance is measured for assets that have significant increase in ECLs for the whole period or have been impaired since initial recognition. Kroeian IFRS 1109 does not define what constitutes a significant increase in credit risk. When assessing whether the credit risk of an asset has increased significantly, the Group considers forward-looking information that is quantitatively and qualitatively reasonable and supported.

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(2) Key sources of estimation uncertainty

1) Income tax

The income is subject to income taxes based on tax laws and interpretations of tax authorities in numerous jurisdictions. There are many transactions and calculations for which the ultimate tax determination is uncertain.

2) Fair value of financial instruments

The fair value of financial instruments that are not traded in an active market is determined by using valuation techniques. The Group uses its judgment to select a variety of methods and make assumptions that are mainly based on market conditions existing at the end of each reporting period (Note 59).

3) Impairment of financial assets

The provisions for impairment for financial assets are based on assumptions about risk of default and expected loss rates. The Group uses judgement in making these assumptions and selecting the inputs to the impairment calculation based on the Group's past history, existing market conditions as well as forward looking estimates at the end of each reporting period (Note 59).

4) Net defined benefit liabilities

The present value of net defined benefit liability depends on a number of factors that are determined on an actuarial basis using a number of assumptions including the discount rate (Notes 23 and 39).

5) Uncertainty on the estimation of the total construction revenue and total construction cost

Although total contract revenue is measured based on the contract amount initially agreed, measurement of contract revenue is subject to various uncertainties related to the outcome of future events. This is because as the contract is executed, it may decrease depending on the change of construction, compensation, incentives or delayed completion due to the Group's reasons.

The amount of construction revenues is affected by the progress measured based on the cumulative incurred contract costs. Total contract costs are based on future estimates of material costs, labor costs, overhead costs, etc. There are uncertainties that may change.

6) Provision

The Group has recorded provision for product warranties and construction warranties at the end of each reporting period. These provisions are based on estimates based on historical experience and forecasts of future events. However, there may be a significant difference between past events and forecasts, and there are uncertainties that may cause significant differences between the estimates based on future events and actual events.

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7) Impairment of non-financial assets

The Group assesses the existence of impairment on all non-financial assets at the end of each reporting period. For intangible assets with indefinite useful lives, impairment tests are carried out annually or in the event of impairment. For other non-financial assets, the Group carries out impairment tests when there are indications that the carrying amount will not be recoverable. To determine the use value, management must estimate future cash flows from the asset or CGU and choose an appropriate discount rate.

8) Allowance for doubtful accounts of trade receivables

In order to calculate the impairment of trade receivables, the management of the Group estimates an expected bad debt considering the aging of receivables, past experience of bad debt and economic and industrial factors.

9) Lease

In determining the lease term, management considers all facts and circumstances that create an economic incentive to exercise an extension option, or not exercise a termination option. Extension options (or periods after termination options) are only included in the lease term if the lease is reasonably certain to be extended (or not terminated).

For leases of warehouses, retail stores and equipment, the following factors are normally the most relevant:

- If there are significant penalties to terminate (or not extend), the Group is typically reasonably certain to extend (or not terminate).
- If any leasehold improvements are expected to have a significant remaining value, the Group is typically reasonably certain to extend (or not terminate).
- Otherwise, the Group considers other factors including historical lease durations and the costs and business disruption required to replace the leased asset.

Most extension options in offices and vehicles leases have not been included in the lease liability, because the Group could replace the assets without significant cost or business disruption.

The lease term is reassessed if an option is actually exercised (or not exercised) or the Group becomes obliged to exercise (or not exercise) it. The assessment of reasonable certainty is only revised if a significant event or a significant change in circumstances occurs, which affects this assessment, and that is within the control of the lessee.

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4. Subsidiaries

(1) Details of subsidiaries as at December 31, 2019 and 2018, are as follows:

	Percentage of ownership (%)		Location	Closing month	Main business
	2019	2018			
Gyeonggi Yongin Techno Valley Co., Ltd.	80.00	80.00	Korea	December	Real estate business
Gimhae Techno Valley Co., Ltd.	80.00	80.00	Korea	December	Real estate business
Agricultural Corporation Company Green Tomorrow	90.00	90.00	Korea	December	Processing and distribution of agricultural, livestock and forest products
Data Analytics Lab Co., Ltd.	100.00	100.00	Korea	December	Management consulting
H-P&D Co., Ltd (Formerly, Lake Park-H Co., Ltd.)	100.00	100.00	Korea	December	Real estate development
Seosan Techno Valley Co., Ltd.	65.00	65.00	Korea	December	Real estate development and supply
Anseong Techno Valley Co., Ltd.	80.00	-	Korea	December	Real estate development and supply
Asan Techno Valley Co., Ltd.	100.00	100.00	Korea	December	Real estate business
Yangju Ecotec Co., Ltd.	100.00	100.00	Korea	December	Construction and operation of sewage treatment plant
Yeosu Sea World Corporation	100.00	100.00	Korea	December	Aquarium
H Valley Co., Ltd.	100.00	100.00	Korea	December	Sale and trading of real estate
Eco E&O	100.00	100.00	Korea	December	Sewage treatment and environmental pollution prevention facility
Ilsan Seaworld, Co., Ltd	99.11	99.11	Korea	December	Aquarium
YoungAm TechnoSolar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
YoungAm HaeOReumSolar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
Hi-pass Solar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
HaeSaRang Solar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
KAES Co., Ltd.	100.00	100.00	Korea	December	Machine manufacturing
Hanwha 63 City Co., Ltd.	100.00	100.00	Korea	December	Real estate management service and others
Hanwha Galleria Co., Ltd.	100.00	100.00	Korea	December	Department store and wholesale/retail
Hanwha Galleria Timeworld Co., Ltd.	85.45	69.45	Korea	December	Department store
Hanwha Engineering and Construction Corp.	100.00	100.00	Korea	December	Civil engineering, housing construction, industrial equipment and others

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Hanwha Finance Asset Co., Ltd.	100.00	100.00	Korea	December	Insurance brokerage
Hanwha City Development Co., Ltd	100.00	100.00	Korea	December	Sale and trading of real estate and others
Hanwha Defense Systems Corp. (Formerly, Hanwha Land Systems Co., Ltd.) ⁶	100.00	100.00	Korea	December	Military equipment
Hanwha Life Asset Co., Ltd.	100.00	100.00	Korea	December	Insurance agency and brokerage
Hanwha B&B Co., Ltd.	100.00	100.00	Korea	December	Food and wholesale/retail
Hanwha Life Insurance Co., Ltd. ¹	44.99	44.99	Korea	December	Life insurance
Hanwha General Insurance Co., Ltd.	51.36	51.36	Korea	December	Insurance and pension services
Hanwha Life Insurance Investigation & Adjusting	100.00	100.00	Korea	December	Insurance and pension services
Hanwha Systems Co., Ltd. ³	48.99	52.91	Korea	December	Gunpowder services
Hanwha Estate Co., Ltd.	100.00	100.00	Korea	December	Business facilities management and business support
Hanwha Aerospace Co., Ltd. ³	33.34	33.03	Korea	December	Manufacturing of aircraft engine and parts
Hanwha Station Development Co., Ltd.	67.25	67.25	Korea	December	Leasing service
Hanwha Eagles Professional Baseball Club Co., Ltd.	90.00	90.00	Korea	December	Operation of sports club
Hanwha Asset Management Co., Ltd.	100.00	100.00	Korea	December	Asset management
Hanwha Savings Bank Co., Ltd.	100.00	100.00	Korea	December	Deposit and savings import business / Financial loan
Hanwha Precision Machinery Co., Ltd.	100.00	100.00	Korea	December	Manufacturing and sale of Chip Mounter and others
Hanwha Q CELLS & Advanced Materials Co., Ltd.	100.00	-	Korea	December	Synthetic resin processing and others
Hanwha Global Asset Corporation (Formerly, Hanwha Q CELLS & Advanced Materials Co., Ltd.) ⁸	100.00	100.00	Korea	December	Synthetic resin processing and others
Hanwha Compound Corporation Co., Ltd.	100.00	100.00	Korea	December	Manufacturing and sale of packaging materials
Hanwha Chemical Co., Ltd. ³	36.62	36.26	Korea	December	Manufacturing of synthetic resin and other petrochemical products
Hanwha Chemical Overseas Holdings, Co., Ltd.	100.00	100.00	Korea	December	Holding company
HIS Co.,Ltd (Formerly,	100.00	100.00	Korea	December	Development,

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Hanwha Q Cell Co., Ltd.)						manufacturing and sale of solar cell (including module) and photovoltaic power generation system
Hanwha TechM Co., Ltd.	100.00	100.00	Korea	December		Domestic and foreign securities investment
Hanwha Techwin Co., Ltd.	100.00	100.00	Korea	December		Manufacturing of broadcasting and wireless communication equipment
Hanwha Investment & Securities Co., Ltd. ³	45.24	32.23	Korea	December		Financial investment
Hanwha Power System Co., Ltd.	100.00	100.00	Korea	December		Manufacturing and sale of compressor, generator and gas turbine
Hanwha Hotel & Resort Inc.	99.32	99.32	Korea	December		Condominium operation
Hanwha Techwin Tianjin Opto-Electronic Co., Ltd.	95.00	95.00	China	December		Manufacturing and sale of CCTV and others
Hanwha Investment Management Limited	100.00	100.00	China	December		Investment management
Hanwha Chemical Trading (Shanghai) Co., Ltd.	100.00	100.00	China	December		Trading
Hanwha International Trading (Shanghai) Co., Ltd.	100.00	100.00	China	December		Trading
Foodist Food Culture (Shanghai) Co., Ltd.	100.00	100.00	China	December		Group meal and catering services
Hanwha TechM (Suzhou) Co., Ltd.	100.00	100.00	China	December		Production of machine tools and power train
Hanwha Commercial Equipment Co., Ltd.	100.00	100.00	China	December		Sale of compressor and industrial equipment
Acropark Golf Corp.	100.00	100.00	Japan	December		Golf course and resort business
Alkin Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December		Photovoltaic power generation
Aslan Gunes Enerjisi A.s.	100.00	100.00	Turkey	December		Photovoltaic power generation
Avenir el Divisadero SpA	100.00	100.00	Chile	December		EPC Construction
Blue Albatross FZE	100.00	100.00	UAE	December		Trading
Eagle Petroleum Monterey, LLC	100.00	100.00	USA	December		Resource development
Eagle Petroleum, LLC	100.00	100.00	USA	December		Resource development
Elcin Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December		Photovoltaic power generation
EMBR PTY LTD	100.00	100.00	Australia	December		Supply of gunpowder products and services
Fior Gunes Enerjisi Anonim sirketi	100.00	100.00	Turkey	December		Photovoltaic power generation
Fnt Gida Turizm Ic Ve Dis Ticaret Sanayi Ltd. sti.	100.00	100.00	Turkey	December		Photovoltaic power generation
Garnet Solar Power	100.00	100.00	USA	December		Photovoltaic business

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Generation 1, LLC						
Hanwha Advanced Materials America LLC	100.00	100.00	USA	December		Manufacturing of automobile parts
Hanwha Advanced Materials Beijing Co., Ltd.	100.00	100.00	China	December		Manufacturing of automobile part materials
Hanwha Advanced Materials Chongqing Co.,Ltd.	100.00	100.00	China	December		Manufacturing of automobile materials
Hanwha Advanced Materials Europe, s.r.o.	100.00	100.00	Czech Republic	December		Manufacturing of automobile part materials
Hanwha Advanced Materials Germany GmbH	100.00	100.00	Germany	December		Manufacturing of automobile parts
Hanwha Advanced Materials Holdings USA Inc.	100.00	100.00	USA	December		Holding company
Hanwha Advanced Materials Holdings USA LLC	100.00	100.00	USA	December		Holding company
Hanwha Advanced Materials Mexico S. De R.L. De C.V.	100.00	100.00	Mexico	December		Manufacturing of automobile parts
Hanwha Advanced Materials Shanghai Co., Ltd.	100.00	100.00	China	December		Manufacturing
HANWHA AERO ENGINES.,LTD	100.00	100.00	Vietnam	December		Manufacturing of aircraft parts
Hanwha America Development Inc.	100.00	100.00	USA	December		Real estate business
Hanwha America Development LLC.	100.00	100.00	USA	December		Real estate development
Hanwha Asset Management (USA) Ltd.	100.00	100.00	USA	December		Domestic and foreign securities investment
HANWHA ASSET MANAGEMENT PTE. LTD.	100.00	100.00	Singapore	December		Asset management
Hanwha AZDEL, Inc.	100.00	100.00	USA	December		Manufacturing of automobile parts
Hanwha Canada Development Inc.	100.00	100.00	Canada	December		Oil business
Hanwha Chemical (Ningbo) Co., Ltd.	100.00	100.00	China	December		Compound manufacturing
Hanwha Chemical (Thailand) Co.,Ltd.	99.99	99.99	Thailand	December		Compound manufacturing
HANWHA CHEMICAL INDIA PRIVATE LIMITED	99.99	99.99	India	December		Sale and purchase of petrochemicals and photovoltaic products
Hanwha Chemical Malaysia Sdn. Bhd.	100.00	100.00	Malaysia	December		Sale of petrochemicals
Hanwha Europe GmbH	100.00	100.00	Germany	December		Trading
Hanwha Holdings(USA), Inc.	100.00	100.00	USA	December		Holding company

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Hanwha Hong Kong Co., Ltd.	100.00	100.00	Hong Kong	December	Trading
Hanwha International (S) Pte Ltd.	100.00	100.00	Singapore	December	Trading
Hanwha International Corp.	100.00	100.00	USA	December	Holding company
HANWHA INTERNATIONAL INDIA PVT., LT	99.99	99.99	India	December	Trading
Hanwha International LLC.	100.00	100.00	USA	December	Trading
Hanwha International Peru S.A.C.	100.00	100.00	Peru	December	Gunpowder services and explosives and blasting
Hanwha Life Insurance Company Limited. (Vietnam)	100.00	100.00	Vietnam	December	Life insurance
Hanwha Machinery Americas, Inc.	100.00	100.00	USA	December	Sale of machine tool
Hanwha Machinery Corporation	100.00	100.00	USA	December	Holding company
Hanwha Mining Services Australia Pty., Ltd	100.00	100.00	Australia	December	Gunpowder services and explosives and blasting
Hanwha Mining Services Chile SpA	100.00	100.00	Chile	December	Gunpowder services and explosives and blasting
Hanwha Parcel O LLC	100.00	100.00	USA	December	Real estate development
Hanwha Power Systems Americas, Inc.	100.00	100.00	USA	December	Sale of compressor and service materials
Hanwha Power Systems (Shanghai) Co.,LTD	100.00	100.00	China	December	Sale of compressor and service materials
Hanwha Power Systems Service Middle East LLC ²	49.00	49.00	UAE	December	Sale of compressor and service materials
Hanwha Property USA LLC	100.00	100.00	USA	December	Real estate business
Hanwha PVPLUS LLC	100.00	100.00	USA	December	Photovoltaic power generation investment
Hanwha Q CELLS America Inc.	100.00	100.00	USA	December	Sale of photovoltaic products
Hanwha Q CELLS America Project Holdings	100.00	100.00	USA	December	Photovoltaic project investment
Hanwha Q CELLS Americas Holdings. Corp.	100.00	100.00	USA	December	Photovoltaic business
Hanwha Q CELLS Australia Holdings Pty Ltd	100.00	100.00	Australia	December	Photovoltaic business
Hanwha Q CELLS Australia Pty Ltd.	100.00	100.00	Australia	December	Sale of photovoltaic products
Hanwha Q CELLS Canada, Inc	100.00	100.00	Canada	December	Photovoltaic business
Hanwha Q CELLS Canada, Corp.	100.00	100.00	Canada	December	Sale of photovoltaic products
Hanwha Q CELLS Chile SpA	100.00	100.00	Chile	December	Construction and sale of photovoltaic power generation system
Hanwha Q CELLS Co., Ltd.(Formerly, Hanwha	100.00	100.00	United Kingdom	December	Manufacturing and sale of photovoltaic products

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Solar Holdings Co.,Ltd) ⁷						
Hanwha Q CELLS(Qidong) Co., Ltd.	100.00	100.00	China	December	Manufacturing of silicon ingot	
Hanwha Q CELLS France SAS	100.00	100.00	France	December	Photovoltaic business	
Hanwha Q CELLS GmbH	100.00	100.00	Germany	December	Manufacturing of photovoltaic products	
Hanwha Q CELLS Hong Kong Limited	100.00	100.00	Hong Kong	December	Investment and international supply	
Hanwha Q CELLS Investment Co., Ltd.	100.00	100.00	United Kingdom	December	Holding company	
Hanwha Q CELLS Japan Co., Ltd.	100.00	100.00	Japan	December	Trading	
Hanwha Q CELLS Japan Power Solutions Co.,Ltd.	100.00	100.00	Japan	December	Design of photovoltaic power plant	
Hanwha Q CELLS Malaysia Sdn. Bhd.	100.00	100.00	Malaysia	December	Manufacturing of photovoltaic products	
Hanwha Q CELLS Peru S.A.C	99.99	99.99	Peru	December	Photovoltaic power generation	
HANWHA Q CELLS SOLAR POWER SDN. BHD.	100.00	100.00	Malaysia	December	EPC business	
Hanwha Q CELLS Solar Technology Australia Pty Ltd.	100.00	100.00	Australia	December	Photovoltaic business	
Hanwha Q CELLS Technology Co., Ltd	100.00	100.00	China	December	Manufacturing of silicon ingot	
Hanwha Q CELLS Til Til Uno SPA	100.00	100.00	Chile	December	Construction and sale of photovoltaic system	
Hanwha Q CELLS Turkey	100.00	100.00	Turkey	December	Construction and sale of photovoltaic power generation system	
Hanwha Q CELLS USA, INC.	100.00	100.00	USA	December	Photovoltaic business	
Hanwha Q CELLS(Nantong) Co., Ltd.	100.00	100.00	China	December	Manufacturing and sale of photovoltaic products	
Hanwha Resources (Canada) Ltd.	100.00	100.00	Canada	December	Resource development	
Hanwha Resources (USA) Corporation	100.00	100.00	USA	December	Resource development	
Hanwha Saudi Contracting Co., Ltd.	100.00	100.00	Saudi Arabia	December	Construction	
Hanwha Singapore Pte. Ltd.	100.00	100.00	Singapore	December	Trading	
Hanwha Solar Electric Power Engineering Co., Ltd.	100.00	100.00	China	December	Construction of photovoltaic power generation facilities	
Hanwha Solar Engineering R&D center Co., Ltd.	100.00	100.00	China	December	Research and development of photovoltaic products	
Hanwha Solar Power Kitsuki G.K. ²	1.00	1.00	Japan	December	Photovoltaic power generation	

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Hanwha SolarOne (Laiyang) Co., Ltd	100.00	100.00	China	December	Photovoltaic business
Hanwha SolarOne (Rugao) Co., Ltd	100.00	100.00	China	December	Photovoltaic business
Hanwha SolarOne GmbH	100.00	100.00	Germany	December	Sale of photovoltaic products
Hanwha SolarOne Investment Holding Ltd.	100.00	100.00	United Kingdom	December	Holding company
Hanwha SolarOne Power Generation (Wuxi) Co., Ltd.	100.00	100.00	China	December	Photovoltaic business
Hanwha Solarone(beipiao)Co.,Ltd	100.00	100.00	China	December	Sale of compressor and service materials
Hanwha Systems Japan Co., Ltd.	100.00	100.00	Japan	December	Integrated advisory, construction and management of computer systems
Hanwha Q CELLS Technology (Shanghai) Co., Ltd.	100.00	100.00	China	December	Sale of photovoltaic products
Hanwha TechM Hungary Zrt.	97.21	97.21	Hungary	December	Leasing service of real estate and supply of utilities
Hanwha TechM USA LLC	100.00	100.00	USA	December	Manufacturing of automobile parts
Samsung Opto-Electronics America, Inc.	100.00	100.00	USA	December	Sale of CCTV and others
Hanwha Techwin Automation Americas, Inc.	100.00	100.00	USA	December	Sale and others
HANWHA TECHWIN AUTOMATION VIETNAM CO.,LTD	100.00	100.00	Vietnam	December	Sale
Hanwha Techwin Europe Limited	100.00	100.00	United Kingdom	December	Sale of CCTV
Hanwha Techwin Middle East FZE	100.00	100.00	UAE	December	Sale
Hanwha Techwin Security Vietnam	100.00	100.00	Vietnam	December	Manufacturing
Hanwha Village Market, LLC	100.00	100.00	USA	December	Real estate development
Hanwha West Properties LLC	100.00	100.00	USA	December	Real estate development
Hiprom Enerji Yatirimlari A.s.	100.00	100.00	Turkey	December	Photovoltaic power generation
HMS AUSTRALIA OPERATIONS PTY LTD	100.00	100.00	Australia	December	Gunpowder services and explosives and blasting
HMS AUSTRALIA PROPERTY HOLDINGS PTY LTD	100.00	100.00	Australia	December	Land leasing service
HQC Rock River Solar Holdings LLC	100.00	100.00	USA	December	Photovoltaic business
HQC Rock River Solar	100.00	100.00	USA	December	Photovoltaic business

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Power Generation Station LLC						
Huoqiu Hanrui New Energy Power Generation co. Ltd	100.00	100.00	China	December	Photovoltaic business	
HW SOLAR POWER 3 G.K.	100.00	100.00	Japan	December	Photovoltaic power generation	
HW SOLAR POWER 6 G.K.	100.00	100.00	Japan	December	Photovoltaic power generation	
HW SOLAR POWER 8 G.K. ²	0.66	0.66	Japan	December	Photovoltaic power generation	
Kartal Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation	
KMPT Solarpark Verwaltung GmbH	100.00	100.00	Germany	December	Photovoltaic business	
Sociedade Poente Deslumbrante Lda.	100.00	-	Germany	December	Photovoltaic business	
Las Coronadas Hive SL	100.00	-	Germany	December	Photovoltaic business	
Guadajoz Hive SL	100.00	-	Germany	December	Photovoltaic business	
Agenor Hive SL	100.00	-	Germany	December	Photovoltaic business	
Don Rodrigo Hive SL	100.00	-	Germany	December	Photovoltaic business	
Laheeb Al-Ezdihar	100.00	100.00	Iraq	December	Trading	
LDE Corporation PTY LTD	100.00	100.00	Australia	December	Mine development	
LDE HOLDINGS PTY LTD	100.00	100.00	Australia	December	Holding company	
LENEX Co.,Ltd.	100.00	100.00	Japan	December	Sale of photovoltaic products	
LLP Zharyk Zol Company 2007	100.00	100.00	Kazakhstan	December	Investment of real estate (SPC)	
Lodz Solar Sp. z o.o.	100.00	100.00	Poland	December	EPC construction	
Marel Bilisim Muhendislik Enerji Insaat Iletisim Turizm Gida San. Ve Dis Tic. Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation	
Maxxsol 01 srl	100.00	100.00	Italy	December	Photovoltaic power generation	
Mazovia Solar 1 Sp. Z o.o.	100.00	100.00	Poland	December	EPC Construction	
Mazovia Solar 2 Sp. Z o.o.	100.00	100.00	Poland	December	EPC Construction	
Mazovia Solar 3 Sp. Z o.o.	100.00	100.00	Poland	December	EPC Construction	
Meva Muhendislik Bilisim Enerji Insaat Iletisim Turizm San. Ve Dis Tic. Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation	
Moravia Enerji Sanayi ve Ticaret Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation	
Mutlak Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation	
Nantong Hanwha Import & Export Co., Ltd.	100.00	100.00	China	December	Sale of photovoltaic products	
PT. Bara Bumi International	100.00	100.00	Indonesia	December	Coal sales	
PT. Hanwha Life Insurance	99.61	99.61	Indonesia	December	Life insurance	

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Indonesia					
PT. Hanwha Mining Services Indonesia	100.00	100.00	Indonesia	December	Gunpowder services and explosives and blasting
PV Vallenar Uno SpA	100.00	100.00	Chile	December	Holding company (SPC)
S&P World Networks DMCC	100.00	100.00	UAE	December	Trading
Sema Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Serimer Optik Medikal Kirtasiye Temizlik Insaat Ithalat Ihracat Sanayi Tic. Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
SFH Solarpark GmbH	100.00	100.00	Germany	December	Photovoltaic business
QSUN Poland Sp. z o.o.	100.00	100.00	Poland	December	Photovoltaic business
QSUN 1	100.00	100.00	Poland	December	Photovoltaic business
QSUN 2	100.00	100.00	Poland	December	Photovoltaic business
QSUN 3	100.00	100.00	Poland	December	Photovoltaic business
QSUN 4	100.00	100.00	Poland	December	Photovoltaic business
QSUN 5	100.00	100.00	Poland	December	Photovoltaic business
QSUN 6	100.00	100.00	Poland	December	Photovoltaic business
QSUN 7	100.00	100.00	Poland	December	Photovoltaic business
QSUN 8	100.00	100.00	Poland	December	Photovoltaic business
QSUN 9	100.00	100.00	Poland	December	Photovoltaic business
QSUN 10	100.00	100.00	Poland	December	Photovoltaic business
QSUN 11	100.00	100.00	Poland	December	Photovoltaic business
QSUN 12	100.00	100.00	Poland	December	Photovoltaic business
QSUN 13	100.00	100.00	Poland	December	Photovoltaic business
QSUN 14	100.00	100.00	Poland	December	Photovoltaic business
QSUN 15	100.00	100.00	Poland	December	Photovoltaic business
QSUN 16	100.00	100.00	Poland	December	Photovoltaic business
QSUN 17	100.00	100.00	Poland	December	Photovoltaic business
QSUN 18	100.00	100.00	Poland	December	Photovoltaic business
QSUN 19	100.00	100.00	Poland	December	Photovoltaic business
TAWASUL AL-EZDIHAR Co., Ltd	100.00	100.00	Iraq	December	Trading
Techwin Engineering Center	100.00	100.00	Japan	December	Research and development of industrial equipment
Tecsol Srl	100.00	100.00	Italy	December	Photovoltaic power generation
Toprakkale Altyapi ve Malzeme Hizmetleri A.s.	100.00	100.00	Turkey	December	Photovoltaic power generation
Ulu Gunes Enerjisi Anonim sirketi	100.00	100.00	Turkey	December	Photovoltaic power generation
Universal Bearings LLC.	100.00	100.00	USA	December	Bearing manufacturing
Uno Enerji A.s.	100.00	100.00	Turkey	December	Photovoltaic power

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					generation
World corporation	100.00	100.00	Saipan	December	Hotel business
WSE Bradley Road Ltd	100.00	100.00	United Kingdom	December	Photovoltaic power generation
Hanwha Q CELLS USA Corp.	100.00	100.00	USA	December	Photovoltaic business
HSESM American Union LLC	100.00	100.00	USA	December	Photovoltaic business
HSESM PlanadaES LLC	100.00	100.00	USA	December	Photovoltaic business
HSESM LeGrandUHS LLC	100.00	100.00	USA	December	Photovoltaic business
HQ MEX, LLC	100.00	100.00	Mexico	December	Photovoltaic business
HQ MEXICO HOLDINGS S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
HQ MEXICO Solar I S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
HQ MEXICO Solar II S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
Kalaeloa Renewable Energy Park, LLC	100.00	100.00	USA	December	Photovoltaic business
HSEA HVES, LLC	100.00	100.00	USA	December	Photovoltaic business
Solar Monkey 1, LLC	100.00	100.00	USA	December	Photovoltaic business
Solar Monkey 2, LLC	100.00	100.00	USA	December	Photovoltaic business
HQC Maywood, LLC	100.00	100.00	USA	December	Photovoltaic business
Hanwha Q CELLS EPC USA, LLC	100.00	100.00	USA	December	Photovoltaic business
Hanwha Q CELLS Servicios Comerciales, S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
Recon Co., Ltd. ⁵	-	-	Korea	February	Other finance business
KB Hotels&Resorts 1st LLC ⁵	-	-	Korea	November	Other finance business
HANWHA MINING SERVICE USA INC.	100.00	-	USA	December	Gunpowder services and explosives and blasting
HANWHA DEFENSE AUSTRALIA PTY LTD	100.00	-	Australia	December	Military equipment
Hanwha Systems Vietnam Co., Ltd.	100.00	-	Vietnam	December	Integrated advisory, construction and management of computer systems
Q CELLS DO BRASIL CONSULTORIA EMPRESARIAL LTDA	100.00	-	Brazil	December	Photovoltaic business
Elektrownia Fotowoltaiczna Kreznica Okragla Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
QSUN 20 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
HW SOLAR POWER 14 G.K.	100.00	-	Japan	December	Photovoltaic business
LENEX Electric Power G.K.	100.00	-	Japan	December	Photovoltaic business

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Carrot Co.,Ltd.	51.60	-	Korea	December	Insurance and pension services
PLAZA Development & Company	100.00	-	Korea	December	Retail of souvenirs, folk crafts and decorative products
Hanwha Estate Service Co.,Ltd.	100.00	-	Korea	December	Business facilities management and business support services
Hanwha Aerospace USA ⁹	100.00	-	USA	December	Manufacturing of aircraft engine and parts
EDAC Technologies Intermediate Company	100.00	-	USA	December	Manufacturing of aircraft engine and parts
Hanwha Aerospace USA LLC	100.00	-	USA	December	Manufacturing of aircraft engine and parts
EBTEC Corporation	100.00	-	USA	December	Manufacturing of aircraft engine and parts
APEX Machine Tool Company, Inc.	100.00	-	USA	December	Manufacturing of aircraft engine and parts
Gros-Ite Industries Inc.	100.00	-	USA	December	Manufacturing of aircraft engine and parts
EDAC ND, Inc	100.00	-	USA	December	Manufacturing of aircraft engine and parts
HANWHA POWER SYSTEMS VIETNAM COMPANY LIMITED	100.00	-	Vietnam	December	Manufacturing and sale of compressor, generator and gas turbine
Sunrise Solar	100.00	-	Korea	December	Photovoltaic business
QSUN 23 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
Elektrownia OZE 3 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
Sunwolt Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
Silesian Sun Energy Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
QSUN 26 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
SPP Wytwarzanie 18 sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
SPP Wytwarzanie 31 sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
SPP Wytwarzanie 33 sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
PV Jagodne Sp. z.o.o.	100.00	-	Poland	December	Photovoltaic business
INCOGNITWORLD, LDA.	100.00	-	Portugal	December	Photovoltaic business
Pinetree Securities Corporation (Formerly, HFT Securities Corporation)	98.38	-	Vietnam	December	Stock brokerage
Hanwha Development USA Inc	100.00	-	USA	December	Real estate development and supply
Summit Apollo Eleven	100.00	-	Japan	December	Condominium operation
HHR Development B	100.00	-	Japan	December	Condominium operation
HaeOREumSolar Co., Ltd	100.00	-	Korea	December	Photovoltaic power

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						generation
ARBECA SOLAR SLU	100.00	-	Turkey	December		Photovoltaic business
REUS SOLAR SLU	100.00	-	Turkey	December		Photovoltaic business
CASTELLNOU SOLAR SLU	100.00	-	Turkey	December		Photovoltaic business
VECIANA SOLAR SLU	100.00	-	Turkey	December		Photovoltaic business
CASTELLDANS SOLAR SLU	100.00	-	Turkey	December		Photovoltaic business
Malhada Green S.A	100.00	-	Turkey	December		Photovoltaic business
Aceka 2 Gunes Enerjisi A.S.	100.00	-	Turkey	December		Photovoltaic power generation
Aceka 3 Gunes Enerjisi A.S.	100.00	-	Turkey	December		Photovoltaic power generation
Bilgidar 2 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December		Photovoltaic power generation
Buselik 2 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December		Photovoltaic power generation
Buselik 3 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December		Photovoltaic power generation
Dimetoka 2 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December		Photovoltaic power generation
Dimetoka 3 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December		Photovoltaic power generation
Isfahan 3 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December		Photovoltaic power generation
Onan 2 Gunes Enerji Uretim A.S.	100.00	-	Turkey	December		Photovoltaic power generation
Onan 3 Gunes Enerji Uretim A.S.	100.00	-	Turkey	December		Photovoltaic power generation
Jeju Ocean Science Museum Corporation	89.90	29.90	Korea	December		Operation of botanical garden and zoo
Beneficiary certificates						
Hanwha Global Infrastructure Strategy Fund III	88.00	-	Korea	December		Special Asset Collective Investment Vehicle
Hanwha The 3rd Gyeongin highway Fund 1 ⁴	48.19	-	Korea	December		Special Asset Collective Investment Vehicle
Great opportunity Co., Ltd ⁵	-	-	Korea	December		Special Purpose Company
YJ Asan 1 ⁵	-	-	Korea	December		Special Purpose Company
YJ Asan 2 ⁵	-	-	Korea	December		Special Purpose Company
HSF 19th Co., Ltd ⁵	-	-	Korea	December		Special Purpose Company
Purple tip 1 Co., Ltd ⁵	-	-	Korea	December		Special Purpose Company
Small Giants New Renewable Energy Innovation Fund	99.00	100.00	Korea	December		Investment Fund
ChungNam-Hanwha Small & Medium Company Growth Fund	66.67	66.67	Korea	December		Investment Fund

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Hanwha Global Business Fund	100.00	100.00	Korea	December	Investment Fund
2018 Hanwha New Industry Global Plus-up Fund	60.00	60.00	Korea	December	Investment Fund
Kyobo AXA Bong-dam Song-san Highway Private Investment Trust	85.21	85.21	Korea	December	Special Asset Collective Investment Vehicle
Loyal MJ 1st Co., Ltd ⁵	-	-	Korea	December	Special Purpose Company
Loyal MJ 2nd Co., Ltd ⁵	-	-	Korea	December	Special Purpose Company
Mirae Asset UK Gas Infra Private special asset Investment Trust No.1	83.78	83.78	Korea	April, October	Special Asset Collective Investment Vehicle
Mirae Asset Global Renewable Energy Private Special Asset Investment Trust No.2	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Mirae Asset Maps Global New Recycling Energy Private special asset Investment Trust No. 1	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Blackrock Global Total Solution Investment Trust No.1	100.00	100.00	Korea	April	Security Collective Investment Vehicle
Samsung VLCC Private Investment Trust No.1	68.40	68.39	Korea	February, May, August, November	Special Asset Collective Investment Vehicle
Shining Clear Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)
Simone Global Venture Private Investment Special No.1	100.00	100.00	Korea	May	Special Asset Collective Investment Vehicle
Shinhan BNPP Global Solar Energy Private Equity Special Asset Investment Trust	100.00	100.00	Korea	The end of each quarter	Special Asset Collective Investment Vehicle
Shinhan BNPP Seoul-Munsan Expressway Private Special Asset Investment Trust	93.33	93.33	Korea	December	Special Asset Collective Investment Vehicle
Asia Pacific 45 Vessel Investment Co., Ltd. ⁵	-	-	Korea	December	Vessels Investment Company
HSF 8th Co., Ltd. ⁵	-	-	Korea	September	Liquidation of Loans receivable (SPC)
YJ Deoksookoong Co., Ltd ⁵	-	-	Korea	September	Liquidation of Loans receivable (SPC)
Aegis KORIF Private real estate Trust 17-1	100.00	100.00	Korea	September	Security Collective Investment Vehicle
Aegis KORIF Private real estate Trust 17-2	100.00	100.00	Korea	September	Security Collective Investment Vehicle
Aegis KORIF Private real estate Trust 17-3	100.00	100.00	Korea	September	Security Collective Investment Vehicle
Aegis KORIF Private real estate Trust 17-4	100.00	100.00	Korea	September	Security Collective Investment Vehicle

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Invest Blue 1st Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
InvestCity 3rd Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)
Invest ST The First Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
Pine Tree sol Three Private equity investment Trust No.3	100.00	99.08	Korea	The end of each quarter	Real Estate Collective Investment Vehicle
Pine Tree sol Three Private equity investment Trust No.5	97.09	97.09	Korea	The end of each quarter	Real Estate Collective Investment Vehicle
Pine Tree sol Three Private equity investment Trust No.6-2	98.04	98.04	Korea	March, June, September, December	Real Estate Collective Investment Vehicle
Poong Cheon 2nd ⁵	-	-	Korea	May	Liquidation of Beneficiary certificates (SPC)
Phoenix Kyomoon 1st Co., Ltd. ⁵	-	-	Korea	October	Liquidation of Loans receivable (SPC)
Phoenix SN 2nd Co., Ltd. ⁵	-	-	Korea	October	Liquidation of Loans receivable (SPC)
Phoenix Yeondong 3rd Co., Ltd. ⁵	-	-	Korea	May	Liquidation of Loans receivable (SPC)
Phoenix Yulbuk 1st Co., Ltd. ⁵	-	-	Korea	April	Special Purpose Company
Phoenix Tangjung 1st Co., Ltd. ⁵	-	-	Korea	March	Liquidation of Loans receivable (SPC)
Hana Daol HW Landchip Private real estate feeder investment Trust No.1	98.00	98.00	Korea	26 th of each quarter	Real Estate Collective Investment Vehicle
Hanwha ASIA OPPORTUNITY Private Investment Trust No.1	100.00	100.00	Korea	May	Special Asset Collective Investment Vehicle
Hanwha GLOBAL CORPORATE PE STRATEGY Private Investment Trust No.2	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL CORPORATE PE STRATEGY Private Investment Trust No.1	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL CREDIT STRATEGY Private Investment Trust No.1	100.00	100.00	Korea	The end of each quarter	Security Collective Investment Vehicle
Hanwha GLOBAL INFRASTRUCTURE STRATEGY No.2	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL INFRASTRUCTURE STRATEGY No.1	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL REAL ESTATE STRATEGY	100.00	100.00	Korea	December	Real Estate Collective Investment Vehicle

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Private Investment Trust No.1						
Hanwha GLOBAL REAL ESTATE STRATEGY Private Investment Trust No.2	100.00	100.00	Korea	December	Real Estate Collective Investment Vehicle	
Hanwha Prudential U.S. Real Estate Debt	100.00	100.00	Korea	September	Real Estate Collective Investment Vehicle	
Hanwha Lifestyle Private Investment Trust No.1	100.00	100.00	Korea	April	Special Asset Collective Investment Vehicle	
Hanwha Vietnam OPPORTUNITY Private Investment Trust No.1	100.00	100.00	Korea	The end of each quarter	Security Collective Investment Vehicle	
Hanwha Solar Development Private Investment Trust No.2 ⁴	50.00	50.00	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha AI Global Choice Private Investment Trust No.1	100.00	100.00	Korea	April	Security Collective Investment Vehicle	
Hanwha AI Global Choice Private Investment Trust No.2	99.00	100.00	Korea	December	Security Collective Investment Vehicle	
Hanwha CONSUMER CREDIT Private Investment Trust No.1	100.00	100.00	Korea	March, June, September, December	Special Asset Collective Investment Vehicle	
Hanwha DEBT STRATEGY Real Estate Trust No.6	100.00	100.00	Korea	March	Special Asset Collective Investment Vehicle	
Hanwha LIFEPLUSTDF2020 equity investment Trust C-F	100.00	99.22	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha LIFEPLUSTDF2025 equity investment Trust C-F	100.00	99.47	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha LIFEPLUSTDF2030 equity investment Trust C-F	100.00	99.22	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha LIFEPLUSTDF2035 equity investment Trust C-F	100.00	99.52	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha LIFEPLUSTDF2040 equity investment Trust C-F	100.00	99.74	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha LIFEPLUSTDF2045 equity investment Trust C-F	100.00	99.63	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha LTI Private equity investment Trust No.2[Infra]	90.57	90.57	Korea	The end of each quarter, June	Special Asset Collective Investment Vehicle	
Hanwha LTI Infra Private equity investment Trust No.1	100.00	100.00	Korea	The end of each quarter, July	Special Asset Collective Investment Vehicle	
Hanwha Gwangju Ringroad	50.00	50.00	Korea	The end of each	Special Asset Collective	

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special asset investment trust(Infra) ⁴				quarter, June	Investment Vehicle
Hanwha Global Real Asset Investment Trust C-F	95.33	99.57	Korea	December	Special Asset Collective Investment Vehicle
Hanwha Global Security Investment Trust for corporation only(Bond)C	97.76	95.22	Korea	December	Security Collective Investment Vehicle
Hanwha Vietnam Regend Security Investment trust(Stock) C-F	93.61	100.00	Korea	June	Security Collective Investment Vehicle
Hanwha Asian Regend Security Investment trust(Stock) C-F	87.13	100.00	Korea	November	Security Collective Investment Vehicle
Hanwha Asian Regend 4th Industrial Revolution Investment trust(Stock) C-F	86.66	88.80	Korea	December	Security Collective Investment Vehicle
Hanwha Korea Regend 4th Industrial Revolution Investment trust(Stock) C-F	58.20	57.93	Korea	December	Security Collective Investment Vehicle
Hanwha Korea Regend Security Investment trust(Stock) C-F ⁴	81.52	49.87	Korea	December	Security Collective Investment Vehicle
Hanwha Photovoltaics Private Investment Trust No.1(Power Generation Facility) ⁴	50.00	50.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha Tricircle Infra Special Asset No.1	100.00	100.00	Korea	The end of each quarter, June	Special Asset Collective Investment Vehicle
Hanwha Tricircle Infra Special Asset No.3	95.00	95.00	Korea	The end of each quarter, July	Special Asset Collective Investment Vehicle
Hanwha Environment Love Private Investment Trust No.1 ⁴	50.00	50.00	Korea	The end of each quarter, June	Special Asset Collective Investment Vehicle
Hanwha Environment Love Private Investment Trust No.2 ⁴	40.30	40.30	Korea	The end of each quarter, July	Special Asset Collective Investment Vehicle
Hanwha AF 4 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
Hanwha AF 5 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
Eui-wang Landmark 1 ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)
Invest H 1 ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)
KB Sunjin Asia Real Asset Credit Professional Investment Type Private Equity Fund	93.40	-	Korea	April	Special Asset Collective Investment Vehicle
DB Exchangeable Bond Professional Investment	62.50	-	Korea	April	Special Asset Collective Investment Vehicle

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Type Private Equity Fund						
Daishin Asia Direct Lending Professional Investment Type Private Equity Fund	88.71	-	Korea	May	Special Asset Collective Investment Vehicle	
HSF 12th Co., Ltd ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Invest Industry 1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Invest Urge1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Great Banwol ⁵	-	-	Korea	December	Liquidation of Liquidation of Beneficiary certificates (SPC)	
Shinsegye1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
First M No.9 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
First M No.10 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Hyundai invest global infra Special Asset Investment Trust 15	100.00	-	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha DEBT STRATEGY Private Special Asset Investment Trust Security 16	50.90	-	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha Solar 4 Co., Ltd ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Newstar central valley 1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
JR Professional Investment Criminal Real Estate Investment Trust 15	63.13	-	Korea	December	Special Asset Collective Investment Vehicle	
KOTAM Aircraft Private Special Asset Investment Trust Security 2	50.10	-	Korea	December	Special Asset Collective Investment Vehicle	
ARIRANG US s-term A-rated corporate debts	65.22	-	Korea	December	Special Asset Collective Investment Vehicle	
ARIRANG US L-term A-rated corporate debts	62.50	-	Korea	December	Special Asset Collective Investment Vehicle	
Hanwha asia reits realestate reinvest fund (Reits-indirect type) C-F	100.00	-	Korea	December	Real Estate Collective Investment Vehicle	

¹ Considering the situation where the feasibility of potential voting rights is remote, the Company is considered to have control since it is able to exercise the majority of voting rights in its decision-making process as the percentage of voting rights exceeds 50%.

² Although the percentage of ownership is less than 50%, the Company is considered to have control since it is able to exercise the majority of voting rights in its decision-making process as the percentage of voting rights exceeds 50%.

³ Although the percentage of ownership is less than 50%, the Company is considered to have

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control as the majority of the remaining shareholders are widely dispersed, each holding less than 1% of ownership, and the Company is able to exercise its majority voting rights in the decision-making process considering the past attendance rate at the General Meeting.

⁴ Although the percentage of ownership does not exceed 50%, it is included in the subsidiary in accordance with Korean IFRS 1110, taking into account the percentage of ownership and the de facto agent relationship.

⁵ Although the Company does not have ownership interest, it is included in the scope of consolidation, considering contractual arrangements, exposures to variable returns and others.

⁶ Hanwha Land Systems Co., Ltd. merged Hanwha Defense Systems Corp. and changed its name to Hanwha Defense Systems Corp. for the year ended December 31, 2019.

⁷ Hanwha Solar Holdings Co., Ltd. merged Hanwha Q CELLS Co., Ltd. and changed its name to Hanwha Q CELLS Co., Ltd. for the year ended December 31, 2019.

⁸ Hanwha Q CELLS & Advanced Materials Co., Ltd. changed its name to Hanwha Global Asset Corporation and spun off Hanwha Q CELLS & Advanced Materials Co., Ltd. for the year ended December 31, 2019.

⁹ Hanwha Aerospace USA acquired 100% of shares of EDAC Technologies Holding Company and changed its name for the year ended December 31, 2019.

(2) Consus Incheon Sewer Private Equity Investment Trust 1 and other thirteen beneficiary certificates were excluded from the consolidated subsidiaries because the Group has failed to make practical decision on related activities of investees even though the Group has a majority of the ownership ratio for the year ended December 31, 2019.

(3) Subsidiaries newly included in the consolidation for the year ended December 31, 2019, are as follows:

Subsidiary	Reason
HANWHA MINING SERVICE USA INC.	Newly established
HANWHA DEFENSE AUSTRALIA PTY LTD	Newly established
Hanwha Systems Vietnam Co., Ltd.	Newly established
Q CELLS DO BRASIL CONSULTORIA EMPRESARIAL LTDA	Newly established
Elektrownia Fotowoltaiczna Kreznica Okragla Sp. z o.o.	Newly acquired
QSUN 20 Sp. z o.o.	Newly acquired
HW SOLAR POWER 14 G.K.	Newly acquired
LENEX Eletric Power G.K.	Newly acquired
Hanwha Global Infrastructure Strategy Fund III	Newly acquired
Hanwha The 3 rd Gyeongin highway Fund 1	Newly acquired
Landmark City 8 th Co., Ltd	Newly acquired
Great opportunity Co., Ltd	Newly acquired
YJ Asan 1	Newly acquired
YJ Asan 2	Newly acquired
HSF 19 th Co., Ltd	Newly acquired

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Invest CN Co., Ltd	Newly acquired
Purple tip 1 Co., Ltd	Newly acquired
Carrot General Insurance	Newly established
PLAZA Development & Company	Newly established
Hanwha Estate Service Co., Ltd.	Newly established
Accelerate Merger Corp.	Newly established
HANWHA POWER SYSTEMS VIETNAM COMPANY LIMITED	Newly established
Sunrise Solar	Newly acquired
QSUN 23 Sp. z o.o.	Newly acquired
Elektrownia OZE 3 Sp. z o.o.	Newly acquired
Sunwolt Sp. z o.o.	Newly acquired
Silesian Sun Energy Sp. z o.o.	Newly acquired
QSUN 26 z.o.o.	Newly acquired
SPP Wytwarzanie 18 sp. z o.o.	Newly acquired
SPP Wytwarzanie 31 sp. z o.o.	Newly acquired
SPP Wytwarzanie 33 sp. z o.o.	Newly acquired
PV Jagodne Sp. z.o.o.	Newly acquired
INCOGNITWORLD, LDA.	Newly acquired
Pinetree Securities Corporation(Formerly, HFT Securities Corporation)	Newly acquired
Hanwha AF 4	Newly acquired
Hanwha AF 5	Newly acquired
Eui-wang Landmark 1	Newly acquired
Invest H 1	Newly acquired
KB Sunjin Asia Real Asset Credit Professional Investment Type Private Equity Fund	Newly acquired
DB Exchangeable Bond Professional Investment Type Private Equity Fund	Newly acquired
Daishin Asia Direct Lending Professional Investment Type Private Equity Fund	Newly acquired
Hanwha U.S. Parking PPP Specialized Investment & Securities Special Asset Investment Trust 1-1	Newly acquired
Hanwha U.S. Parking PPP Specialized Investment & Securities Special Asset Investment Trust 1-2	Newly acquired
Anseong Techno Valley Co., Ltd.	Newly established
Hanwha Q CELLS & Advanced Materials Co., Ltd.	Newly established
Sociedade Poente Deslumbrante Lda.	Newly acquired
Las Coronadas Hive SL	Newly acquired
Guadajoz Hive SL	Newly acquired
Agenor Hive SL	Newly acquired

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Don Rodrigo Hive SL	Newly acquired
Hanwha Aerospace USA	Newly merged
EDAC Technologies Intermediate Company	Newly acquired
Hanwha Aerospace USA LLC	Newly acquired
EBTED Corporation	Newly acquired
APEX Machine Tool Company, Inc.	Newly acquired
Gros-lte Industries Inc.	Newly acquired
EDAC ND, Inc	Newly acquired
HSF 8 th Co., Ltd	Newly acquired
Invest Industry 1	Newly acquired
Invest Urge 1	Newly acquired
Great Banwol	Newly acquired
Shinsegye 1	Newly acquired
Hanwha Japan Solar Power 2	Newly acquired
Frist M No. 9	Newly acquired
First M No. 10	Newly acquired
Hanwha Gemini 1	Newly acquired
Hyundai Invest global infra Special Asset Investment Trust 15	Newly acquired
Hanwha DEBT STRATEGY Private Special Asset Investment Trust Security 16	Newly acquired
Hanwha Development USA Inc	Newly established
Summit Apollo Eleven	Newly acquired
HHR Development B	Newly acquired
HaeOReumSolar Co. Ltd	Newly established
ARBECA SOLAR SLU	Newly acquired
REUS SOLAR SLU	Newly acquired
CASTELLNOU SOLAR SLU	Newly acquired
VECIANA SOLAR SLU	Newly acquired
CASTELLDANS SOLAR SLU	Newly acquired
Malhada Green S.A	Newly acquired
Aceka 2 Gunes Enerjisi A.S.	Newly acquired
Aceka 3 Gunes Enerjisi A.S.	Newly acquired
Bilgidar 2 Gunes Enerjisi Limited Sirketi	Newly acquired
Buselik 2 Gunes Enerjisi Limited Sirketi	Newly acquired
Buselik 3 Gunes Enerjisi Limited Sirketi	Newly acquired
Dimetoka 2 Gunes Enerjisi Limited Sirketi	Newly acquired
Dimetoka 3 Gunes Enerjisi Limited Sirketi	Newly acquired
Isfahan 3 Gunes Enerjisi Limited Sirketi	Newly acquired
Onan 2 Gunes Enerji Uretim A.S.	Newly acquired

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Onan 3 Gunes Enerji Uretim A.S.	Newly acquired
Jeju Ocean Science Museum Corporation	Additionally acquired
Hanwha Solar 4 Co., Ltd	Newly acquired
Newstar central valley 1	Newly acquired
JR Professional Investment Criminal Real Estate Investment Trust 15	Newly acquired
KOTAM Aircraft Private Special Asset Investment Trust Security 2	Newly acquired
ARIRANG US s-term A-rated corporate debts	Newly acquired
ARIRANG US L-term A-rated corporate debts	Newly acquired
Hanwha asia reits realestate reinvest fund (Reits-indirect type) C-F	Newly acquired

(4) Subsidiaries excluded from the consolidation for the year ended December 31, 2019, are as follows:

Subsidiary	Reason
Hanwha Defense Systems Corp.	Merged
Formerly, Hanwha Q CELLS Co., Ltd.	Merged
Hanwha Multi-Asset Cruize 5.0 C-i1	Disposal
ARIRANG KRX300	Disposal
TIGER Preferred Stock ETF	Disposal
Masterpiece 1st Co, Ltd	Disposal
Antares Co., Ltd.	Disposal
Yookyeong Kosdaq Venture Investment Trust No.1	Disposal
Hanbando Solar Co., Ltd.	Disposal
WATER SOLAR CO., LTD	Disposal
Laura 1st Co., Ltd.	Disposal
HSF 7th Co., Ltd.	Disposal
Phoenix Gate Tower 1st	Disposal
Landmark City 8 th Co., Ltd. (Acquisition in Q1 and Exclusion Q2)	Disposal
Hanwha Arirang NASDAQ Technology Sector ETF	Equity method
Accelerate Merger Corp.	Merged
Bolca Enerji Uretim A.S.	Disposal
Kuantum Enerji Uretim A.S.	Disposal
Nuans Enerji Uretim A.S.	Disposal
Sipahi Enerji Uretim A.S.	Disposal
Tugce Enerji Uretim A.S.	Disposal
Varlık Enerji Uretim A.S.	Disposal

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AKD Enerji Uretim Sanayi ve Tic. A.S.	Disposal
AKY 4 Enerji Uretim Sanayi ve Tic. A.S.	Disposal
AKY 5 Enerji Uretim Sanayi ve Tic. A.S.	Disposal
BNS 5 Enerji Uretim Sanayi ve Tic. A.S.	Disposal
RTE 4 Enerji Uretim Sanayi ve Tic. A.S.	Disposal
Hanwha Techwin Do Brasil Equipamentos De Seguranca Ltda.	Disposal
Hanwha Consulting Services Myanmar Company Limited	Disposal
Hanwha U.S. Parking PPP Specialized Investment & Securities Special Asset Investment Trust 1-1	Disposal
Hanwha U.S. Parking PPP Specialized Investment & Securities Special Asset Investment Trust 1-2	Disposal
Invest PS 2nd Co., Ltd.	Disposal
Invest CN Co., Ltd	Disposal
NHL Development Co., Ltd.	Liquidated
Hanwha Investment Corp.	Liquidated
Ilsan Seaworld,Co., Ltd	Liquidated
Hanwha Agritech Ltd.	Liquidated
Hanwha Riverside LLC	Disposal
Fotovoltaica Sol del Norte SpA	Disposal
Fotovoltaica De Los Andes SpA	Disposal
Fotovoltaica Del Desierto SPA	Disposal
Onan Enerji Uretim A.S.	Disposal
Buselik Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Dimetoka Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Eflak Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Hersek Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
isfahan Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Kaniye Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Segah Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Turaneli Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Varna Enerji Sanayi ve Ticaret Ltd. Sti.	Disposal
Aceka Turizm ve Insaat A.S.	Disposal
Altaylar Altyapi ve Malzeme Hizmetleri A.S.	Disposal
Bilgidar Iletisim Egitim ve Danismanlik Hizmetleri Ltd. Sti.	Disposal
Greenland Altyapi ve Malzeme Hizmetleri A.S.	Disposal
Hazar Altyapi ve Malzeme Hizmetleri A.S.	Disposal
Kartal Altyapi ve Malzeme Hizmetleri A.S.	Disposal
Kent Altyapi ve Malzeme Hizmetleri A.S.	Disposal
Lisola Elektrik Uretim Insaat ve Ticaret Ltd. Sti.	Disposal

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Tesla 1 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 2 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 6 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 7 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 8 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 9 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 10 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 11 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 12 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Tesla 13 Gunes En. Ur. San. Ve Tic. A.S.	Disposal
Smart Side Co., Ltd.	Disposal
Invest Sejong 1st Co., Ltd.	Disposal
Invest Songdo 4th	Disposal
Invest Songdo 3 rd	Disposal
InvestCity 1st Co., Ltd.	Disposal
Crystal Moonlight Co., Ltd.	Disposal
HSF 17th Co., Ltd.	Disposal
HSF 18th Co., Ltd.	Disposal
Hanwha Japan Solar Power 2	Disposal
Hanwha Gemini 1	Disposal
2018 Hanwha IoT NeW Technology Venture Fund	Equity method
Hanwha Q CELLS PR Solar Holdings LLC	Liquidated
HSEA PR Isla Solar III, LLC	Liquidated

(5) Summary of financial information of subsidiaries as at December 31, 2019, is as follows:

Type Name of entity	2019						Total equity
	Current assets	Non-current assets	Assets for financial business	Current liabilities	Non-current liabilities	Liabilities for financial business	
Gyeonggi Yongin Techno Valley Co., Ltd.	W 138,155	W 445	W -	W 142,205	W -	W -	(3,605)
Hanwha Galleria Co., Ltd.	692,142	1,310,741	-	486,626	547,507	-	968,750
Hanwha Galleria Timeworld Co., Ltd.	61,475	291,414	-	185,653	36,381	-	130,854
Hanwha Engineering and Construction Corp.	2,641,979	2,695,640	-	3,034,883	1,678,135	-	624,601
Hanwha City Development Co., Ltd	7,975	182,088	-	1,759	5,142	-	183,161
Hanwha Savings Bank	-	-	960,168	-	-	843,614	116,554

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Co., Ltd.							
Small Giants New Renewable Energy Innovation Fund	-	-	83,353	-	-	1,918	81,435
Jeju Ocean Science Museum Corporation	15,859	94,390	-	6,699	77,517	-	26,034
H-P&D Co., Ltd	301,201	127,655	-	292,075	113,836	-	22,945
Carrot General Insurance	-	-	92,779	-	-	2,236	90,543
Hanwha Global Asset Corporation ¹¹	53,415	588,934	-	38,499	1,003	-	602,848
Hanwha Defense Systems Corp. ¹⁰	952,178	762,087	-	1,017,665	191,357	-	505,244
Hanwha Life Insurance Co., Ltd. ¹	-	-	119,523,683	-	-	109,399,950	10,123,733
Hanwha General Insurance Co., Ltd. ²	-	-	18,642,939	-	-	16,890,259	1,752,680
Hanwha Systems Co., Ltd.	1,520,711	885,940	-	1,167,703	270,525	-	968,424
Hanwha Aerospace Co., Ltd.	1,328,239	2,766,385	-	825,319	1,450,156	-	1,819,149
Hanwha Station Development Co., Ltd.	29,105	468,209	-	71,280	290,473	-	135,561
Hanwha Asset Management Co., Ltd.	-	-	234,591	-	-	34,701	199,890
Hanwha Precision Machinery Co., Ltd.	184,925	66,340	-	69,040	89,935	-	92,290
Hanwha Compound Corporation Co., Ltd.	44,793	32,313	-	18,825	6,576	-	51,705
Hanwha Chemical Co., Ltd.	1,277,657	6,969,001	-	1,375,965	1,917,119	-	4,953,575
Hanwha Chemical Overseas Holdings, Co., Ltd.	12,328	70,111	-	3,615	-	-	78,824
Hanwha Q CELLS & Advanced Materials Co., Ltd.	1,162,876	1,487,335	-	1,599,315	651,975	-	398,921
Hanwha Techwin Co., Ltd.	195,465	184,864	-	96,353	95,106	-	188,870
Hanwha Investment & Securities Co., Ltd. ³	-	-	9,874,049	-	-	8,716,715	1,157,334
Hanwha Power System Co., Ltd.	162,229	64,193	-	46,999	64,125	-	115,298
Hanwha Hotel & Resort Inc.	276,028	2,260,095	-	885,135	1,062,550	-	588,437
Hanwha Advanced Materials Europe, s.r.o.	59,154	29,664	-	55,658	19,458	-	13,703
HANWHA AERO ENGINES.,LTD	45,305	97,108	-	31,121	82,867	-	28,424
Hanwha Aerospace	92,514	108,475	-	30,671	132,442	-	37,876

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USA							
Hanwha America Development Inc.	40,621	74,262	-	-	3,561	-	111,322
Hanwha Chemical (Ningbo) Co., Ltd.	89,001	211,012	-	53,970	-	-	246,042
Hanwha Europe GmbH ⁴	74,061	21,684	-	68,223	6,747	-	20,775
Hanwha Holdings(USA), Inc. ⁵	316,963	338,635	-	340,265	23,769	-	291,564
Hanwha Life Insurance Company Limited. (Vietnam)	-	-	496,254	-	-	272,034	224,220
Hanwha Q CELLS Americas Holdings. Corp. ⁸	445,569	232,304	-	439,479	163,262	-	75,132
Hanwha Q CELLS Co., Ltd. ^{6,9}	1,260,812	1,447,194	-	1,289,492	473,656	-	944,858
Hanwha Q CELLS GmbH	330,718	159,210	-	270,175	52,029	-	167,724
Hanwha Q CELLS Investment Co., Ltd.	93,429	382,364	-	104,828	-	-	370,966
Hanwha Q CELLS Japan Co., Ltd.	209,268	94,715	-	168,807	9,530	-	125,646
Hanwha Q CELLS Malaysia Sdn. Bhd.	328,869	364,018	-	363,476	185,338	-	144,073
Hanwha Q CELLS Turkey ⁷	63,624	18,734	-	58,728	4,508	-	19,122
Hanwha Solar Power Kitsuki G.K.	12,680	65,628	-	3,976	41,446	-	32,887
Hanwha Techwin Security Vietnam	49,362	37,200	-	27,452	39,102	-	20,008
PT. Hanwha Life Insurance Indonesia	-	-	166,329	-	-	16,196	150,132
S&P World Networks DMCC	127,486	964	-	87,345	51	-	41,054
Samsung Opto-Electronics America, Inc.	118,379	6,933	-	85,796	-	-	39,517

¹ Financial information of Hanwha Life Insurance Co., Ltd., which includes 59 beneficiary certificates as at December 31, 2019.

² Financial information of Hanwha General Insurance Co., Ltd., which includes one beneficiary certificate as at December 31, 2019.

³ Consolidated financial information of Hanwha Investment & Securities Co., Ltd., which includes 39 SPCs as at December 31, 2019.

⁴ Consolidated financial information of Hanwha Europe GmbH, which includes the financial information of two subsidiaries.

⁵ Consolidated financial information of Hanwha Holdings (USA) Inc., which includes the financial information of 16 subsidiaries.

⁶ Consolidated financial information of Hanwha Q CELLS Co., Ltd., which includes the financial

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information of 19 subsidiaries.

⁷ Consolidated financial information of Hanwha Q CELLS Turkey, which includes the financial information of 26 subsidiaries.

⁸ Consolidated financial information of Hanwha Q CELLS Americas Holdings. Corp. which includes the financial information of 17 subsidiaries.

⁹ Hanwha Solar Holdings Co., Ltd. merged Hanwha Q CELLS Co., Ltd. and changes its name to Hanwha Q CELLS Co., Ltd. for the year ended December 31, 2019.

¹⁰ Hanwha Land Systems Co., Ltd. merged Hanwha Defense Systems Corp. and changed its name to Hanwha Defense Systems Corp. for the year ended December 31, 2019.

¹¹ Hanwha Q CELLS & Advanced Materials Co., Ltd. changed its name to Hanwha Global Asset Corporation and it was spun off for the year ended December 31, 2019.

(6) Summary of business performance of subsidiaries for the year ended December 31, 2019, is as follows:

Type Name of entity	2019				
	Sales	Operating profit (loss)	Profit (loss) for the year	Other comprehensive income (loss)	Total comprehensive income (loss)
Gyeonggi Yongin Techno Valley Co., Ltd.	₩ 102,556	₩ 15,912	₩ 14,216	₩ -	₩ 14,216
Hanwha Galleria Co., Ltd.	352,638	12,998	(10,339)	1,378	(8,961)
Hanwha Galleria Timeworld Co., Ltd.	263,711	(5,541)	(47,339)	(23,016)	(70,355)
Hanwha Engineering and Construction Corp.	3,823,383	293,405	147,525	(14,407)	133,118
Hanwha City Development Co., Ltd.	6,775	(6,487)	(19,127)	(688)	(19,815)
Hanwha Savings Bank Co., Ltd.	52,388	15,680	13,383	(83)	13,301
Small Giants New Renewable Energy Innovation Fund	760	(822)	(822)	-	(822)
Jeju Ocean Science Museum Corporation	-	-	-	-	-
H-P&D Co., Ltd.	147,330	26,503	18,214	-	18,214
Carrot General Insurance	725	(9,086)	(9,089)	(368)	(9,457)
Hanwha Global Asset Corporation ¹¹	1,726,004	89,212	(40,469)	(4,886)	(45,355)
Hanwha Defense Systems Corp. ¹⁰	1,462,670	85,343	74,031	(1,409)	72,622
Hanwha Life Insurance Co., Ltd. ¹	16,772,563	92,738	84,343	621,446	705,789
Hanwha General Insurance Co., Ltd. ²	8,069,760	(97,105)	(69,718)	324,489	254,771
Hanwha Systems Co., Ltd.	1,519,479	85,754	72,922	(8,327)	64,595
Hanwha Aerospace Co.,	1,190,923	(64,196)	28,148	(7,730)	20,418

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Ltd.					
Hanwha Station Development Co., Ltd.	205,420	12,834	10,438	(243)	10,195
Hanwha Asset Management Co., Ltd.	111,649	32,286	17,570	(12,331)	5,238
Hanwha Precision Machinery Co., Ltd.	337,367	9,693	9,807	1,143	10,950
Hanwha Compound Corporation Co., Ltd.	174,548	1,145	954	(151)	802
Hanwha Chemical Co., Ltd.	3,449,339	133,923	(71,299)	2,467	(68,832)
Hanwha Chemical Overseas Holdings, Co., Ltd.	-	(768)	(15,412)	-	(15,412)
Hanwha Q CELLS & Advanced Materials Co., Ltd.	896,412	33,559	12,455	1,853	14,309
Hanwha Techwin Co., Ltd.	465,502	20,713	17,407	(730)	16,677
Hanwha Investment & Securities Co., Ltd. ³	1,568,139	114,902	99,014	11,073	110,087
Hanwha Power System Co., Ltd.	188,312	9,402	13,801	(900)	12,901
Hanwha Hotel & Resort Inc.	1,243,456	(8,421)	(91,650)	4,414	(87,236)
Hanwha Advanced Materials Europe, s.r.o.	104,871	(2,380)	(66,551)	624	(65,927)
HANWHA AERO ENGINES.,LTD	41,845	967	(2,885)	1,137	(1,748)
Hanwha Aerospace USA	49,381	1,252	277	83	360
Hanwha America Development Inc.	-	-	1,366	3,762	5,128
Hanwha Chemical (Ningbo) Co., Ltd.	390,327	41,791	27,010	3,494	30,504
Hanwha Europe GmbH ⁴	189,867	2,548	1,523	263	1,785
Hanwha Holdings(USA), Inc. ⁵	586,464	20,680	12,148	7,658	19,806
Hanwha Life Insurance Company Limited. (Vietnam)	174,826	23,270	19,971	33,204	53,175
Hanwha Q CELLS Americas Holdings. Corp. ⁸	673,110	9,371	(1,107)	2,944	1,837
Hanwha Q CELLS Co., Ltd. ^{6,9}	1,683,983	56,879	(16,651)	6,567	(10,084)
Hanwha Q CELLS GmbH	841,337	(30,786)	(28,225)	2,911	(25,314)
Hanwha Q CELLS Investment Co., Ltd.	-	(504)	(1,556)	12,783	11,228
Hanwha Q CELLS Japan Co., Ltd.	760,087	23,263	15,791	5,108	20,898
Hanwha Q CELLS Malaysia Sdn. Bhd.	539,142	29,611	(28,682)	7,704	(20,978)
Hanwha Q CELLS Turkey ⁷	139,483	46,918	35,912	(625)	35,287

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Hanwha Solar Power Kitsuki G.K.	11,186	5,218	3,133	1,358	4,491
Hanwha Techwin Security Vietnam	141,736	11,869	9,842	333	10,175
PT. Hanwha Life Insurance Indonesia	19,166	1,958	1,949	11,977	13,926
S&P World Networks DMCC	270,613	6,084	5,513	981	6,495
Samsung Opto-Electronics America, Inc.	253,067	4,339	2,984	1,234	4,218

¹ Financial information of Hanwha Life Insurance Co., Ltd., which includes 59 beneficiary certificates as at December 31, 2019.

² Financial information of Hanwha General Insurance Co., Ltd., which includes one beneficiary certificate as at December 31, 2019.

³ Consolidated financial information of Hanwha Investment & Securities Co., Ltd., which includes 39 SPCs as at December 31, 2019.

⁴ Consolidated financial information of Hanwha Europe GmbH, which includes the financial information of two subsidiaries.

⁵ Consolidated financial information of Hanwha Holdings (USA) Inc., which includes the financial information of 16 subsidiaries.

⁶ Consolidated financial information of Hanwha Q CELLS Co., Ltd., which includes the financial information of 19 subsidiaries.

⁷ Consolidated financial information of Hanwha Q CELLS Turkey, which includes the financial information of 26 subsidiaries.

⁸ Consolidated financial information of Hanwha Q CELLS Americas Holdings. Corp. which includes the financial information of 17 subsidiaries.

⁹ Hanwha Solar Holdings Co., Ltd. merged Hanwha Q CELLS Co., Ltd. and changes its name to Hanwha Q CELLS Co., Ltd. for the year ended December 31, 2019.

¹⁰ Hanwha Land Systems Co., Ltd. merged Hanwha Defense Systems Corp. and changed its name to Hanwha Defense Systems Corp. for the year ended December 31, 2019.

¹¹ Hanwha Q CELLS & Advanced Materials Co., Ltd. changed its name to Hanwha Global Asset Corporation and it was spun off for the year ended December 31, 2019.

5. Investments in Associates and Joint Venture

(1) Details of major investments in associates and joint venture as at December 31, 2019 and 2018, are as follows:

Name of entity	Percentage of ownership (%)		Location	Closing month	Business
	2019	2018			
Joint venture					
Yeochun NCC Co., Ltd.	50.00	50.00	Korea	December	Manufacture of basic compound

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Associate

Hanwha General Chemical Co., Ltd.	36.05	36.05	Korea	December	Manufacture of petrochemicals
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(2) Changes in investments in associates and joint venture for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019						
	Beginning	Acquisitions	Disposals	Share of profit or loss of associates and joint venture	Other comprehensive loss	Others ¹	Ending
Yeochun NCC Co., Ltd.	₩ 567,783	₩ -	₩ -	₩ 166,366	₩ -	₩ (70,164)	₩ 663,985
Hanwha General Chemical Co., Ltd.	1,131,141	-	-	78,849	(1,074)	(45)	1,208,871
Others	556,776	151,979	(39,889)	(6,219)	(15,957)	(17,347)	629,343
	<u>₩ 2,255,700</u>	<u>₩ 151,979</u>	<u>₩ (39,889)</u>	<u>₩ 238,996</u>	<u>₩ (17,031)</u>	<u>₩ (87,556)</u>	<u>₩ 2,502,199</u>

¹ Others include changes in scope of consolidation and receipts of dividends from associates.

(in millions of Korean won)

	2018						
	Beginning	Acquisitions	Disposals	Share of profit or loss of associates and joint venture	Other comprehensive income	Others ¹	Ending
Yeochun NCC Co., Ltd.	₩ 770,602	₩ -	₩ -	₩ 230,585	₩ -	₩ (433,404)	₩ 567,783
Hanwha General Chemical Co., Ltd.	971,321	-	-	158,852	3,267	(2,299)	1,131,141
Hanwha Q CELLS Korea Corp.	186,287	-	-	32,159	1,107	(219,553)	-
Others	529,656	142,943	(21,224)	(765)	7,608	(101,441)	556,777
	<u>₩ 2,457,866</u>	<u>₩ 142,943</u>	<u>₩ (21,224)</u>	<u>₩ 420,831</u>	<u>₩ 11,982</u>	<u>₩ (756,697)</u>	<u>₩ 2,255,701</u>

¹ Others include changes in scope of consolidation and receipts of dividends from associates.

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(3) Summary of financial information of major associates and joint venture as at December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

	2019			
	Current assets	Non-current assets	Current liabilities	Non-current liabilities
Yeochun NCC Co., Ltd.	₩ 1,244,173	₩ 1,306,130	₩ 710,244	₩ 434,846
Hanwha General Chemical Co., Ltd.	1,143,829	2,531,175	282,060	67,973

(in millions of Korean won)

	2018			
	Current assets	Non-current assets	Current liabilities	Non-current liabilities
Yeochun NCC Co., Ltd.	₩ 1,140,900	₩ 954,697	₩ 601,890	₩ 289,059
Hanwha General Chemical Co., Ltd.	1,075,401	2,531,233	412,598	81,242

(4) Summary of business performance of major associates and joint venture for the years ended December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

	2019				
	Revenue	Gain from continuing operations	Other comprehensive income (loss)	Total comprehensive income	Receipts of dividends from associates
Yeochun NCC Co., Ltd.	₩ 5,006,425	₩ 340,893	₩ (1,188)	₩ 339,705	₩ 70,000
Hanwha General Chemical Co., Ltd.	1,472,790	215,282	(4,319)	210,963	-

(in millions of Korean won)

	2018				
	Revenue	Gain from continuing operations	Other comprehensive income (loss)	Total comprehensive income	Receipts of dividends from associates
Yeochun NCC Co., Ltd.	₩ 5,854,385	₩ 457,306	₩ (6,808)	₩ 450,497	₩ 430,000
Hanwha General Chemical Co., Ltd.	2,917,814	503,228	1,491	504,719	-

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(5) Details of adjustments from financial information of major associates and joint venture to the book amount of investments in associates and joint venture for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019	
	Yeochun NCC Co., Ltd.	Hanwha General Chemical Co., Ltd. ¹
Net assets (A)	₩ 1,405,213	₩ 3,324,971
Percentage of ownership (B)	50.00	36.05
Interests in net assets (A×B)	702,607	1,198,498
(+) Goodwill	-	-
(-) Intercompany transactions	(38,622)	10,373
Book amount	<u>₩ 663,985</u>	<u>₩ 1,208,871</u>

¹ The information is based on consolidated financial statements, and the Group has reflected net assets attributed to owners of the parent within the entity's consolidated financial statements.

(in millions of Korean won)

	2018	
	Yeochun NCC Co., Ltd.	Hanwha General Chemical Co., Ltd. ¹
Net assets (A)	₩ 1,204,648	₩ 3,112,794
Percentage of ownership (B)	50.00	36.05
Interests in net assets (A×B)	602,324	1,122,018
(+) Goodwill	-	-
(-) Intercompany transactions	(34,541)	9,123
Book amount	<u>₩ 567,783</u>	<u>₩ 1,131,141</u>

¹ The information is based on consolidated financial statements, and the Group has reflected net assets attributed to owners of the parent within the entity's consolidated financial statements.

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(6) Unrecognized accumulated loss as discontinued use of equity method for the years ended December 31, 2019 and 2018, is as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Galleriaforet Corp.	₩	16,058	₩	15,598
Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.		24,141		-
Crystal Solar Inc.		-		3,386
Burdur Enerji A.S.		1,986		1,872
Bio Green Technology Sdn Bhd.		258		269
Alterpower Digos Solar, Inc. (Formerly, Enfinity Philippines Renewable Resources Fourth, Inc.)		6,845		268
Luxbon Solar S.A.		848		-

Investments in associates are provided as collateral for payables of the Group as at December 31, 2019 (Note 55).

6. Segment Information

(1) The Group's reportable segments and details are as follows

Segment	Main business
Explosives and production	Manufacturing and selling of explosives
Trading and wholesale retails	Trading and retails
Petrochemical production	Manufacturing and selling of petrochemicals
Construction	Engineering and construction services for building, plant and environment facilities, and others
Leisure and service	Operating athletic facilities, tourism, hotel and catering businesses
Photovoltaic business	Manufacturing and selling of product related to sunlight and photovoltaic power generation
Financial business	Insurance business and management of deposits and instalment savings
Others	Manufacturing and selling of others

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(2) A profit or loss by each segment for the years ended December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

		2019				
		Explosives & Production	Trading & Wholesale retails	Petrochemical production	Construction	Leisure & Service
Revenue	₩	7,310,767	₩ 4,922,766	₩ 4,996,795	₩ 4,032,633	₩ 2,105,037
Operating profit (loss)		251,680	100,522	150,750	270,781	52,241
Finance income (costs) and others		27,013	(144,449)	(464,434)	(200,875)	(114,296)
Profit (loss) for the year		278,693	(43,927)	(313,684)	69,906	(62,055)

(in millions of Korean won)

		2019				
		Photovoltaic business	Financial business	Others	Consolidation adjustment	Total
Revenue	₩	6,173,958	₩ 26,875,982	₩ 975,561	₩ (6,981,100)	₩ 50,412,399
Operating profit (loss)		229,577	170,627	11,490	(111,951)	1,125,717
Finance income (costs) and others		(217,412)	(17,053)	(36,758)	273,601	(894,663)
Profit (loss) for the year		12,165	153,574	(25,268)	161,650	231,054

(in millions of Korean won)

		2018				
		Explosives & Production	Trading & Wholesale retails	Petrochemical production	Construction	Leisure & Service
Revenue	₩	7,350,142	₩ 4,905,693	₩ 5,585,346	₩ 3,850,092	₩ 1,805,338
Operating profit (loss)		312,716	94,182	359,585	281,962	35,456
Finance income (costs) and others		67,464	(33,624)	136,859	(224,205)	(31,882)
Profit (loss) for the year		380,180	60,558	496,444	57,757	3,574

(in millions of Korean won)

		2018				
		Photovoltaic business	Financial business	Others	Consolidation adjustment	Total
Revenue	₩	3,679,600	₩ 25,497,274	₩ 1,172,199	₩ (5,105,531)	₩ 48,740,153
Operating profit (loss)		(2,471)	815,325	13,992	(104,599)	1,806,148
Finance income (costs) and others		(293,460)	(266,530)	(49,507)	(311,922)	(1,006,807)
Profit (loss) for the year		(295,931)	548,795	(35,515)	(416,522)	799,340

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(3) Segment assets and liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019	
	Reportable segment asset	Reportable segment liability
Explosives and production	₩ 17,099,602	₩ 9,632,077
Trading and wholesale retails	3,837,515	2,537,101
Petrochemical production	9,976,405	3,759,195
Construction	6,509,266	6,535,168
Leisure and service	3,458,494	2,457,959
Photovoltaic business	8,940,219	5,842,037
Financial business	150,266,734	136,209,329
Others	1,808,392	992,070
Consolidation adjustment	(19,610,449)	(3,942,729)
	<u>₩ 182,286,178</u>	<u>₩ 164,022,207</u>

(in millions of Korean won)

	2018	
	Reportable segment asset	Reportable segment liability
Explosives and production	₩ 15,313,692	₩ 8,068,474
Trading and wholesale retails	3,802,962	2,457,964
Petrochemical production	9,671,798	3,140,337
Construction	5,719,912	5,751,322
Leisure and service	3,125,355	2,137,425
Photovoltaic business	7,736,541	5,179,761
Financial business	139,739,594	127,417,184
Others	1,662,881	856,252
Consolidation adjustment	(17,224,158)	(2,413,177)
	<u>₩ 169,548,577</u>	<u>₩ 152,595,542</u>

The above composition of reportable segments for the prior period has been restated to meet the classification criteria of the current period.

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(4) The Group's sales for the years ended December 31, 2019 and 2018, and the book amount of non-current assets as at December 31, 2019 and 2018, by regional groups, are as follows:

(in millions of Korean won)

	Sales		Non-current assets ¹	
	2019	2018	2019	2018
Domestic	₩ 41,953,463	₩ 41,135,227	₩ 17,113,951	₩ 16,430,335
USA	1,712,528	981,172	1,361,832	1,117,648
Asia	3,502,453	3,458,388	981,976	924,968
Others	3,243,955	3,165,366	2,899,788	2,540,410
	<u>₩ 50,412,399</u>	<u>₩ 48,740,153</u>	<u>₩ 22,357,547</u>	<u>₩ 21,013,361</u>

¹ Financial instruments, deferred tax assets and others are excluded from 'Non-current assets'.

No single customer accounts for more than 10% of consolidated sales for the years ended December 31, 2019 and 2018.

7. Restricted-to-use and Secured Financial Assets (Non-financial Business)

Restricted-to-use and secured financial assets as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	Description	2019	2018
Cash and cash equivalents	Guarantees for transaction and others	₩ 75,848	₩ 56,418
Short-term financial instruments	Guarantees for borrowings and transaction	323,711	290,630
Long-term financial instruments	Guarantees for deposit for opening of checking account and others	6,386	10,512
		<u>₩ 405,945</u>	<u>₩ 357,560</u>

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8. Cash and Cash Equivalents (Non-financial Business)

Details of cash and cash equivalents as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
Cash on hand	₩	309,722	₩	235,935
Cash in bank		1,545,114		1,560,872
Other cash and cash equivalents		1,657,839		1,147,734
	₩	<u>3,512,675</u>	₩	<u>2,944,541</u>

9. Financial Instruments by Category (Non-financial Business)

(1) Categorizations of financial assets as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Hedging derivative financial instruments	Financial assets at fair value through other comprehensive income	Total
Current assets:					
Cash and cash equivalents	₩ 3,512,676	₩ -	₩ -	₩ -	₩ 3,512,676
Financial assets at fair value through profit or loss	-	11,171	-	-	11,171
Financial assets at fair value through other comprehensive income	-	-	-	50	50
Financial assets at amortized cost	9,998	-	-	-	9,998
Trade and other receivables	4,128,018	36,449	-	-	4,164,467
Other financial assets	740,107	18,348	14,518	-	772,973
Non-current assets:					
Financial assets at fair value through profit or loss	-	150,982	-	-	150,982
Financial assets at fair value through other comprehensive income	-	-	-	17,107	17,107
Trade and other receivables	182,632	-	-	-	182,632
Other financial assets	237,852	30,268	2,706	-	270,826
	₩ 8,811,283	₩ 247,218	₩ 17,224	₩ 17,157	₩ 9,092,882

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	2018				
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Hedging derivative financial instruments	Financial assets at fair value through other comprehensive income	Total
Current assets:					
Cash and cash equivalents	₩ 2,944,541	₩ -	₩ -	₩ -	₩ 2,944,541
Financial assets at fair value through profit or loss	-	15	-	-	15
Financial assets at fair value through other comprehensive income	-	-	-	156	156
Trade and other receivables	4,229,779	15,100	-	-	4,244,879
Other financial assets	700,488	9,847	805	-	711,140
Non-current assets:					
Financial assets at fair value through profit or loss	-	155,203	-	-	155,203
Financial assets at fair value through other comprehensive income	-	-	-	23,669	23,669
Trade and other receivables	93,866	-	-	-	93,866
Other financial assets	194,659	15,915	767	-	211,341
	<u>₩ 8,163,333</u>	<u>₩ 196,080</u>	<u>₩ 1,572</u>	<u>₩ 23,825</u>	<u>₩ 8,384,810</u>

(2) Categorizations of financial liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Financial liabilities at amortized cost	Financial liabilities at fair value through profit or loss	Hedging derivative financial instruments	Total
Current liabilities:				
Trade and other payables	₩ 3,010,231	₩ -	₩ -	₩ 3,010,231
Borrowings and debentures	7,240,643	-	-	7,240,643
Other financial liabilities	882,482	9,159	8,457	900,098
Non-current liabilities:				
Trade and other payables	266,051	-	-	266,051
Borrowings and debentures	6,886,500	-	-	6,886,500
Other financial liabilities	850,608	11,314	1,865	863,787
	<u>₩ 19,136,515</u>	<u>₩ 20,473</u>	<u>₩ 10,322</u>	<u>₩ 19,167,310</u>

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(in millions of Korean won)

	2018			
	Financial liabilities at amortized cost	Financial liabilities at fair value through profit or loss	Hedging derivative financial instruments	Total
Current liabilities:				
Trade and other payables	₩ 2,981,563	₩ 23,758	₩ -	₩ 3,005,321
Borrowings and debentures	7,062,482	-	-	7,062,482
Other financial liabilities	758,098	27,413	590	786,101
Non-current liabilities:				
Trade and other payables	164,078	-	-	164,078
Borrowings and debentures	5,799,913	-	-	5,799,913
Other financial liabilities	322,283	2,740	1,527	326,550
	<u>₩ 17,088,417</u>	<u>₩ 53,911</u>	<u>₩ 2,117</u>	<u>₩ 17,144,445</u>

(3) Net gains or losses on each category of financial instruments for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019	2018
Financial assets and liabilities at fair value through profit or loss:		
Loss on transactions	₩ (17,600)	₩ (14,220)
Gain on valuation	15,756	25,260
Others	(208)	(829)
Financial assets and liabilities at amortized cost:		
Loss on transactions	(2,015)	(4,373)
Interest income	55,877	57,695
Interest expenses ¹	(489,309)	(419,079)
Loss on valuation	(69,441)	(5,142)
Loss on foreign currency translation	(19,303)	(71,259)
Gain (loss) on foreign currency transaction	1,361	(8,513)
Financial assets at fair value through other comprehensive income:		
Gain (loss) on valuation (other comprehensive income and loss) ²	635,448	(118,694)
Loss on transactions	(2)	(61)
Dividend income	3,008	17,500

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¹ Interest expenses that are directly attributable to qualifying asset are capitalized as part of the acquisition cost for the year ended December 31, 2019 (Note 52).

² Gain (loss) on valuation of financial assets and liabilities at fair value through other comprehensive income in financial business is included and the amount is before tax effect.

10. Trade and Other Receivables (Non-financial Business)

(1) Details of trade and other receivables as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
	Current	Non-current	Current	Non-current
Trade receivables	₩ 4,252,648	₩ 108,986	₩ 4,338,953	₩ 110,392
Less: provisions for impairment	(302,372)	(24,008)	(362,476)	(25,811)
Less: present value discounts	(517)	(1,099)	(567)	(1,138)
Other receivables	251,948	107,544	291,485	15,902
Less: provisions for impairment	(37,240)	(5,200)	(22,516)	(5,479)
Less: Present value discounts	-	(3,591)	-	-
	<u>₩ 4,164,467</u>	<u>₩ 182,632</u>	<u>₩ 4,244,879</u>	<u>₩ 93,866</u>

(2) Credit risk and provisions for impairment

The Group always recognizes lifetime ECL for trade receivables. The ECLs on these trade receivables are estimated using a provision matrix based on the adjusted for factors that are specific to the debtors, general economic conditions and an assessment of both the current as well as the forecast direction of conditions at the reporting date, including time value of money where appropriate.

1) Changes in provisions for impairment of trade and other receivables for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019
Beginning balance	₩ 416,282
Increase in loss allowance recognized in profit or loss during the year	76,444
Receivables written off during the year as uncollectible	(97,864)
Unused amounts reversed	(25,654)
Others ¹	(388)
Ending balance ²	<u>₩ 368,820</u>

¹ Others include the effects of changes in exchange rate and others.

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² As at December 31, 2019, the Group applies the simplified approach, which requires expected lifetime credit losses to be recognized in accordance with Korean IFRS 1109.

(in millions of Korean won)

	2018	
Beginning (Korean IFRS 1039)	₩	627,527
Adjustments for retained earning		7,352
Beginning (Korean IFRS 1109)		634,879
Increase in loss allowance recognized in profit or loss during the year		120,312
Receivables written off during the year as uncollectible		(206,483)
Unused amounts reversed		(139,481)
Others ¹		7,056
Ending balance ²	₩	<u>416,283</u>

¹ Others include the effects of changes in exchange rate and others.

² As at December 31, 2018, the Group applies the simplified approach, which requires expected lifetime credit losses to be recognized in accordance with Korean IFRS 1109.

(3) The aging analysis of the trade and other receivables as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
Receivables not past due	₩	2,496,685	₩	3,219,341
		<u>2,496,685</u>		<u>3,219,341</u>
Past due but not impaired				
Less than 3 months		960,552		785,646
Between 3 months and 6 months		414,711		155,611
Between 6 months and 1 year		287,434		104,539
More than 1 year		285,705		188,952
		<u>1,948,402</u>		<u>1,234,748</u>
Impaired				
Less than 3 months		38,280		12,165
Between 3 months and 6 months		2,953		8,047
Between 6 months and 1 year		6,370		3,789
More than 1 year		228,436		278,642
		<u>276,039</u>		<u>302,643</u>
	₩	<u>4,721,126</u>	₩	<u>4,756,732</u>

The aging analysis include trade and other receivables.

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(4) Details of transferred financial assets that are not derecognized in their entirety as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	Trade receivables			
		2019		2018
Book amount of transferred financial assets	₩	81,003	₩	215,363
Related liabilities ¹		(81,003)		(215,363)

¹ The Group transferred trade receivables to banks and collected cash. The Group has responsibility of recourse as at December 31, 2019. In addition, the related liabilities are recognized as collateralized borrowing (Note 20).

11. Financial Assets (Non-financial Business)

(1) Details of financial assets measured at fair value as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019		2018
Financial assets at fair value through profit or loss	₩	162,152	₩	155,218
Financial assets at fair value through other comprehensive income		17,157		23,825
	₩	<u>179,309</u>	₩	<u>179,043</u>

(2) Details of financial assets measured at fair value through profit or loss as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019		2018
Equity securities				
Listed securities	₩	6,224	₩	5,270
Unlisted securities		5,125		2,000
		<u>11,349</u>		<u>7,270</u>
Debt securities				
Public bonds		9		24
Unlisted debt securities		130,956		130,588
		<u>130,965</u>		<u>130,612</u>
Beneficiary certificates				
		19,838		17,336
	₩	<u>162,152</u>	₩	<u>155,218</u>

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(3) Details of financial assets measured at fair value through other comprehensive income as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Equity securities				
Listed securities	₩	58	₩	65
Unlisted securities		16,659		23,110
		<u>16,717</u>		<u>23,175</u>
Debt securities				
Public bonds		440		571
Unlisted debt securities		-		79
		<u>440</u>		<u>650</u>
	₩	<u>17,157</u>	₩	<u>23,825</u>

12. Other Financial Assets (Non-financial Business)

(1) Details of other financial assets as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019				2018			
	Current		Non-current		Current		Non-current	
Long and short-term financial instruments	₩	671,416	₩	19,112	₩	544,664	₩	30,008
Accrued income		6,081		-		6,948		-
Loans		32,663		607,029		136,788		584,367
Less: provision for impairment		(639)		(484,075)		(1,130)		(510,719)
Less: present value discounts		(283)		(2,928)		(491)		(4,917)
Guarantee deposits		31,393		105,742		14,385		106,394
Less: provision for impairment		-		(730)		-		(768)
Less: present value discounts		(526)		(6,298)		(676)		(9,705)
Derivative financial instruments		32,868		32,974		10,652		16,681
	₩	<u>772,973</u>	₩	<u>270,826</u>	₩	<u>711,140</u>	₩	<u>211,341</u>

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13. Derivative Financial Instruments (Non-financial Business)

Details of derivative financial assets as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Assets	Liabilities	Assets	Liabilities
Trading				
Currency forward	₩ 16,655	₩ 2,678	₩ 6,839	₩ 1,985
Currency swap	13,226	9,832	1,213	14,721
Currency option	-	-	2,849	8,074
Interest swap	986	4,183	988	2,289
Others ^{1,2}	17,750	-	13,872	2,526
Fair value hedge				
Currency forward	132	64	45	429
Currency swap	1,134	-	-	57
Physical derivatives	12,540	11,971	750	750
Cash flow hedge				
Currency swap	3,419	709	763	1,136
Interest swap	-	1,358	14	304
	₩ 65,842	₩ 30,795	₩ 27,333	₩ 32,271

¹ Other derivative liabilities include the fair value of the exchangeable rights and early repayment right that are embedded in the exchangeable bonds issued during the year 2016.

² Details of other derivative financial instruments as at December 31, 2019, is as follows:

Details	
Underlying assets	Residual equity of P&W NGPF Manufacturing Company Singapore. Ltd. (70%)
Striking price of call option	70% of P&W NGPF Manufacturing Company Singapore. Ltd.'s net asset value plus \$11,800,000 at the time of the exercise
Striking period of call option	January 1, 2022, to December 31, 2026
Owner of call option	Hanwha Aerospace Co., Ltd. (Formerly, Hanwha Techwin Co., Ltd.)
Discount rate	Singapore Government bond interest rate curve

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14. Inventories (Non-financial Business)

(1) Details of inventories as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Finished goods	₩	640,988	₩	761,342
Less: valuation allowance		(34,276)		(29,020)
Merchandise		465,885		613,817
Less: valuation allowance		(26,431)		(22,961)
Semifinished goods		308,582		247,354
Less: valuation allowance		(3,786)		(5,205)
Work in progress		1,055,134		1,151,139
Less: valuation allowance		(1,018)		(1,003)
Raw materials		1,075,305		878,083
Less: valuation allowance		(37,082)		(34,697)
Supplies		98,443		89,327
Less: valuation allowance		(15,353)		(119)
Materials in transit		389,397		231,751
	₩	<u>3,915,788</u>	₩	<u>3,879,808</u>

The cost of inventories recognized as expense and included in 'cost of sales' amounts to ₩ 15,346,480 million (2018: ₩ 15,487,199 million) for the year ended December 31, 2019. The Group recognized loss on inventory valuation of ₩ 24,941 million (2018: ₩ 23,310 million) for the year ended December 31, 2019. The amount of loss on inventory has been included in 'cost of sales'. In addition, the Group recognized obsolescence loss on inventory amounting to ₩ 11,217 million (2018: ₩ 278 million) for the year ended December 31, 2019. The amount of loss on inventory has been included in 'other expenses'.

(2) The inventories are provided as collateral in relation to liabilities as at December 31, 2019 (Note 56).

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15. Other Assets (Non-financial Business)

(1) Details of other assets as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Advance payments	₩ 1,458,124	₩ -	₩ 1,153,440	₩ -
Less: provisions for impairment	(106,505)	-	(104,320)	-
Contract execution cost ¹	62,594	-	6,342	-
Prepaid expense	116,375	91,207	194,658	47,352
Prepaid VAT	103,235	-	71,759	-
Contract assets	679,912	-	521,823	-
Refund asset	76	-	316	-
Long-term advance payments	-	187	-	-
Others	-	96,716	-	107,554
	<u>₩ 2,313,811</u>	<u>₩ 188,110</u>	<u>₩ 1,844,018</u>	<u>₩ 154,906</u>

¹ Includes the amount of prepaid construction costs

(2) Details of contract assets as at December 31, 2019, are as follows:

(in millions of Korean won)

	2019	2018
Due from customers for contract work	₩ 678,950	₩ 521,823
Incremental costs	53,120	-
Prepaid construction costs	11,436	-
Others	122	54,787
	<u>₩ 743,627</u>	<u>₩ 576,610</u>

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16. Property, Plant and Equipment (Non-financial Business)

(1) Details of property, plant and equipment as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Cost	Accumulated depreciation	Accumulated impairment	Government grants	Book amount
Land	₩ 4,145,208	₩ -	₩ (5,757)	₩ (778)	₩ 4,138,673
Buildings	3,860,823	(1,285,878)	(72,482)	(793)	2,501,670
Structures	852,829	(413,991)	(26,952)	(68)	411,818
Machinery	7,839,066	(4,220,922)	(603,911)	(957)	3,013,276
Vehicles	116,153	(84,871)	(31)	-	31,251
Tools and equipment	910,508	(667,455)	(10,433)	(112)	232,508
Construction in progress	1,091,462	-	(4,316)	(34,207)	1,052,939
Others	344,146	(251,471)	(12,697)	-	79,978
Mining properties in development	12,682	-	(12,682)	-	-
	₩ 19,172,877	₩ (6,924,588)	₩ (749,261)	₩ (36,915)	₩ 11,462,113

(in millions of Korean won)

	2018				
	Cost	Accumulated depreciation	Accumulated impairment	Government grants	Book amount
Land	₩ 4,267,408	₩ -	₩ (5,484)	₩ -	₩ 4,261,924
Buildings	4,022,260	(1,296,253)	(72,551)	(824)	2,652,632
Structures	799,179	(389,511)	(2,308)	(9)	407,351
Machinery	7,318,424	(3,879,257)	(338,096)	(293)	3,100,778
Vehicles	115,317	(76,996)	-	-	38,321
Tools and equipment	918,840	(673,765)	(900)	(135)	244,040
Construction in progress	725,142	-	(13,822)	(16,305)	695,015
Others	319,743	(239,656)	(8)	-	80,079
Mining properties in development	12,682	-	(12,682)	-	-
	₩ 18,498,995	₩ (6,555,438)	₩ (445,851)	₩ (17,566)	₩ 11,480,140

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(2) Changes in property, plant and equipment for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019					
	Beginning	Acquisitions	Disposals	Depreciation	Others ¹	Ending
Land	₩ 4,261,924	₩ 71,970	₩ (3,508)	₩ -	₩ (191,712)	₩ 4,138,674
Buildings	2,652,632	59,999	(9,249)	(129,124)	(72,587)	2,501,671
Structures	407,351	20,747	(1,922)	(32,816)	18,459	411,819
Machinery	3,100,778	136,630	(32,603)	(471,932)	280,402	3,013,275
Vehicles	38,321	4,618	(376)	(9,828)	(1,484)	31,251
Tools and equipment	244,040	62,734	(7,620)	(79,716)	13,069	232,507
Construction in progress	695,015	1,389,060	(11,597)	(77)	(1,019,462)	1,052,939
Others	80,079	44,453	(2,253)	(18,306)	(23,996)	79,977
	<u>₩ 11,480,140</u>	<u>₩ 1,790,211</u>	<u>₩ (69,128)</u>	<u>₩ (741,799)</u>	<u>₩ (997,311)</u>	<u>₩ 11,462,113</u>

¹ Others include changes in scope of consolidation, the change from transfer, the effects of changes in exchange rate and impairment loss on property, plant and equipment of ₩ 406,646 million.

(in millions of Korean won)

	2018					
	Beginning	Acquisitions	Disposals	Depreciation	Others ¹	Ending
Land	₩ 4,218,607	₩ 18,506	₩ (27,700)	₩ -	₩ 52,511	₩ 4,261,924
Buildings	2,202,963	29,892	(12,246)	(121,073)	553,096	2,652,632
Structures	370,965	9,706	(1,306)	(31,695)	59,681	407,351
Machinery	2,575,314	188,950	(13,878)	(409,616)	760,008	3,100,778
Vehicles	43,413	5,087	(536)	(9,306)	(337)	38,321
Tools and equipment	203,762	41,757	(8,755)	(73,985)	81,261	244,040
Construction in progress	459,731	918,266	(1,445)	-	(681,537)	695,015
Others	101,586	50,046	(1,634)	(31,544)	(38,375)	80,079
	<u>₩ 10,176,341</u>	<u>₩ 1,262,210</u>	<u>₩ (67,500)</u>	<u>₩ (677,219)</u>	<u>₩ 786,308</u>	<u>₩ 11,480,140</u>

¹ Others include changes in scope of consolidation, the change from transfer and the effects of changes in exchange rate

Depreciation expense of ₩ 649,098 million (2018: ₩ 578,731 million) was charged to 'cost of sales' and ₩ 92,701 million (2018: ₩ 98,407 million) to 'selling and administrative expenses'.

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Property, plant and equipment are provided as collateral for borrowings as at December 31, 2019 (Note 56).

(3) Impairment of property, plant and equipment

The Group completed the construction of a polysilicon manufacturing plant in Yeosu Industrial Complex in 2013 and has commenced production from the first quarter of 2014. Due to reduction of subsidies by China and safeguard sanction by the U.S. that cause long-term stagnation indicators of possible impairment of the related business segment were detected. As at December 31, 2019, the carrying amount of polysilicon business segment is ₩ 358,919 million and its recoverable amount is ₩ 57,706 million. In relation to this, the Group recognized impairment loss of ₩ 301,213 million as non-operating expenses.

The Group estimated net fair value based on the recent market price of assets with similar useful lives and obsolescence levels and estimated value-in-use based on the discounted future cash flows expected from the continuous use of the assets. In this case, impairment loss was allocated to the cash generating units (CGUs) in consideration of the net fair value of each asset.

Value-in-use is calculated based on the following key assumptions:

- ① Future cash flows over a period of five years were predicted. The Group estimated future cash flows of each CGU by considering past experience, operation results and future business plan for the next five years. Cash flows after five years were estimated using a fixed growth rate of 1.00% as at December 31, 2019 and 2018, respectively. The growth rates do not exceed the long-term average growth rates for the business in which the CGU operates.
- ② The selling price of the product was applied to the cash flow forecast period based on external information.
- ③ Value-in-use is calculated by using discounted cash flow model with discount rates of 6.9% and 7.49% for annual operating cash flows as at December 31, 2019 and 2018, respectively.

The key assumptions used to calculate value-in-use reflect management's assessment of the future trends of the industry, which were determined in consideration of external and internal information (past historical information).

Net fair value was calculated using the results of an appraisal by an external professional agency (appraisal and assessment institution), and details of matters applied to the appraisal are as follows:

- ① Net fair value of assets subject to evaluation is based on the appraisal value according to the relevant statutes and general theory of the appraisal corporate's Act on Appraisal and Certified Appraisers and Rules of Appraisal Practice.

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- ② The appraisal amount of the assets subject to evaluation is determined based on the market value of the land subject to the appraisal (hereinafter referred to as "target") that is most likely to be established if there is a careful and voluntary transaction among the parties familiar with the contents of the target after it was disclosed for a sufficient period of time in the ordinary market.
- ③ The appraisal amount of land is determined by the land price based on standard method, which is the main appraisal method of land, according to the relevant statutes, after reviewing the reasonableness of the price by comparing the value of the land price calculated using the officially announced price of representative land and sales comparison approach.
- ④ The appraisal amount of buildings is determined by using cost method, which is the main method of buildings, according to the relevant statutes.
- ⑤ The appraisal amount is determined by comprehensively reviewing the asset characteristics of each item, price level of local real estate, price data of similar items in neighborhood and real estate market data (appraisal precedent information, sales comparable and others).

17. Investment Property (Non-financial Business)

(1) Details of investment property as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Cost	Accumulated depreciation	Accumulated impairment	Book amount
Land	₩ 301,031	₩ -	₩ (52,589)	₩ 248,442
Buildings	680,770	(172,928)	(5,951)	501,891
Others	9,299	(5,434)	(1,548)	2,317
	<u>₩ 991,100</u>	<u>₩ (178,362)</u>	<u>₩ (60,088)</u>	<u>₩ 752,650</u>

(in millions of Korean won)

	2018			
	Cost	Accumulated depreciation	Accumulated impairment	Book amount
Land	₩ 349,841	₩ -	₩ (53,776)	₩ 296,065
Buildings	672,766	(150,879)	(5,951)	515,936
Others	8,643	(4,908)	(1,548)	2,187
	<u>₩ 1,031,250</u>	<u>₩ (155,787)</u>	<u>₩ (61,275)</u>	<u>₩ 814,188</u>

(2) Changes in investment property for the years ended December 31, 2019 and 2018, are as follows:

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	2019					
	Beginning	Acquisitions	Disposals	Depreciation	Others ¹	Ending
Land	₩ 296,065	₩ 9	₩ (69,176)	₩ -	₩ 21,544	₩ 248,442
Buildings	515,936	25,469	(25,870)	(23,105)	9,463	501,893
Structures	2,187	-	-	(232)	360	2,315
	<u>₩ 814,188</u>	<u>₩ 25,478</u>	<u>₩ (95,046)</u>	<u>₩ (23,337)</u>	<u>₩ 31,367</u>	<u>₩ 752,650</u>

¹ Others include changes in scope of consolidation, the change from transfer and the effects of changes in exchange rate.

(in millions of
Korean won)

	2018					
	Beginning	Acquisitions	Disposals	Depreciation	Others ¹	Ending
Land	₩ 334,784	₩ 12,825	₩ (4,612)	₩ -	₩ (46,932)	₩ 296,065
Buildings	624,905	1,058	(19,577)	(23,812)	(66,638)	515,936
Structures	2,464	-	-	(307)	30	2,187
	<u>₩ 962,153</u>	<u>₩ 13,883</u>	<u>₩ (24,189)</u>	<u>₩ (24,119)</u>	<u>₩ (113,540)</u>	<u>₩ 814,188</u>

¹ Others include changes in scope of consolidation, the change from transfer and the effects of changes in exchange rate.

Depreciation of ₩ 17,909 million (2018: ₩ 20,000 million) has been charged to 'cost of sales,' and ₩ 5,428 million (2018: ₩ 4,120 million) to 'selling and administrative expenses' for the year ended December 31, 2019.

Certain investment property are provided as collateral for borrowings as at December 31, 2019 (Note 56).

(3) Fair value of investment property as at December 31, 2019, is ₩ 1,113,200 million (2018: ₩ 851,835 million). Rental income and maintenance expenses from investment property for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)	2019	2018
Rental income	₩ 68,250	₩ 66,483
Maintenance expenses	(41,622)	(36,460)

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18. Intangible Assets (Non-financial Business)

(1) Details of intangible assets as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Cost	Accumulated amortization	Accumulated impairment	Government grants	Book amount
Goodwill	₩ 1,268,361	₩ -	₩ (33,413)	₩ -	₩ 1,234,948
Development costs	409,990	(71,530)	(31,407)	-	307,053
Membership rights	40,684	(1,017)	(1,647)	-	38,020
Others	1,380,306	(345,048)	(43,251)	(50,276)	941,731
Development rights	3,927	-	(3,927)	-	-
Exploration mining areas	9,857	-	(9,857)	-	-
	₩ 3,113,125	₩ (417,595)	₩ (123,502)	₩ (50,276)	₩ 2,521,752

(in millions of Korean won)

	2018				
	Cost	Accumulated amortization	Accumulated impairment	Government grants	Book amount
Goodwill	₩ 1,104,043	₩ -	₩ (36,314)	₩ -	₩ 1,067,729
Development costs	344,193	(93,072)	(28,689)	-	222,432
Membership rights	71,428	(2,488)	(1,967)	-	66,973
Others	1,116,662	(388,161)	(26,106)	(32)	702,363
Development rights	3,927	-	(3,927)	-	-
Exploration mining areas	9,857	-	(9,857)	-	-
	₩ 2,650,110	₩ (483,721)	₩ (106,860)	₩ (32)	₩ 2,059,497

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(2) Changes in intangible assets for the years ended December 31, 2019 and 2018, are as follows:

(in millions of
Korean won)

	2019					
	Beginning	Acquisitions	Disposals	Amortization	Others ¹	Ending
Goodwill	₩ 1,067,730	₩ -	₩ -	₩ -	₩ 167,218	₩ 1,234,948
Development costs	222,432	80,022	(233)	(25,755)	30,586	307,052
Membership rights	66,972	4,128	(9,287)	(278)	(23,515)	38,020
Others	702,363	121,859	(3,454)	(104,981)	225,945	941,732
	<u>₩ 2,059,497</u>	<u>₩ 206,009</u>	<u>₩ (12,974)</u>	<u>₩ (131,014)</u>	<u>₩ 400,234</u>	<u>₩ 2,521,752</u>

¹ Others include changes in scope of consolidation, the change from transfer and the effects of changes in exchange rate.

(in millions of
Korean won)

	2018					
	Beginning	Acquisitions	Disposals	Amortization	Others ¹	Ending
Goodwill	₩ 721,149	₩ -	₩ -	₩ -	₩ 346,580	₩ 1,067,729
Development costs	135,108	70,408	-	(19,974)	36,890	222,432
Membership rights	52,171	569	(710)	(381)	15,324	66,973
Others	642,151	139,023	(42,940)	(97,447)	61,576	702,363
	<u>₩ 1,550,579</u>	<u>₩ 210,000</u>	<u>₩ (43,650)</u>	<u>₩ (117,802)</u>	<u>₩ 460,370</u>	<u>₩ 2,059,497</u>

¹ Others include changes in scope of consolidation, the change from transfer and the effects of changes in exchange rate.

Amortization of ₩ 59,728 million (2018 ₩ 42,280 million) is included in 'cost of sales' and ₩ 71,286 million (2018 ₩ 75,522 million) is included in 'selling and administrative expenses' for the year ended December 31, 2019

Certain intangible assets are provided as collateral for borrowings as at December 31, 2019 (Note 56).

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(3) Details on non-chargeable allocation of emission permits held by the Group according to the enforcement of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits, are as follows:

<i>(Unit: KAU)</i>	2018	2019	2020	Total
Emission permits	₩ 2,652,112	₩ 2,492,732	₩ 2,492,732	₩ 7,637,576

Meanwhile, the estimated amount of greenhouse gas emissions during the year 2019 was 2,506,510 KAU (2018: 2,706,659 KAU).

(4) Impairment tests for goodwill

A. Goodwill is monitored by the management at the CGU or group of CGUs level. The following is a summary of goodwill allocation for each CGU or group of CGUs, and the Group used the same goodwill allocation method as at December 31, 2019 and 2018:

<i>(in millions of Korean won)</i>	2019	2018
Hanwha General Insurance Co., Ltd.	₩ 160,187	₩ 160,187
Hanwha Defense Co., Ltd.	272,825	271,180
Hanwha Systems Co., Ltd.(System)	127,334	127,334
Hanwha Systems Co., Ltd.(ICT)	324,398	324,398
Photovoltaic division	211,593	212,631
Hanwha Aerospace Co., Ltd.	49,528	50,781
Hanwha Savings Bank Co., Ltd.	19,153	19,153
Hanwha Aerospace USA	159,326	-
Others	96,731	86,213
Total ¹	₩ 1,421,075	₩ 1,251,877

¹ Includes the distribution of goodwill of financial services.

B. The recoverable amounts of CGUs have been determined based on value-in-use calculations. The key assumptions used for value-in-use calculations as at December 31, 2019, are as follows:

Key assumptions	Hanwha Aerospace Co., Ltd.	Hanwha Defense Co., Ltd.	Hanwha Systems Co., Ltd.(System)	Hanwha Systems Co., Ltd.(ICT)	Hanwha Savings Bank Co., Ltd.	Photovoltaic division
Operating profit ratio ¹	8.11%	5.47%	6.05%	10.10%	30.87%	5.78%
Growth rate ²	8.77%	10.83%	11.69%	4.65%	3.55%	18.87%
Discount rate	7.93%	7.59%	7.76%	9.24%	12.74%	10.30%

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¹ Operating profit ratio is a weighted-average operating profit-to-revenue ratio used to extrapolate cash flows for certain budget period.

² Growth rate is a compounded annual growth rate used to extrapolate cash flows for certain budget period.

Key assumptions	Hanwha General Insurance Co., Ltd.
Investment earnings rate ¹	3.00%
Discount rate	8.00%

¹ Investment earnings rate is for calculating expected cash flow for certain prospective budget period.

C. The impairment test suggests that the carrying amount of CGUs does not exceed the recoverable amount.

19. Trade and Other Payables (Non-financial Business)

Details of trade and other payables as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
	Current	Non-current	Current	Non-current
Trade payables	₩ 2,390,576	₩ 144,190	₩ 2,236,423	₩ 94,971
Other payables	619,656	121,861	768,898	69,107
	₩ 3,010,231	₩ 266,051	₩ 3,005,321	₩ 164,078

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20. Borrowings and Debentures (Non-financial Business)

(1) Borrowings and debentures as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Short-term borrowings	₩ 3,977,005	₩ -	₩ 4,007,952	₩ -
Long-term borrowings	1,597,005	3,564,474	1,313,054	3,283,493
Debentures	1,682,307	3,333,372	1,762,760	2,529,611
Less: discount on bonds	(16,429)	(11,346)	(21,284)	(13,946)
Less: redemption premium on bonds	755	-	-	755
Total	₩ 7,240,643	₩ 6,886,500	₩ 7,062,482	₩ 5,799,913

(2) Details of bank borrowings as at December 31, 2019 and 2018, are as follows:

A. Short-term borrowings (including current portion of long-term borrowings)

(in millions of Korean won)

	Creditor	Interest rate (%)	2019	2018
Bank overdraft	Woori Bank and others	3.21	₩ 5,513	₩ 20,147
Usance	Shinhan Bank and others	0.49~3.39	146,220	187,972
Collateralized borrowings ¹	Shinhan Bank and others	0.45~4.33	81,004	215,363
General borrowings	Woori Bank and others	0.79~4.79	3,744,268	3,584,470
Add: Current portion			1,597,005	1,313,054
			₩ 5,574,010	₩ 5,321,006

¹ The Group transferred trade receivables to banks and collected cash. This transaction is accounted for as a collateralized borrowing (Note 10).

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B. Long-term borrowings

<i>(in millions of Korean won)</i>		Interest rate			2019	2018
	Creditor	(%)				
General loan (long-term)	Kookmin Bank and others	0.89~5.70	₩	3,541,929	₩	3,324,492
Loan for industrial facilities	Korea Development Bank and others	1.23~5.80		1,049,749		630,284
Project financing ("PF")	Woori Bank and others	3.67~4.95		153,440		195,941
Loan for special operating funds	NH Bank	1.81~2.00		115,989		96,301
ABL ¹	Shinhan Bank and others	4.23~5.00		300,000		349,000
Fund for energy	Woori Bank and others	1.75~2.00		372		529
	Subtotal			<u>5,161,479</u>		<u>4,596,547</u>
	Less: Current portion			<u>(1,597,005)</u>		<u>(1,313,054)</u>
	Total		₩	<u>3,564,474</u>	₩	<u>3,283,493</u>

¹ The Group executed an asset-based lending based on the right of disposal and collateral security right on the redeemable convertible preferred shares of Hanwha Engineering and Construction Corp (Note 56).

In addition, the Group provided property, plant and equipment and others as collateral in relation to the above long- and short-term borrowings (Note 56).

(3) Details of debentures as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		Annual interest rate			2019	2018
	Creditor	Maturity date	(%)			
Hanwha Corporation	214th Public subscription bond	2019.09.27	-	₩	-	₩ 100,000
	215th Public subscription bond	2019.07.05	-		-	100,000
	216th Public subscription bond	2020.03.09	3.29		150,000	150,000
	217th Public subscription bond	2020.06.07	2.67		100,000	100,000
	218th Public subscription bond	2020.08.31	2.56		100,000	100,000
	219th FRN	2020.10.19	3ML+0.95		34,734	33,543
	220th Public subscription bond	2020.11.09	3.14		140,000	140,000
	221st Public	2021.02.08	2.93		100,000	100,000

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	subscription bond					
	222nd Public subscription bond	2021.04.13	2.78	100,000	100,000	
	223rd Public subscription bond	2021.11.02	2.55	120,000	120,000	
	224th Public subscription bond	2022.02.01	2.25	150,000	-	
	225-1st Public subscription bond	2022.04.18	2.14	70,000	-	
	225-2nd Public subscription bond	2024.04.18	2.35	80,000	-	
	226-1st Public subscription bond	2022.09.17	1.93	90,000	-	
	226-2nd Public subscription bond	2024.09.13	2.19	60,000	-	
Hanwha Galleria Co., Ltd.	67th Private subscription bond	2020.04.14	3.65	20,000	20,000	
	FRN	2021.06.20	3.12	34,734	33,543	
	68th Private subscription bond	2021.02.26	3.08	30,000	30,000	
	FRN	2022.07.19	2.13	34,734	-	
	FRN	2020.05.26	2.21	34,734	33,543	
Hanwha Galleria Timeworld Co., Ltd.	Public subscription	2021.06.22	-	50,000	50,000	
	22nd Private subscription bond	2019.06.28	3.30	-	20,000	
Hanwha Engineering and Construction Corp.	85th Public subscription bond (EB)	2021.06.03	3.00	239,646	249,818	
	Premium on 85th Public subscription bond (EB)	2021.06.03	3.00	27,037	28,183	
	89th Private subscription bond	2019.01.04	-	-	15,000	
	90th Private subscription bond	2019.07.26	-	-	20,000	
	91st Private subscription bond	2019.10.24	-	-	10,000	
	92nd Private subscription bond	2019.02.01	-	-	30,000	
	93rd Private subscription bond	2019.03.22	-	-	35,000	
	94th Private subscription bond	2020.04.13	4.60	10,000	10,000	
	95th Private subscription bond	2019.10.27	-	-	50,000	
	96th Private subscription bond	2019.12.14	-	-	74,000	
	97th FRN	2021.07.19	3ML+0.90	34,734	33,543	

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	98th Private subscription bond	2019.07.19	-	-	30,000
	99th Private subscription bond	2020.09.11	3.82	85,000	85,000
	100th Public subscription bond	2021.03.07	3.41	100,000	-
	101-1st Public subscription bond	2021.05.30	3.02	30,000	-
	101-2nd Public subscription bond	2022.05.30	3.24	70,000	-
	102-1st Public subscription bond	2021.09.20	3.07	35,000	-
	102-2nd Public subscription bond	2022.09.20	3.38	45,000	-
Hanwha Q CELLS Co., Ltd.	FRN	2019.01.01	3ML+2.90	-	111,770
	FRN	2022.01.10	3ML+1.65	46,172	-
	FRN	2021.10.08	3ML+1.50	23,053	-
Summit Apollo Eleven	1st Bond	2020.02.20	3.96	9,890	-
Hanwha Defense Systems Corp.	FRN	2021.07.27	3ML+1.60	34,734	33,543
	2nd Private subscription bond	2024.03.27	2.76	50,000	-
	3rd Private subscription bond	2022.10.11	1.89	20,000	-
Hanwha Systems Co., Ltd.	1st Private subscription bond	2019.09.27	-	-	30,000
	2nd Private subscription bond	2021.03.12	3.48	10,000	10,000
	3rd Private subscription bond	2022.07.05	1.95	30,000	-
	4th Private subscription bond	2024.07.05	2.10	30,000	-
Hanwha Aerospace CO.,LTD.	115-2nd Public subscription bond	2020.11.26	2.79	30,000	30,000
	116-1st Public subscription bond	2019.06.22	-	-	110,000
	116-2nd Public subscription bond	2021.06.22	2.20	40,000	40,000
	117th Public subscription bond	2019.08.03	-	-	70,000
	118th Public subscription bond	2019.10.28	-	-	100,000
	119th Private subscription bond	2023.03.15	3.50	20,000	20,000
	120-1st Public subscription bond	2021.05.03	2.76	95,000	95,000
	120-2nd Public subscription bond	2023.05.02	3.18	55,000	55,000
	121-1st Public	2021.11.05	2.71	60,000	60,000

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	subscription bond				
	121-2nd Public subscription bond	2023.11.06	2.98	40,000	40,000
	122-1st Public subscription bond	2022.04.29	2.06	100,000	-
	122-2nd Public subscription bond	2024.04.30	2.30	100,000	-
	123-1st Public subscription bond	2022.09.30	1.84	70,000	-
	123-2nd Public subscription bond	2024.10.02	2.10	80,000	-
Hanwha Precision Machinery Co., Ltd.	1st Private subscription bond	2020.11.28	3.90	10,000	10,000
Hanwha Chemical Corporation	243-2nd Public subscription bond	2020.05.28	3.07	98,000	98,000
	245-2nd Public subscription bond	2020.10.28	3.08	50,000	50,000
	246-1st Public subscription bond	2019.02.24	-	-	56,000
	246-2nd Public subscription bond	2021.02.24	3.09	50,000	50,000
	247th FRN	2019.04.08	-	-	111,810
	248th Public subscription bond	2019.11.07	-	-	202,636
	249th Public subscription bond	2020.02.06	2.52	100,000	100,000
	250th Public subscription bond	2020.05.25	2.35	100,000	100,000
	251st Public subscription bond	2020.09.22	2.35	80,000	80,000
	252nd FRN	2021.07.23	3ML+0.98	34,734	33,543
	253rd FRN	2021.10.04	3ML+1.15	57,890	55,905
	254-1st Public subscription bond	2021.11.29	2.31	60,000	60,000
	254-2nd Public subscription bond	2023.11.29	2.50	90,000	90,000
	255th Public subscription bond	2024.01.31	2.31	150,000	-
	256th FRN	2022.04.04	3ML+1.15	231,560	-
	257th Private subscription bond	2022.10.11	3ML+0.95	57,890	-
	258th Private subscription bond	2022.10.11	3ML+0.95	57,890	-
	259th Private subscription bond	2022.10.11	3ML+1.00	57,890	-
	260-1st Public subscription bond	2022.10.24	1.79	110,000	-
	260-2nd Public subscription bond	2024.10.24	1.98	80,000	-
	260-3rd Public	2026.10.24	2.28	60,000	-

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	subscription bond				
Hanwha Q CELLS & Advanced Materials Corporation	55th FRN	2019.05.19	-	-	33,543
	58th FRN	2021.02.16	3ML+1.60	34,734	33,543
	59-1st Private subscription bond	2019.08.27	3.50	-	10,000
	59-2nd Private subscription bond	2020.02.27	3.69	20,000	20,000
	60th Private subscription bond	2020.08.24	3.50	20,000	20,000
	61st Private subscription bond	2020.04.16	3.30	10,000	10,000
	62nd Private subscription bond	2019.10.17	3.20	-	10,000
	1st Private subscription bond	2020.06.30	3.80	40,000	40,000
	2nd Private subscription bond	2019.08.18	3.60	-	50,000
	3rd Private subscription bond	2019.08.18	3.60	-	15,000
	3rd Private subscription bond	2019.08.18	3.60	-	20,000
	4th Private subscription bond	2019.08.18	3.60	-	5,000
	5th Private subscription bond	2020.08.25	3.80	40,000	40,000
	5th Private subscription bond	2020.08.25	3.80	20,000	20,000
	6th Private subscription bond	2019.08.25	3.60	-	10,000
	8th Private subscription bond	2020.01.26	3.80	30,000	30,000
	9th FRN	2021.06.29	3ML+1.96	34,734	33,543
Hanwha Hotel & Resort Inc.	36th FRN	2020.05.26	3ML+1.90	23,156	22,362
	37th FRN	2019.08.24	3ML+1.90	-	20,000
	38th Private subscription bond	2019.02.26	3.10	-	20,000
	39th Private subscription bond	2019.06.14	3.20	-	15,000
	40th Private subscription bond	2020.08.07	3.30	10,000	10,000
	41st Private subscription bond	2021.01.29	3.40	10,000	-
	42nd Private subscription bond	2020.02.27	3.05	10,000	-
	43rd Private subscription bond	2020.03.18	3.05	10,000	-
	44th Private	2021.04.29	3.07	48,000	-

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subscription bond		
Subtotal	5,015,681	4,292,371
Less: present value discount	(27,778)	(35,230)
Add: redemption premium on bonds	755	755
Less: current portion (including discount on bonds)	(1,666,632)	(1,741,476)
Total	₩ 3,322,026	₩ 2,516,420

¹ Details of bond with warrant as at December 31, 2019, are as follows:

Details

Issuance company	Hanwha Galleria Time World Co., Ltd.
Par value	₩ 50,000 million
Coupon rate	0.00%
Maturity rate	0.50%
Terms	₩ 43,300 par value convertible into one share
Exercise period	The bonds are convertible to shares from one month after issuance (July 22, 2018) until one month before the maturity (May 22, 2021).

In addition, some borrowings and debentures are contracted to comply with credit ratings, debt ratios and EBITDA rates (Note 56).

(4) Exchangeable bonds

The Group issued exchangeable bonds for financing working capital, and classified embedded put option and exchangeable rights into a hybrid embedded derivative during the year ended December 31, 2016.

Terms and conditions of the exchangeable bonds issued are as follows:

Subject	Contents
Type of Bonds	Bearer coupon unsecured exchangeable bonds
Issuing price	100% of the par value: ₩ 250,000,000,000
Interest rate	3% nominal rate for bonds before maturity and annual 5% (3 month compound interest) for bonds at maturity
Redemption at maturity	For bonds matured, redeem 111.2815% of the par value of the bonds after June 3, 2021, but if the redemption date is non-working day for banks, regard the following working day as the maturity date and no computation of interest after the maturity date
Put option	Bond holders may request for early redemption for all or partial amount

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of the par value of the bond every 6 month after June 3, 2019. Price for early redemption is determined by nominal interest rate and YTM as depicted in the chart below. When the redemption date is non-working day for banks, regard the following working day but no computation of interest after the maturity date.

1) Percentage portion for early redemption: 100% of the par value

2) Price for early redemption

Date for early redemption	Period for early redemption		Price for early redemption
	From	To	
2019-06-03	2019-04-04	2019-05-07	106.4302% of the par value
2019-12-03	2019-10-04	2019-11-04	107.5982% of the par value
2020-06-03	2020-04-04	2020-05-04	108.7956% of the par value
2020-12-03	2020-10-04	2020-11-03	110.0231% of the par value

3) Redemption period: Bond holders shall request for early redemption to the issuing company from 60 days to 30 days before each early redemption payment date.

Share subject to exchange	Ordinary shares issued by Hanwha Life Insurance Co., Ltd.
Exchangeable period	From the following date of bonds issuance date, June 4, 2016 to 1 month prior to redemption date, May 3, 2021
Number of shares subject to exchange	By dividing par value of bonds price by exchange price on the exchange date, round off under 1 share
Exchange price ¹	₩ 7,400

¹ In the event of capital increase, stock dividends, issuance of shares without consideration, issuance or merge of stock warrants, stock split, and stock reverse split, exchange price is subject to change.

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21. Other Financial Liabilities (Non-financial Business)

(1) Details of other financial liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Derivatives	₩ 17,616	₩ 13,179	₩ 28,004	₩ 4,267
Deposits received	287,801	550,658	312,918	506,288
Less: present value discounts	(1,017)	(231,661)	(1,537)	(231,444)
Accrued expenses	483,568	3,045	433,830	577
Financial guarantee contract liabilities ¹	14,395	52,904	9,121	1,400
Others	97,735	475,662	3,765	45,462
	₩ 900,098	₩ 863,787	₩ 786,101	₩ 326,550

¹ The Group provides credit guarantees for developers on housing project loans and others (Note 56).

(2) Book amount and fair value of non-current deposits received of non-financial business as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Book amount	Fair value	Book amount	Fair value
Non-current deposits received	₩ 318,997	₩ 367,886	₩ 274,843	₩ 338,751

22. Other Liabilities (Non-financial Business)

(1) Details of other liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Advances receivable	₩ 3,060,652	₩ 959,003	₩ 2,731,567	₩ 1,005,388
Withholdings	86,900	-	93,263	-
VAT payables	35,062	-	34,882	-
Unearned revenues	54,341	256,860	50,147	273,461
Refund liability	840	-	1,387	-
Contract liabilities ¹	925,324	-	548,459	-
	₩ 4,163,119	₩ 1,215,863	₩ 3,459,705	₩ 1,278,849

¹ Due to customers for contract work.

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(2) Details of contract liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Due to customers for contract work	₩ 898,372	₩ 524,888
Advances receivable	1,338,536	1,329,734
Membership, etc.	267,022	264,094
Customer loyalty	26,143	23,056
Others	26,556	18,729
	<u>₩ 2,556,628</u>	<u>₩ 2,160,501</u>

23. Post-employment Benefits (Non-financial Business)

(1) Details of net defined benefit liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Present value of defined benefit obligations	₩ 1,764,695	₩ 1,651,721
Fair value of plan assets	(100,819)	(97,327)
	<u>₩ 1,663,876</u>	<u>₩ 1,554,394</u>

(2) Movements in the defined benefit obligations for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Beginning balance	₩ 1,651,721	₩ 1,469,668
Current service cost ¹	202,552	181,016
Interest expense	55,924	56,961
Past service cost	(4,634)	639
Remeasurements:		
Actuarial loss from change in demographic assumptions	1,905	1,928
Actuarial loss from change in financial assumptions	9,785	50,723
Actuarial loss from experience adjustments	17,341	14,145
Actuarial loss arising from changes in adjustment of retirement age	194	45
Payments from plans:		
Benefit payments	(150,658)	(174,513)
Others ²	(19,435)	51,109
Ending balance	<u>₩ 1,764,695</u>	<u>₩ 1,651,721</u>

¹ Current service cost amounting to ₩ 1,138 million, (2018: ₩ 3,072 million) is transferred to

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'construction in progress' for the year ended December 31, 2019.

² Others include the impact of changes in consolidations scope, changes in exchange rate and transfer to and from affiliates.

(3) Movements in the fair value of plan assets for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Beginning balance	₩	97,328	₩	98,574
Interest income		9,311		10,277
Remeasurements ¹		(3,232)		(6,959)
Contributions		28,594		23,028
Benefit payments		(28,136)		(21,966)
Others ²		(3,046)		(5,627)
Ending balance	₩	<u>100,819</u>	₩	<u>97,327</u>

¹ Excluded the amount that is included in interest income.

² Others include the impact of changes in consolidations scope, changes in exchange rate and transfer to and from affiliates.

(4) Amounts recognized in the consolidated statements of comprehensive income for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Current service cost	₩	202,552	₩	181,016
Interest expense		55,924		56,961
Past service cost		(4,634)		639
Interest income of plan assets		(9,311)		(10,277)
Expense included in employee benefit	₩	<u>244,531</u>	₩	<u>228,339</u>

Amount of ₩ 161,703 million (2018: ₩ 145,434 million) is included in 'cost of manufacturing' and ₩ 81,690 million (2018: ₩ 79,833 million) in 'selling and administrative expenses'.

(5) The significant actuarial assumptions as at December 31, 2019 and 2018, are as follows:

<i>(in percentage, %)</i>	2019		2018	
Discount rate	2.44% ~ 4.28%		2.70% ~ 4.35%	
Salary growth rate	2.83% ~ 4.70%		3.00% ~ 5.79%	

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(6) The sensitivity of the defined benefit obligation to changes in the principal assumptions is:

	Changes in principal assumption	Effect on defined benefit obligations
Discount rate	Increase of 1%	7.88% decrease
	Decrease of 1%	9.16% increase
Salary growth rate	Increase of 1%	9.15% increase
	Decrease of 1%	8.01% decrease

Because there is a correlation between actuarial assumptions, the sensitivity analysis above will not show actual changes in the defined benefit obligation, as changes in assumptions will not occur independently. Also, in the above sensitivity analysis, the present value of the defined benefit obligation was measured using the projected unit credit method applied to measure the defined benefit obligation in the consolidated financial statements.

(7) Plan assets as at December 31, 2019 and 2018, consist of:

(in millions of Korean won)

	2019		2018	
	Amount	Composition	Amount	Composition
Principal guaranteed financial instruments	₩ 96,519	95.73%	₩ 93,092	95.65%
Transferred to National Pension Fund and others	532	0.53%	581	0.60%
Others	3,768	3.74%	3,654	3.75%
	<u>₩ 100,819</u>	<u>100.00%</u>	<u>₩ 97,327</u>	<u>100.00%</u>

(8) The weighted average duration of the defined benefit obligation is 3.22 ~ 11.21 years.

24. Provisions (Non-financial Business)

(1) Details of provisions as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Provision for construction warranties	₩ 106	₩ 85,346	₩ 1,977	₩ 84,006
Provision for product warranties	61,746	88,771	54,886	41,972
Provision for construction losses	29,593	26,953	38,796	26,790
Others	359,265	131,214	268,465	126,821
	<u>₩ 450,710</u>	<u>₩ 332,284</u>	<u>₩ 364,124</u>	<u>₩ 279,589</u>

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(2) Changes in the provisions for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Provision for product warranties	Provision for construction warranties	Provision for construction losses	Others	Total
Beginning	₩ 85,983	₩ 96,858	₩ 65,586	₩ 395,286	₩ 643,713
Increase	26,572	63,952	128,280	183,302	402,106
Used during year	(28,231)	(9,395)	(11,425)	(68,790)	(117,841)
Reversal	(57)	(1,281)	(123,683)	(33,887)	(158,908)
Others ¹	1,185	383	(2,212)	14,568	13,924
Ending	₩ 85,452	₩ 150,517	₩ 56,546	₩ 490,479	₩ 782,994

¹ Others include changes in scope of consolidation and the effect of changes in exchange rate.

(in millions of Korean won)

	2018				
	Provision for product warranties	Provision for construction warranties	Provision for construction losses	Others	Total
Beginning	₩ 71,836	₩ 77,644	₩ -	₩ 291,037	₩ 440,517
Changes in accounting policies	-	-	20,412	238	20,650
Beginning after adjustments	71,836	77,644	20,412	291,275	461,167
Increase	29,847	17,469	87,639	167,166	302,121
Used during year	(12,572)	(4,158)	(13,770)	(23,348)	(53,848)
Reversal	(3,245)	(8,669)	(71,404)	(78,583)	(161,901)
Others ¹	117	14,572	42,709	38,776	96,174
Ending	₩ 85,983	₩ 96,858	₩ 65,586	₩ 395,286	₩ 643,713

¹ Others include changes in scope of consolidation and the effect of changes in exchange rate.

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25. Construction Contract (Non-financial Business)

(1) Changes in construction contract balance for the year ended December 31, 2019, are as follows:

(in millions of Korean won)

	2019			
	Beginning	Changes	Recognized construction revenue	Ending
Domestic architecture construction	₩ 853,138	₩ 415,195	₩ (408,767)	₩ 859,566
Domestic development construction	4,074,943	1,448,337	(1,019,594)	4,503,686
Domestic civil construction	1,094,135	798,564	(510,814)	1,381,885
Domestic plant construction	726,011	1,204,402	(905,174)	1,025,239
Overseas subcontract	8,107,495	550,613	(1,194,755)	7,463,353
Overseas plant construction	60,071	85,988	(71,245)	74,814
Aviation engine division	345,893	247,385	(218,003)	375,275
Defense division	1,737,207	2,295,209	(1,004,851)	3,027,565
	₩ 16,998,893	₩ 7,045,693	₩ (5,333,203)	₩ 18,711,383

(2) Details of accumulated contract gains and losses in relation to construction contract in progress as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Accumulated contract revenue	Accumulated contract cost of sales	Accumulated profit or loss	Advance receivables	Retention
Domestic architecture construction	₩ 1,092,292	₩ 986,550	₩ 105,742	₩ 4,978	₩ -
Domestic development construction	4,187,850	3,516,032	671,818	2,559	-
Domestic civil construction	2,763,143	2,666,869	96,274	12,986	-
Domestic plant construction	1,804,255	1,588,228	216,027	106,411	-
Overseas subcontract	9,670,449	9,717,287	(46,838)	790,356	-
Overseas plant construction	374,534	319,907	54,627	4,155	-
Aviation engine division	291,773	275,301	16,472	104,341	-
Defense division	2,943,742	2,789,365	154,377	660,714	-
	₩ 23,128,038	₩ 21,859,539	₩ 1,268,499	₩ 1,686,500	₩ -

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	2018					
	Accumulated contract revenue	Accumulated contract cost of sales	Accumulated profit or loss	Advance receivables	Retention	
Domestic architecture construction	₩ 10,140,393	₩ 8,963,204	₩ 1,177,189	₩ 27,610	₩	-
Domestic civil construction	4,183,144	3,889,082	294,062	17,653		-
Domestic plant construction	3,620,681	3,297,373	323,308	393,533		-
Overseas subcontract	9,743,699	10,097,450	(353,751)	838,180		46,078
Overseas plant construction	205,990	171,483	34,507	2,002		-
	<u>₩ 27,893,907</u>	<u>₩ 26,418,592</u>	<u>₩ 1,475,315</u>	<u>₩ 1,278,978</u>	<u>₩</u>	<u>46,078</u>

(3) Details of contract assets and contract liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Contract assets	Contract liabilities	Contract assets	Contract liabilities
Domestic architecture construction	₩ 16,634	₩ 26,518	₩ 142,891	₩ 171,642
Domestic development construction	225,103	39,708	-	-
Domestic civil construction	67,691	39,157	47,264	6,382
Domestic plant construction	72,232	41,087	223,006	185,441
Overseas subcontract ¹	36,825	339,955	77,839	91,762
Overseas plant construction	35,789	13,355	20,531	21,607
Aviation engine division	5,176	104,341	-	-
Defense division	126,345	428,513	-	-
	<u>₩ 585,795</u>	<u>₩ 1,032,634</u>	<u>₩ 511,531</u>	<u>₩ 476,834</u>

¹ Certain fees related to overseas subcontract were received as payment for construction work in advance and accounted for advances receivable. Billings are made according to certain milestone; thus, contract assets can be increased prior to the milestone.

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(4) Amount of effect on current and future profits and losses caused by changes in construction contract in progress for the years ended December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

		2019						
		Provision for construction losses	Changes in estimated total contract revenue	Changes in estimated total contract cost of sales	Effect on current profit or losses	Effect on future profits and losses	Changes in contract assets	Changes in contract liabilities
Domestic architecture construction	₩	439	₩ 30,677	₩ (6,256)	₩ 29,800	₩ 7,133	₩ 29,990	₩ (190)
Domestic development construction		1,638	52,663	(30,600)	52,557	30,706	55,136	(2,579)
Domestic civil construction		5,559	75,516	91,075	(17,904)	2,345	10,970	(28,874)
Domestic plant construction		61	104,177	77,007	25,794	1,376	36,071	(10,277)
Overseas subcontract		13,126	47,352	125,992	(53,138)	(25,502)	11,551	(64,689)
Overseas plant construction		-	(166)	(2,151)	1,319	666	2,806	(1,487)
Aviation engine division		4,967	11,186	22,217	(5,230)	(5,801)	-	(5,230)
Defense division		33,303	77,631	82,636	823	(5,828)	44,775	(43,952)
	₩	59,093	₩ 399,036	₩ 359,920	₩ 34,021	₩ 5,095	₩ 191,299	₩ (157,278)

(in millions of Korean won)

		2018						
		Provision for construction losses	Changes in estimated total contract revenue	Changes in estimated total contract cost of sales	Effect on current profit or losses	Effect on future profits and losses	Changes in contract assets	Changes in contract liabilities
Domestic architecture construction	₩	6,494	₩ 28,797	₩ (42,696)	₩ 46,466	₩ 25,027	₩ 66,439	₩ (19,973)
Domestic civil construction		2,300	73,541	79,126	(13,507)	7,922	9,081	(22,588)
Domestic plant		13,556	74,789	56,878	12,404	5,507	15,839	(3,435)

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construction								
Overseas subcontract	16,474	(44,339)	(56,639)	589	11,711	18,431	(17,842)	
Overseas plant construction	-	8,844	3,142	3,914	1,788	5,036	(1,122)	
Aviation engine division	6,734	21,105	19,377	1,728	-	1,728	-	
Defense division	17,301	13,668	33,841	(13,767)	(6,406)	12,728	(26,495)	
	<u>₩ 62,859</u>	<u>₩ 176,405</u>	<u>₩ 93,029</u>	<u>₩ 37,827</u>	<u>₩ 45,549</u>	<u>₩ 129,282</u>	<u>₩ (91,455)</u>	

(5) Details of construction contract in progress for which the amount of contract revenue is more than 5% of total revenue as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

					2019			
					Contract assets		Receivables of construction	
	Contract	Date of contract	Due date	Rate of progress (%)	Total amount	Provision	Total amount	Provision
Overseas subcontract	BNCP	2012-05-30	2021-12-31	41.50%	₩ -	₩ -	₩ 449,542	₩ -

(in millions of Korean won)

					2018			
					Contract assets		Receivables of construction	
	Contract	Date of contract	Due date	Rate of progress (%)	Total amount	Provision	Total amount	Provision
Overseas subcontract	BNCP	2012-05-30	2021-12-31	35.04%	₩ 6,300	₩ -	₩ 109,864	₩ -

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26. Financial Instruments by Category (Financial Business)

(1) Categorizations of financial instruments as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Hedging derivative financial instruments	Financial assets at fair value through other comprehensive income	Total
Cash and cash equivalents	₩ 1,062,273	₩ -	₩ -	₩ -	₩ 1,062,273
Deposits	1,022,995	182,137	-	219,351	1,424,483
Securities	32,042,522	24,517,844	-	25,222,377	81,782,743
Loans and other receivables	29,219,261	720,923	-	874,610	30,814,794
Derivative financial assets	-	212,027	246,986	-	459,013
Other financial assets	2,283,505	-	-	-	2,283,505
	<u>₩ 65,630,556</u>	<u>₩ 25,632,931</u>	<u>₩ 246,986</u>	<u>₩ 26,316,338</u>	<u>₩ 117,826,811</u>

(in millions of Korean won)

	2018				
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Hedging derivative financial instruments	Financial assets at fair value through other comprehensive income	Total
Cash and cash equivalents	₩ 2,114,197	₩ -	₩ -	₩ -	₩ 2,114,197
Deposits	967,047	165,547	-	253,162	1,385,756
Securities	32,319,331	19,517,802	-	22,364,398	74,201,531
Loans and other receivables	27,193,662	481,587	-	839,679	28,514,928
Derivative financial assets	-	146,995	346,282	-	493,277
Other financial assets	2,056,028	-	-	-	2,056,028
	<u>₩ 64,650,265</u>	<u>₩ 20,311,931</u>	<u>₩ 346,282</u>	<u>₩ 23,457,239</u>	<u>₩ 108,765,717</u>

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(2) Categorizations of financial liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Financial liabilities at fair value through profit or loss	Hedging derivative financial instruments	Financial liabilities at amortized cost	Total
Deposit liabilities	₩ -	₩ -	₩ 1,233,940	₩ 1,233,940
Derivative financial liabilities	172,042	565,789	-	737,831
Other financial liabilities	2,673,028	-	7,829,273	10,502,301
	<u>₩ 2,845,069</u>	<u>₩ 565,789</u>	<u>₩ 9,063,213</u>	<u>₩ 12,474,072</u>

(in millions of Korean won)

	2019			
	Hedging derivative financial instruments	Financial liabilities at amortized cost	Financial liabilities at fair value through profit or loss	Total
Deposit liabilities	₩ -	₩ -	₩ 1,151,598	₩ 1,151,598
Derivative financial liabilities	260,587	305,331	-	565,918
Other financial liabilities	1,972,055	-	5,712,344	7,684,399
	<u>₩ 2,232,642</u>	<u>₩ 305,331</u>	<u>₩ 6,863,942</u>	<u>₩ 9,401,915</u>

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(3) Net gains or losses on each category of financial instruments for the years ended December 31, 2019 and 2018, are as follows:

(in millions of
Korean won)

	2019						
	Interest income	Dividend income	Commission income	Interest expense	Gain (loss) on valuation and transaction	Gain (loss) on foreign currency transaction and translation	Total
Financial assets at fair value through profit or loss	₩ 227,231	₩ 183,297	₩ 1,390	₩ -	₩ 496,548	₩ 172,042	₩ 1,080,508
Financial assets at fair value through other comprehen- sive income	636,607	15,680	-	-	303,422	357,804	1,313,513
Financial assets at amortized cost	2,396,612	-	15,607	-	9,457	532,977	2,954,653
Derivative financial instruments	-	-	-	-	(918,630)	-	(918,630)
Financial liabilities at amortized cost	-	-	-	(129,880)	-	(9,924)	(139,804)
Financial liabilities at fair value through profit or loss	-	-	-	(327)	(220,961)	-	(221,288)
	<u>₩ 3,260,450</u>	<u>₩ 198,977</u>	<u>₩ 16,997</u>	<u>₩ (130,207)</u>	<u>₩ (330,164)</u>	<u>₩ 1,052,899</u>	<u>₩ 4,068,952</u>

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Korean won)

	2018						
	Interest income	Dividend income	Commission income	Interest expense	Gain (loss) on valuation and transaction	Gain (loss) on foreign currency transaction and translation	Total
Financial assets at fair value through profit or loss	₩ 182,662	₩ 215,747	₩ 2,030	₩ -	₩ (407,137)	₩ 130,749	₩ 124,051
Financial assets at fair value through other comprehen- sive income	675,635	16,303	-	-	158,190	217,141	1,067,269
Financial assets at amortized cost	2,428,227	-	23,908	-	(26,587)	540,657	2,966,205
Derivative financial instruments	-	-	-	-	(768,685)	-	(768,685)
Financial liabilities at amortized cost	-	-	-	(108,491)	-	(362)	(108,853)
Financial liabilities at fair value through profit or loss	-	-	-	(850)	42,348	-	41,498
	<u>₩ 3,286,524</u>	<u>₩ 232,050</u>	<u>₩ 25,938</u>	<u>₩ (109,341)</u>	<u>₩ (1,001,871)</u>	<u>₩ 888,185</u>	<u>₩ 3,321,485</u>

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27. Cash and Cash Equivalents and Deposits (Financial Business)

(1) Details of cash and cash equivalents and deposits as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Cash and cash equivalents				
Cash and demand deposits	₩	1,062,273	₩	2,114,197
Deposits				
Long-term deposits		667,100		722,650
Others		757,391		663,114
Provision for impairment		(9)		(8)
		<u>1,424,482</u>		<u>1,385,756</u>
	₩	<u>2,486,755</u>	₩	<u>3,499,953</u>

(2) Details of restricted to use deposits as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019	2018	Reason for restrictions
Cash and cash equivalent	Shinhan Bank and others	₩ 1	₩ 66	Restricted deposit for lawsuit and others
Deposits	Kookmin Bank and others	310,601	469,446	Collateral for transactions and others
	Shinhan Bank and others	6	15	Deposit for checking account
	Korea Federation of Savings Bank and others	33,828	-	Others
		<u>₩ 344,436</u>	<u>₩ 469,527</u>	

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28. Securities (Financial Business)

(1) Details of securities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Financial assets at fair value through profit or loss	₩	24,517,844	₩	19,517,802
Financial assets at fair value through other comprehensive income		25,222,377		22,364,398
Financial assets at amortized cost		32,042,522		32,319,331
	₩	<u>81,782,743</u>	₩	<u>74,201,531</u>

(2) Details of financial assets at fair value through profit or loss as at December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019	
Equity securities		
Stocks	₩	1,444,203
		<u>1,444,203</u>
Debt securities		
Stocks		54,095
Government and public bonds		487,618
Special bonds		2,542,293
Financial bonds		176,196
Corporate bonds		2,455,843
Investments		52,088
		<u>5,768,133</u>
Beneficiary certificates		7,258,408
Overseas securities		8,314,508
Other securities		1,732,592
	₩	<u>24,517,844</u>

In addition, the Group provides certain of its financial assets at fair value through profit or loss as collateral for repurchase agreements (Note 56).

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(3) Details of financial assets at fair value through other comprehensive income as at December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019
Equity securities	
Stocks	₩ 322,043
	<u>322,043</u>
Debt securities	
Government and public bonds	3,803,336
Special bonds	4,461,704
Financial bonds	585,980
Corporate bonds	3,246,275
Investments	604
	<u>12,097,899</u>
Overseas securities	12,507,371
Other securities	295,064
	<u>₩ 25,222,377</u>

In addition, the Group provides certain of its financial assets at fair value through other comprehensive income as collateral for derivative instrument transactions and others (Note 56).

(4) Details of financial assets at amortized cost as at December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019
Debt securities	
Government and public bonds	₩ 9,685,540
Special bonds	8,487,556
Corporate bonds	808,261
	<u>18,981,357</u>
Overseas securities	12,830,828
Other ¹	230,337
	<u>₩ 32,042,522</u>

¹ Transfer transactions that do not meet the derecognition requirements in accordance with Korean IFRS 1109. The Group receives the commission through the loan of financial assets currently held in the Korea Securities Depository as at December 31, 2019.

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(5) Details of financial assets at fair value through profit or loss as at December 31, 2018, are as follows:

<i>(in millions of Korean won)</i>	2018	
Equity securities		
Stocks	₩	1,112,500
		<u>1,112,500</u>
Debt securities		
Stocks		43,372
Government and public bonds		264,812
Special bonds		1,566,574
Financial bonds		63,576
Corporate bonds		1,923,001
Investments		44,114
		<u>3,905,449</u>
Beneficiary certificates		6,277,103
Overseas securities		5,925,064
Other securities		2,297,687
	₩	<u>19,517,802</u>

(6) Details of financial assets at fair value through other comprehensive income as at December 31, 2018, are as follows:

<i>(in millions of Korean won)</i>	2018	
Equity securities		
Stocks	₩	388,675
		<u>388,675</u>
Debt securities		
Government and public bonds		2,282,436
Special bonds		4,620,408
Financial bonds		847,150
Corporate bonds		2,704,820
Investments		604
		<u>10,455,418</u>
Overseas securities		9,828,919
Other securities		1,691,386
	₩	<u>22,364,398</u>

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(7) Details of financial assets at amortized cost as at December 31, 2018, are as follows:

<i>(in millions of Korean won)</i>	2018	
Debt securities		
Government and public bonds	₩	9,745,511
Special bonds		8,559,943
Corporate bonds		808,151
		<u>19,113,605</u>
Overseas securities		12,632,241
Other ¹		573,485
	₩	<u>32,319,331</u>

¹ Transfer transactions that do not meet the derecognition requirements in accordance with Korean IFRS 1039. The Group receives the commission through the loan of financial assets currently held in the Korea Securities Depository as at December 31, 2018.

29. Loans and Receivables (Financial Business)

(1) Loans and receivables as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Loan at fair value through profit or loss	₩	720,923	₩	418,587
Loan at fair value through other comprehensive income		874,610		839,679
Loan at amortized cost		29,219,262		27,193,661
	₩	<u>30,814,794</u>	₩	<u>28,514,927</u>

(2) Details of loans and receivables as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Policy loans	₩	7,767,640	₩	7,326,592
Loans secured by securities		221,680		232,549
Loans secured by real estate		8,704,294		8,052,756
Unsecured loan		9,438,330		8,076,717
Loans secured by third-party guarantee		637,859		672,664
Loans secured by deposit and instalment savings		327		1,175
Other loans		4,094,738		4,215,128
		<u>30,864,868</u>		<u>28,577,581</u>
Loan origination cost and fee		56,218		49,776
Present value discount		(2,167)		(2,293)
Provision for impairment		(104,125)		(110,137)
	₩	<u>30,814,794</u>	₩	<u>28,514,927</u>

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(3) Changes in allowance for possible losses on loans and receivables for the year ended December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019	
Beginning	₩	110,137
Increase in provision		119,352
Written off and others		(116,829)
Others ¹		(8,535)
Ending	₩	<u>104,125</u>

¹ Others include unwinding effect and recovery of impairment loss.

(4) Changes in allowance for possible losses on loans and receivables for the year ended December 31, 2018, are as follows:

<i>(in millions of Korean won)</i>	2018	
Beginning (Korean IFRS 1039)	₩	127,098
Adjustments		1,264
Beginning (Korean IFRS 1109)		128,362
Increase in provision		26,505
Written off and others		(51,978)
Others ¹		7,248
Ending	₩	<u>110,137</u>

¹ Others include unwinding effect and recovery of impairment loss.

(5) Details of loans that are impaired and overdue as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Loans that are neither past due nor impaired	₩	30,399,573	₩	27,954,730
Loans past due but not impaired				
Less than 30 days		226,121		260,616
30-60 days		22,910		32,292
60-90 days		10,741		9,979
More than 90 days		29,132		26,385
		<u>288,904</u>		<u>329,272</u>
Impaired loans		176,391		293,579
	₩	<u>30,864,868</u>	₩	<u>28,577,581</u>

The amount is classified on the basis of principal of loans.

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30. Other Financial Assets (Financial Business)

(1) Details of other financial assets as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Insurance receivables	₩	651,072	₩	421,098
Other accounts receivable		633,684		698,973
Accrued income		957,468		869,960
Deposit received for guarantee		149,166		164,677
Others		9,087		2,553
Present value discount		(2,905)		(2,847)
Provision for impairment		(114,067)		(98,386)
	₩	<u>2,283,505</u>	₩	<u>2,056,028</u>

(2) Changes in provision for impairment on other financial assets for the year ended December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019	
Beginning	₩	98,387
Increase in provision		19,104
Written off and others		(501)
Others ¹		(2,923)
Ending	₩	<u>114,067</u>

¹ Others include unwinding effect and recovery of impairment loss.

(3) Changes in provision for impairment on other financial assets for the year ended December 31, 2018, are as follows:

<i>(in millions of Korean won)</i>	2018	
Beginning (Korean IFRS 1039)	₩	132,049
Adjustments		-
Beginning (Korean IFRS 1109)		<u>132,049</u>
Increase in provision		1,327
Written off and others		(37,255)
Others ¹		2,266
Ending	₩	<u>98,387</u>

¹ Others include unwinding effect and recovery of impairment loss.

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31. Derivative Financial Instruments (Financial Business)

(1) Details of derivative financial instruments as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019							
	Trading				Hedging			
	Assets		Liabilities		Assets		Liabilities	
Currency								
Currency forward	₩	24,157	₩	-	₩	50,332	₩	113,746
Currency swap ¹		12,309		41,537		196,654		452,043
Stock index								
Stock index option		3,872		21,555		-		-
Credit								
Credit derivative		10,724		1,143		-		-
Derivatives-combined securities								
Stock warrants and conversion rights		27		-		-		-
Interest rate								
Interest rate swap		8,569		19,319		-		-
Others								
Option and swap		152,369		88,488		-		-
	₩	<u>212,027</u>	₩	<u>172,042</u>	₩	<u>246,986</u>	₩	<u>565,789</u>

¹ The Group has entered into currency swap contracts to hedge the exposure to fluctuations in foreign currency receivables' future fair value and cash flows. The maximum exposure period is March 15, 2039.

(in millions of Korean won)

	2018							
	Trading				Hedging			
	Assets		Liabilities		Assets		Liabilities	
Currency								
Currency forward	₩	17,553	₩	15,293	₩	19,117	₩	108,880
Currency swap ¹		1,046		1,136		327,165		196,451
Stock index								
Stock index option		3,077		102,282		-		-
Credit								
Credit derivative		10,091		4,770		-		-
Derivatives-combined securities								
Stock warrants and conversion rights		143		-		-		-
Interest rate								
Interest rate swap		4,234		37,995		-		-

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Others					
Option and swap	110,851	99,111	-	-	-
	<u>₩ 146,995</u>	<u>₩ 260,587</u>	<u>₩ 346,282</u>	<u>₩ 305,331</u>	

¹ The Group has entered into currency swap contracts to hedge the exposure to fluctuations in foreign currency receivables' future fair value and cash flows. The maximum exposure period is March 15, 2039.

(2) Details of gains and losses from derivative financial instruments for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Trading	Hedging	Trading	Hedging
Currency				
Currency forward	₩ (63,352)	₩ (136,353)	₩ (56,633)	₩ (159,907)
Currency swap	(36,711)	(782,277)	10,909	(608,778)
Stock index				
Stock index option	193,455	-	44,366	-
Credit				
Credit derivative	15,933	-	(87,629)	-
Derivatives-combined securities				
Stock warrants and conversion rights	(17)	-	(648)	-
Interest rate				
Interest rate swap	4,204	-	(1,394)	-
	<u>₩ 113,512</u>	<u>₩ (918,630)</u>	<u>₩ (91,029)</u>	<u>₩ (768,685)</u>

(3) The securities are provided as collateral for derivative instrument transactions of the Group (Note 56).

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32. Other Assets (Financial Business)

(1) Details of other assets as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Reinsurance assets	₩ 681,459	637,917
Deferred policy acquisition costs	2,534,588	2,609,260
Prepaid expenses	15,204	25,776
Prepaid VAT	720	195
Advance payments	73,563	64,144
Compensation receivables	29,015	25,521
Others	4,730	5,340
	<u>₩ 3,339,279</u>	<u>3,368,153</u>

(2) Changes in deferred policy acquisition costs for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

		2019						
		Individual insurance						
		Annuity	Whole life, Term life	Endowment	Group insurance	Long term	Pension	Total
Beginning	₩	213,178	₩ 1,439,884	₩ 38,773	₩ 2,014	₩ 913,462	₩ 1,949	₩ 2,609,260
Increase		44,661	729,422	7,712	431	549,276	761	1,332,264
Decrease		(111,244)	(712,761)	(24,204)	(865)	(556,471)	(1,390)	(1,406,935)
Ending	₩	<u>146,595</u>	₩ <u>1,456,545</u>	₩ <u>22,281</u>	₩ <u>1,580</u>	₩ <u>906,267</u>	₩ <u>1,320</u>	₩ <u>2,534,588</u>

(in millions of Korean won)

		2018						
		Individual insurance						
		Annuity	Whole life, Term life	Endowment	Group insurance	Long term	Pension	Total
Beginning	₩	332,716	₩ 1,550,897	₩ 64,520	₩ 1,968	₩ 911,890	₩ 3,826	₩ 2,865,817
Increase		53,808	640,377	10,668	950	565,908	820	1,272,531
Decrease		(173,346)	(751,391)	(36,415)	(904)	(564,336)	(2,696)	(1,529,088)
Ending	₩	<u>213,178</u>	₩ <u>1,439,883</u>	₩ <u>38,773</u>	₩ <u>2,014</u>	₩ <u>913,462</u>	₩ <u>1,950</u>	₩ <u>2,609,260</u>

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33. Property, Plant and Equipment, Investment Property and Intangible Assets (Financial Business)

(1) Details of property, plant and equipment, investment property and intangible assets as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

		2019			
		Acquisition cost	Accumulated depreciation/ amortization	Accumulated impairment losses	Book amount
Property, plant and equipment	Land	₩ 839,776	₩ -	₩ (26,303)	₩ 813,473
	Buildings	1,233,248	(408,519)	(16,077)	808,652
	Structures	643	(316)	(54)	273
	Vehicles	1,059	(1,014)	-	45
	Tools and equipment	394,909	(322,557)	-	72,352
	Others	31,166	(4,989)	(9,331)	16,846
	Construction in progress	29,801	-	-	29,801
		<u>2,530,602</u>	<u>(737,395)</u>	<u>(51,765)</u>	<u>1,741,442</u>
Investment property	Land	1,460,571	-	(13,666)	1,446,905
	Buildings	1,411,891	(405,435)	(11,772)	994,684
		<u>2,872,462</u>	<u>(405,435)</u>	<u>(25,438)</u>	<u>2,441,589</u>
Intangible assets	Goodwill	278,916	-	(92,789)	186,127
	Development costs	328,148	(233,701)	-	94,447
	Membership rights	41,295	-	-	41,295
	Others	280,567	(227,415)	(14,202)	38,950
		<u>928,926</u>	<u>(461,116)</u>	<u>(106,991)</u>	<u>360,819</u>
	<u>₩ 6,331,990</u>	<u>₩ (1,603,946)</u>	<u>₩ (184,194)</u>	<u>₩ 4,543,850</u>	

(in millions of Korean won)

		2018			
		Acquisition cost	Accumulated depreciation/ amortization	Accumulated impairment losses	Book amount
Property, plant and equipment	Land	₩ 819,788	₩ -	₩ (28,497)	₩ 791,291
	Buildings	1,196,111	(376,025)	(18,339)	801,747
	Structures	624	(295)	(54)	275
	Vehicles	1,128	(1,073)	-	55
	Tools and equipment	378,556	(310,713)	-	67,843
	Others	75,921	(49,141)	(9,331)	17,449
	Construction in progress	3,329	-	-	3,329
		<u>3,329</u>	<u>-</u>	<u>-</u>	<u>3,329</u>

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		2,475,457	(737,247)	(56,221)	1,681,989
Investment property	Land	1,428,743	-	(11,472)	1,417,271
	Buildings	1,370,794	(373,876)	(9,512)	987,406
		2,799,537	(373,876)	(20,984)	2,404,677
Intangible assets	Goodwill	276,937	-	(92,789)	184,148
	Development costs	272,399	(215,178)	-	57,221
	Membership rights	41,148	-	-	41,148
	Others	261,040	(212,186)	(14,202)	34,652
		851,524	(427,364)	(106,991)	317,169
	₩ 6,126,518	₩ (1,538,487)	₩ (184,196)	₩ 4,403,835	

(2) Changes in property, plant and equipment, investment property and intangible assets for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019						
	Beginning	Acquisitions	Disposals	Transfer	Depreciation and amortization	Others ¹	Ending
Property, plant and equipment							
Land	₩ 791,291	₩ 325	₩ (3,538)	₩ 25,395	₩ -	₩ -	₩ 813,473
Buildings	801,747	23,359	(8,613)	(1,247)	(29,853)	23,260	808,653
Structures	275	19	-	-	(20)	(2)	272
Vehicles	55	-	(3)	-	(10)	3	45
Tools and equipment	67,843	34,614	(170)	54	(29,982)	(7)	72,352
Others	17,449	12,716	(176)	5,863	(705)	(18,301)	16,846
Construction in progress	3,329	37,652	-	(11,185)	-	5	29,801
	1,681,989	108,685	(12,500)	18,880	(60,570)	4,958	1,741,442
Investment property							
Land	1,417,271	-	(64,494)	(25,395)	-	119,523	1,446,905
Buildings	987,406	-	(19,990)	33,950	(36,293)	29,611	994,684
	2,404,677	-	(84,484)	8,555	(36,293)	149,134	2,441,589
Intangible assets							
Goodwill	184,148	-	-	-	-	1,979	186,127
Development costs	57,221	36,766	-	18,970	(18,529)	19	94,447
Membership rights	41,148	155	-	-	(2)	(6)	41,295
Others	34,652	23,190	(197)	(1,656)	(17,364)	325	38,950
	317,169	60,111	(197)	17,314	(35,895)	2,317	360,819

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₩	4,403,835	₩	168,796	₩	(97,181)	₩	44,749	₩	(132,758)	₩	156,409	₩	4,543,850
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¹ Others include changes in scope of consolidation and the effect of changes in exchange rate.

(in millions of
Korean won)

		2018						
		Beginning	Acquisitions	Disposals	Transfer	Depreciation and amortization	Others ¹	Ending
Property, plant and equipment								
Land	₩	816,646	₩ 6,885	₩ (29,990)	₩ (2,250)	₩ -	₩ -	₩ 791,291
Buildings		778,714	15,127	(21,158)	57,099	(28,015)	(20)	801,747
Structures		258	35	-	-	(18)	-	275
Vehicles		78	21	(22)	-	(21)	(1)	55
Tools and equipment		66,781	32,080	(44)	1,170	(32,117)	(27)	67,843
Others		18,438	3,212	(21)	982	(5,155)	(7)	17,449
Construction in progress		18,484	132,835	-	(147,977)	-	(13)	3,329
		<u>1,699,399</u>	<u>190,195</u>	<u>(51,235)</u>	<u>(90,976)</u>	<u>(65,326)</u>	<u>(68)</u>	<u>1,681,989</u>
Investment property								
Land		1,413,140	-	(6,061)	9,336	-	856	1,417,271
Buildings		962,516	2,634	(4,416)	61,706	(38,493)	3,459	987,406
		<u>2,375,656</u>	<u>2,634</u>	<u>(10,477)</u>	<u>71,042</u>	<u>(38,493)</u>	<u>4,315</u>	<u>2,404,677</u>
Intangible assets								
Goodwill		257,176	-	-	-	-	(73,028)	184,148
Development costs		58,041	15,912	-	6,945	(17,841)	(5,836)	57,221
Membership rights		34,875	114	(738)	7,220	(3)	(320)	41,148
Others		37,977	16,058	(2)	1,518	(20,674)	(225)	34,652
		<u>388,069</u>	<u>32,084</u>	<u>(740)</u>	<u>15,683</u>	<u>(38,518)</u>	<u>(79,409)</u>	<u>317,169</u>
	₩	<u>4,463,124</u>	₩ <u>224,913</u>	₩ <u>(62,452)</u>	₩ <u>(4,251)</u>	₩ <u>(142,337)</u>	₩ <u>(75,162)</u>	₩ <u>4,403,835</u>

¹ Others include changes in scope of consolidation and the effect of changes in exchange rate.

Certain property, plant and equipment, investment property and intangible assets are provided as collateral for borrowings as at December 31, 2019 (Note 56).

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(3) Fair value of investment property as at December 31, 2019, is ₩ 2,481,715 million (2018: ₩ 2,727,358 million). Rental income and maintenance expenses from investment property for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Rental income	₩	142,377	₩	140,554
Maintenance expenses		(129,535)		(125,954)

34. Insurance Contract Liabilities (Financial Business)

(1) Details of insurance contract liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019		2018	
Premium reserve	Annuity	₩	26,518,447	₩	25,611,934
	Whole life, Term life		41,630,318		39,923,778
	Endowment		10,874,482		10,645,251
	Group		637,749		640,575
	Long term		<u>13,487,152</u>		<u>12,403,972</u>
			<u>93,148,148</u>		<u>89,225,510</u>
Reserve for outstanding claims	Annuity		533,588		499,663
	Whole life, Term life		706,121		695,698
	Endowment		603,338		505,067
	Group		32,510		32,015
	IBNR		949,244		370,511
	General		276,457		508,296
	Automobile		153,346		171,158
	Long term		<u>195,122</u>		<u>297,041</u>
			<u>3,449,726</u>		<u>3,079,449</u>
Reserve for unearned premium	Annuity		3,183		2,156
	Whole life, Term life		864		931
	Endowment		1		2
	Group		4,159		3,907
	General		207,666		199,905
	Automobile		495,784		501,984
	Long term		<u>25,769</u>		<u>20,333</u>
				<u>737,426</u>	
Reserve for minimum guaranteed benefit	Annuity		100,700		61,495
	Whole life, Term life		1,412,129		1,074,834
	Endowment		<u>628</u>		<u>3,158</u>
			<u>1,513,457</u>		<u>1,139,487</u>

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Reserve for policyholders' dividends	Annuity	251,305	250,269
	Whole life, Term life	41,963	47,419
	Endowment	1,931	2,217
	Group	1,058	1,232
	Long term	17,903	15,480
		<u>314,160</u>	<u>316,617</u>
Reserve for policyholders' profit dividends		69,980	48,793
Reserve for losses on dividend insurance		35,251	33,046
	<u>₩</u>	<u>99,268,148</u>	<u>₩</u> 94,572,120

(2) Amendments to Detailed Regulations on Supervision of Insurance Business

The method for assessing the adequacy of insurance contract liabilities was changed according to the amendments to Detailed Regulations on Supervision of Insurance Business. The Group has changed its accounting policies, as the new method is considered to provide more reliable and relevant information about the current estimates of future cash flows. The comparative notes information as at December 31, 2018 and January 1, 2018, has been restated to reflect the changes in accounting policies retrospectively.

(3) Contracts subject to liability adequacy test

The Group has performed the adequacy test for premium reserve and unearned premium reserve as at December 31, 2019. Premium reserves are net premium reserves after deducting deferred acquisition cost and policy loans.

(4) Assumptions used for test are as follows:

1) Life insurance

Description	Applied assumptions	Basis
Discount rate	2.02% ~ 8.35%	The scenario prepared by Korean Financial Supervisory Service.
Business expense rates	Acquisition costs	Calculated to be paid in the future based on the actual data for the recent one year by channels, products and payment methods in accordance with the relevant provisions.
	Maintenance costs	Calculated by channels using the actual statistical data for the recent one year based on the number of contracts held, premium revenue, etc.
Lapse ratio	1.50% ~ 61.50%	Calculated by payment methods, channels, product groups and elapsed time based on our experience in

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Risk ratio 13% ~ 179% the recent five years.
 Calculated as a ratio by life tables, product groups, dividend types and elapsed time based on the actual statistical data for the recent five years as a ratio of risk insurance premium to insurance paid.

2) Non-life insurance

Description	Basis
Discount rate	Risk free interest rate plus risk spread in accordance with 200 scenarios prepared by Korean Financial Supervisory Service.
Business expense rates	Calculated to be paid in the future based on the actual statistical data for the recent one year.
Lapse ratio	Calculated by payment methods, channels, product groups and elapsed time based on our experience in the recent five years.
Risk ratio	Calculated as a ratio based on the actual statistical data for recent fifteen years as a ratio of risk insurance premium to insurance paid.

(5) Liability adequacy test is performed by insurance contract types, and insurance contract types were classified into insurance with fixed rate insurance, floating rate insurance and variable life insurance. Surplus and deficiency by insurance types and result of liability adequacy test as at December 31, 2019, 2018 and 2017, are as follows:

1) Life insurance

(in millions of Korean won)

	Surplus (deficiency)				
	2019	2018		2017	
		Prior to change	After change	Prior to change	After change
Fixed-rate insurance					
Participating	₩ (8,773,369)	₩ (8,935,268)	₩ (8,687,011)	₩ (8,086,044)	₩ (7,384,540)
Non-participating	1,913,961	(1,018,136)	(341,668)	(686,282)	(617,605)
Floating rate insurance					
Participating	(487,666)	(444,894)	(426,690)	(371,605)	(312,290)
Non-participating	7,326,613	7,145,101	7,696,568	8,082,029	8,407,933
Variable life insurance	4,365,603	4,444,349	4,639,937	4,960,514	4,683,300
	<u>₩ 4,345,141</u>	<u>₩ 1,191,152</u>	<u>₩ 2,881,136</u>	<u>₩ 3,898,612</u>	<u>₩ 4,776,797</u>

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2) Non-life insurance

(in millions of Korean won)

	Surplus (deficiency)				
	2019	2018		2017	
		Prior to change	After change	Prior to change	After change
Premium reserve and reserve for unearned premium	₩ 6,419,217	₩ 6,583,404	₩ 6,973,307	₩ 2,704,572	₩ 3,178,158

As a result of liability adequacy test, as at December 31, 2019, no additional insurance premium reserve has been generated. The changes in accounting policies have no effect on the consolidated financial statements of prior years, presented herein for comparative purposes.

35. Insurance Contract Liabilities and Investment Contract Liabilities (Financial Business)

Details of insurance contract liabilities and investment contract liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)		2019		2018	
General account	Insurance contract liabilities	₩	99,268,148	₩	94,572,120
Separate account	Insurance contract liabilities		16,615,967		16,592,385
	Investment contract liabilities		6,199,058		5,147,768
			<u>22,815,025</u>		<u>21,740,153</u>
		₩	<u>122,083,173</u>	₩	<u>116,312,273</u>

36. Policyholders' Equity Adjustment (Financial Business)

Details of policyholders' equity adjustment as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)		2019		2018	
Net change in fair value of financial assets at fair value through other comprehensive income		₩	327,678	₩	65,989
Net change in property revaluation surplus ¹			101,764		106,520
		₩	<u>429,442</u>	₩	<u>172,509</u>

¹ The property revaluation surplus is the amount of revaluation of property assets revalued by using Korean IFRS adoption cost according to the percentage of contractors.

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37. Withheld Liabilities (Financial Business)

Details of withheld liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	Interest rate (%)		2019		2018
Ordinary deposits	0.1	₩	5,467	₩	2,546
Time deposits	1.2~5.0		751,348		720,221
Installment deposits	1.8~5.5		12,297		25,522
Investor's deposits	-		457,274		390,466
Deposits received for margin accounts	-		5,803		11,326
Others	0~4.3		1,751		1,517
		₩	<u>1,233,940</u>	₩	<u>1,151,598</u>

38. Separate Account (Financial Business)

(1) Separate account assets and liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019		2018
Separate account assets before offset	₩	23,221,242	₩	22,140,236
Separate account payables before offset		<u>(1,093,161)</u>		<u>(729,546)</u>
Separate account assets after offset	₩	<u>22,128,081</u>	₩	<u>21,410,690</u>
Separate account liabilities before offset	₩	23,143,617	₩	22,106,771
Separate account receivables before offset		<u>(503,087)</u>		<u>(71,762)</u>
Separate account liabilities after offset	₩	<u>22,640,530</u>	₩	<u>22,035,009</u>
Separate account accumulated other comprehensive income	₩	77,625	₩	33,465

(2) Statements of financial position of separate accounts as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019		2018
Assets				
Cash and deposits	₩	423,669	₩	378,515
Securities		19,205,317		19,468,239
Loans		1,882,041		1,561,999
Other assets		<u>1,710,215</u>		<u>731,483</u>
	₩	<u>23,221,242</u>	₩	<u>22,140,236</u>
Liabilities				
Other liabilities	₩	328,592	₩	366,618
Insurance contract liabilities		16,615,967		16,592,385

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Investment contract liabilities	6,199,058	5,147,768
	23,143,617	22,106,771
Accumulated other comprehensive income	77,625	33,465
Liabilities and accumulated other comprehensive income	₩ 23,221,242	₩ 22,140,236

(3) Consolidated statements of comprehensive income of separate accounts for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Guaranteed interest contracts	Investment-linked fund	Guaranteed interest contracts	Investment-linked fund
Revenues				
Premium income	₩ -	₩ 2,269,088	₩ -	₩ 2,521,144
Interest income	127,392	269,084	119,317	316,358
Gain on transaction and valuation of securities	54,002	934,690	19,455	443,318
Gain on transaction and valuation of derivatives	9,934	166,550	26,906	3,784
Gain on exchange differences	30,773	4,143	10,267	169,678
Other income	(20,392)	116,545	12,730	115,860
	₩ 201,710	₩ 3,760,101	₩ 188,675	₩ 3,570,142
Expenses				
Change in reserves for insurance contracts	₩ 86,390	₩ 432,351	₩ 74,798	₩ (683,788)
Insurance claims paid	23,457	1,754,894	21,486	1,732,215
Separate account commission	19,214	891,118	38,769	1,011,716
Commission expense	61	27,589	92	29,411
Taxes and dues	288	11,864	223	14,693
Loss on transaction and valuation of securities	30,370	559,005	14,289	1,091,941
Loss on transaction and valuation of derivatives	42,993	158,307	36,108	299,140
Loss on exchange differences	1,175	1,304	2,474	2,065
Other expenses	(2,239)	(76,330)	436	72,749
	₩ 201,710	₩ 3,760,101	₩ 188,675	₩ 3,570,142

Revenues and expenses on performance-based trust accounts (variable insurance contract) are not reflected in the general account of the consolidated statements of comprehensive income. However, revenue and expenses on trust accounts guaranteeing the repayment of principal are accounted for as other income and expenses for financial business in the general account in the consolidated statements of comprehensive income.

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(4) Separate account assets include equity securities amounting to ₩ 25,937 million (2018: ₩ 25,793 million) and debt securities amounting to ₩ 288,367 million (2018: ₩ 159,901 million) provided as collateral in relation to derivative transactions of separate account as at December 31, 2019 (Note 56).

(5) Restricted separate account assets as at December 31, 2019, are as follows:

(in millions of Korean won)

	2019			
	Stocks		Bonds	
Total	₩	25,937	₩	288,367

Restricted separate account assets are provided as collateral in relation to derivative transactions of separate account.

39. Post-employment Benefits (Financial Business)

(1) Details of net defined benefit liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
Present value of defined benefit obligations	₩	539,052	₩	529,252
Fair value of plan assets		(339,017)		(355,849)
	₩	200,035	₩	173,403

(2) Movements in the defined benefit obligations for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
Beginning balance	₩	529,252	₩	508,310
Current service cost		55,269		53,798
Interest expense		18,044		19,531
Remeasurements:				
Actuarial loss from change in demographic assumptions		1,854		-
Actuarial loss from change in financial assumptions		2,631		19,194
Actuarial gain from experience adjustments		(7,275)		(5,337)
Actuarial loss arising from changes in adjustment of retirement age		11		49
Benefit payments		(59,931)		(56,136)
Others ¹		(804)		(10,157)
Ending balance	₩	539,052	₩	529,252

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¹ Others include the impact of changes in consolidations scope, changes in exchange rate and transfer to and from affiliates.

(3) Movements in the fair value of plan assets for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Beginning balance	₩	355,849	₩	354,921
Interest income		20,495		15,925
Remeasurements ¹		(7,008)		(9,872)
Contributions		54,339		50,861
Benefit payments		(57,508)		(41,456)
Others ²		(27,150)		(14,530)
Ending balance	₩	<u>339,017</u>	₩	<u>355,849</u>

¹ Excluded the amount that is included in interest income.

² Others include the impact of changes in consolidations scope, changes in exchange rate and transfer to and from affiliates.

(4) Amounts recognized in the consolidated statements of comprehensive income for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Current service cost	₩	55,269	₩	53,798
Interest expense		18,044		19,531
Interest income of plan assets		(20,495)		(15,925)
Expense included in employee benefit ¹	₩	<u>52,818</u>	₩	<u>57,404</u>

¹ Entire expenses are included in 'cost of sales'.

(5) The significant actuarial assumptions as at December 31, 2019 and 2018, are as follows:

<i>(in percentage, %)</i>	2019	2018
Discount rate	2.85% ~ 3.56%	3.36% ~ 3.97%
Salary growth rate	2.79% ~ 4.24%	3.06% ~ 5.62%

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(6) The sensitivity of the defined benefit obligation to changes in the principal assumptions is:

	Changes in principal assumption	Effect on defined benefit obligations
Discount rate	Increase of 1%	6.26%
	Decrease of 1%	7.08%
Salary growth rate	Increase of 1%	7.09%
	Decrease of 1%	6.38%

Because there is a correlation between actuarial assumptions, the sensitivity analysis above will not show actual changes in the defined benefit obligation, as changes in assumptions will not occur independently. Also, in the above sensitivity analysis, the present value of the defined benefit obligation was measured using the projected unit credit method applied to measure the defined benefit obligation in the consolidated financial statements.

(7) Plan assets as at December 31, 2019 and 2018, consist of:

(in millions of Korean won)

	2019		2018	
	Amount	Composition	Amount	Composition
Principal guaranteed financial instruments	₩ 337,907	99.67%	₩ 354,706	99.68%
Transferred to National Pension Fund and others	1,110	0.33%	1,143	0.32%
	<u>₩ 339,017</u>	<u>100.00%</u>	<u>₩ 355,849</u>	<u>100.00%</u>

(8) The weighted average duration of the defined benefit obligation is 5.98 ~ 11.45 years.

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40.Provisions (Financial Business)

Changes in the provisions for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Provision for restoration	Provision for unused credit limit	Provision for others	Total
Beginning	₩ 17,126	₩ 135	₩ 41,540	₩ 58,801
Increase	923	111	17,117	18,151
Used during year	(1,274)	-	(3,588)	(4,862)
Reversal	(420)	-	(61)	(481)
Others	1,200	-	-	1,200
Ending	<u>₩ 17,555</u>	<u>₩ 246</u>	<u>₩ 55,008</u>	<u>₩ 72,809</u>

(in millions of Korean won)

	2018			
	Provision for restoration	Provision for unused credit limit	Provision for others	Total
Beginning	₩ 16,999	₩ 18	₩ 32,861	₩ 49,878
Increase	974	-	12,504	13,478
Used during year	(762)	-	(3,229)	(3,991)
Reversal	(680)	(99)	(60)	(839)
Others	595	216	(536)	275
Ending	<u>₩ 17,126</u>	<u>₩ 135</u>	<u>₩ 41,540</u>	<u>₩ 58,801</u>

41.Other Financial Liabilities (Financial Business)

(1) Details of other financial liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019	2018
Borrowings and debentures	₩ 5,456,577	4,115,504
Insurance benefits payable	629,489	407,588
Other payable	613,108	466,220
Accrued expenses	366,929	376,168
Leasehold deposits received	101,473	97,555
Other financial liabilities	583,857	249,064
Lease liabilities	77,601	-
Financial liabilities at fair value through profit or loss	2,673,028	1,972,055
Dividend payable	240	245
	<u>₩ 10,502,300</u>	<u>7,684,399</u>

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(2) Details of borrowings as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

Description	Creditor	Annual interest rate (%)	2019	2018
ABSTB	Kookmin Bank and others	3.16	₩ 40,000	₩ 62,272
Bonds sold under repurchase agreements	The Korea Securities Finance Corporation and others	0.10~3.29	2,886,837	2,021,505
Borrowings under securities finance	The Korea Securities Finance Corporation	1.92~2.31	544,595	427,666
Corporate paper	HI Investment & Securities Co., Ltd. and others	2.10~2.50	175,000	200,000
Electronic short-term bond	HI Investment & Securities Co., Ltd. and others	2.17~2.70	946,047	656,611
Loans on land and buildings	Samsung Fire & Marine Insurance Co., Ltd. and two other financial institutions	3.05~3.80	78,022	121,047
			₩ 4,670,501	₩ 3,489,101

In addition, the Group provided property, plant and equipment and others as collateral for the above borrowings (Note 56).

(3) Repayment schedules of borrowings as at December 31, 2019, are as follows:

(in millions of Korean won)

	Less than 1 year	Between 1 and 5 years	More than 5 years	Total
Expected repayment amount	₩ 4,572,343	₩ 98,158	₩ -	₩ 4,670,501

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(4) Details of debentures as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	Description	Date of issue	Date of maturity	Interest rate (%)		2019	2018
Hanwha General Insurance Co., Ltd.	7th Public subscription bond	2012.06.28	2019.06.28	5.80	₩	-	₩ 90,000
	8th Public subscription bond	2016.06.07	2023.06.07	4.35		128,000	128,000
	11th Public subscription bond	2018.10.31	2028.10.31	4.50		350,000	350,000
Hanwha Investment & Securities Co., Ltd.	23-2nd Public subscription bond	2013.04.09	2020.04.09	4.56		20,000	20,000
	24th Public subscription bond	2015.12.10	2021.12.10	5.00		40,000	40,000
	25-1st Public subscription bond	2019.10.18	2022.10.18	2.16		220,000	-
	25-2nd Public subscription bond	2019.10.18	2024.10.18	2.56		30,000	-
						788,000	628,000
Less: Present value discounts						(1,924)	(1,597)
Net amount					₩	786,076	₩ 626,403

42. Other Liabilities (Financial Business)

Details of other liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

		2019		2018
VAT payables	₩	1,941	₩	4,106
Advance receipts		10,633		17,964
Unearned revenues		13,884		12,920
Unearned insurance income		135,062		91,581
Others		47,075		33,970
	₩	208,595	₩	160,541

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43. Share Capital and Capital Surplus

(1) Share capital as at December 31, 2019 and 2018, is as follows:

<i>(in millions of Korean won and in number of shares)</i>	Number of authorized shares	Number of shares issued	Par value (in Korean won)	2019	2018
Ordinary shares		74,958,735	5,000 ₩	₩ 374,794	₩ 374,794
1 st preferred shares ¹	200,000,000	479,294	5,000	2,396	2,396
3 rd preferred shares ²		22,472,000	5,000	112,360	112,360
				<u>₩ 489,550</u>	<u>₩ 489,550</u>

¹ The 1st preferred share, which is non-cumulative, is eligible to receive cash dividends, if declared, equal to that declared for ordinary shares plus an additional 1%.

² In October 2016, the Company increased paid-in capital as preferred share without voting rights (22,472,000 shares).

(2) Capital surplus as at December 31, 2019 and 2018, is as follows:

<i>(in millions of Korean won)</i>	2019	2018
Share premium	₩ 342,536	₩ 342,537
Revaluation reserve	21,903	62,898
Other capital surplus	121,414	90,950
	<u>₩ 485,853</u>	<u>₩ 496,385</u>

44. Capital Adjustment

Details of capital adjustment as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Treasury share ¹	₩ (20,751)	₩ (20,751)
Other capital adjustments	41,019	44,090
	<u>₩ 20,268</u>	<u>₩ 23,339</u>

¹ As at December 31, 2019 and 2018, the number of treasury shares is unchanged at 5,880,000 shares. Treasury shares do not have voting rights according to the commercial law.

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45. Accumulated Other Comprehensive Income

Details of accumulated other comprehensive income as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Gain on valuation of debt instruments at fair value through other comprehensive income	₩ 324,388	₩ 78,024
Loss on valuation of equity instruments at fair value through other comprehensive income	(392,274)	(369,350)
Gain on valuation of financial liabilities designated at fair value through profit or loss (self-credit)	179	105
Loss on valuation of investment in associates	(48,043)	(26,446)
Gain (loss) on valuation of derivatives qualifying cash flow hedge	(30,627)	25,852
Loss on translation of foreign currency financial statements	(123,180)	(155,829)
Accumulated other comprehensive income of separate accounts	30,662	11,089
Adjustment amount for profit or loss (overlay adjustment)	67,834	(47,592)
	<u>₩ (171,060)</u>	<u>₩ (484,146)</u>

46. Retained Earnings

Details of retained earnings as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Legal reserves ¹	₩ 59,300	₩ 53,000
Discretionary reserves	1,217,800	1,231,133
Retained earnings before appropriation	<u>2,323,606</u>	<u>2,376,124</u>
	<u>₩ 3,600,706</u>	<u>₩ 3,660,257</u>

¹ The Commercial Code of the Republic of Korea requires the Company to appropriate for each financial period, as a legal reserve, an amount equal to a minimum of 10% of cash dividends paid until such reserve equals 50% of its issued share capital. The reserve is not available for cash dividends payment, but may be transferred to share capital or used to reduce accumulated deficit in accordance with a resolution of the shareholders' meeting.

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47.Revenue

(1) Details of non-financial business's revenue for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Finished goods	₩	9,313,862	₩	10,047,326
Merchandise		6,783,801		6,833,159
Construction		5,333,203		4,276,885
Service and others		2,419,578		2,360,389
	₩	<u>23,850,444</u>	₩	<u>23,517,759</u>

(2) Details of financial business's revenue for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Insurance income				
Annuity	₩	2,221,044	₩	2,188,854
Term insurance		5,644,580		5,410,773
Endowment insurance		1,647,441		1,635,997
General		549,433		432,425
Motor vehicles		821,064		835,374
Long term		4,571,670		4,292,645
Group insurance		95,614		97,591
		<u>15,550,846</u>		<u>14,893,659</u>
Reinsurance income		1,451,110		1,245,079
Other income				
Commission income		249,093		309,976
Investment operation income		7,719,597		7,139,702
Adjustment amount for profit or loss (overlay adjustment)		(109,954)		(126,063)
Other financial income		1,656,860		1,649,200
Others		44,402		110,841
		<u>9,559,999</u>		<u>9,083,656</u>
	₩	<u>26,561,955</u>	₩	<u>25,222,394</u>

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48. Cost of Sales

(1) Details of non-financial business's cost of sales for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Finished goods	₩	9,004,927	₩	9,816,755
Merchandise		4,720,037		4,706,287
Construction		4,362,275		3,700,326
Service and others		2,353,688		1,982,098
	₩	<u>20,440,927</u>	₩	<u>20,205,466</u>

(2) Details of financial business's cost of sales for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Insurance claims paid	₩	11,988,244	₩	11,295,390
Business expenses		1,818,306		1,748,906
Responsibility reserve		4,645,780		4,289,371
Others		7,408,344		7,448,076
Adjustment amount for profit or loss (overlay adjustment)		357,752		(507,978)
	₩	<u>26,218,426</u>	₩	<u>24,273,765</u>

(3) Insurance claims paid of financial business for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Insurance expenses	₩	4,229,115	₩	3,733,183
Refund expenses		7,716,678		7,517,735
Dividend expenses		42,452		44,472
	₩	<u>11,988,245</u>	₩	<u>11,295,390</u>

(4) Business expenses of financial business for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Deferred policy acquisition costs	₩	420,632	₩	330,186
Wages and salaries		499,671		507,419
Post-employment benefits		64,902		54,420
Employee benefits		122,188		116,464

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General administrative expense		260,519		317,316	
Others		450,395		423,101	
	Total	<u>₩</u>	<u>1,818,306</u>	<u>₩</u>	<u>1,748,906</u>

49. Selling and Administrative Expenses

Details of selling and administrative expenses for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019		2018
Salaries	₩	785,793	₩	690,616
Impairment loss		53,733		110,843
Freight and storage expenses		246,054		233,571
Commission expenses		163,254		267,268
Rental expenses		23,632		52,883
Depreciation ¹		98,129		102,527
Amortization		71,286		75,522
Depreciation of right-of-use assets		41,974		-
Employee benefits		111,240		92,348
Post-employment benefits		80,844		76,004
Sales commission expenses		39,018		33,029
Advertising expenses		96,586		81,133
Taxes and dues		73,720		50,955
Entertainment expenses		19,967		22,740
Transportation fees		48,802		42,888
Outsourcing fees		99,292		69,929
Overseas branch maintenance fees		5,518		4,595
Insurance expenses		16,371		18,759
Others		552,116		429,164
	₩	<u>2,627,329</u>	₩	<u>2,454,774</u>

¹ Depreciation of investment property is included.

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50. Breakdown of Expenses by Nature

Details of expenses by nature for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Changes in inventories ¹	₩ 152,739	₩ (1,006,038)
Raw materials and supplies used	7,577,059	7,621,359
Merchandise purchased	5,136,794	4,912,547
Salaries and wages	3,712,111	3,094,020
Employee benefits ²	519,733	615,488
Rental expenses	75,539	279,946
Depreciation of property, plant and equipment	802,369	742,545
Depreciation of investment property	59,630	62,613
Amortization	166,909	156,321
Depreciation of right-of-use assets	144,110	-
Taxes and dues	325,148	327,984
Research and development expenses	162,925	230,026
Responsibility reserve	4,645,780	4,289,371
Refund expenses	7,716,678	7,517,735
Other expenses	18,089,158	18,090,088
Total ³	<u>₩ 49,286,682</u>	<u>₩ 46,934,005</u>

¹ Changes in raw materials and supplies are excluded.

² Post-employment benefits are included.

³ The amount before adjustment amount for profit or loss (overlay adjustment) is deducted.

51. Other Income and Expenses

(1) Details of other income for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Gain on foreign currency transaction and translation	₩ 415,396	₩ 387,591
Gain on transaction of derivatives	76,454	69,916
Gain on valuation of derivatives	62,635	52,081
Gain on valuation of financial assets measured at fair value through profit or loss	3,536	4,896
Gain on disposal of financial assets measured at fair value through profit or loss	122	80
Others	249,342	327,578
	<u>₩ 807,485</u>	<u>₩ 842,142</u>

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(2) Details of other expenses for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Loss on foreign currency transaction and translation	₩	433,337	₩	467,363
Loss on transaction of derivatives		94,172		84,200
Loss on valuation of derivatives		34,413		10,640
Loss on valuation of short-term trading securities		205		-
Commission		-		36,857
Loss on disposal of investments in associates		22,946		60,228
Loss on valuation of financial assets measured at fair value through profit or loss		15,795		21,077
Loss on disposal of financial assets measured at fair value through profit or loss		3		16
Loss on disposal of financial assets at amortized cost		2,356		-
Loss on disposal of financial assets measured at fair value through other comprehensive income		2		61
Others		877,655		744,954
	₩	1,480,884	₩	1,425,396

52. Finance Income and Costs

(1) Details of finance income for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Interest income according to the effective interest rate method				
Financial assets at amortized cost and others	₩	(9,745)	₩	5,662
Interest income - others				
Cash and cash equivalents, advance deposit and others		45,994		33,637
Financial assets at amortized cost and others		14,856		2,023
Interest income of lease		132		-
Others		4,640		16,372
Dividend income		3,008		17,500
	₩	58,885	₩	75,194

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(2) Details of finance costs for the years ended December 31, 2019 and 2018, are as follows:

1) Finance costs (interest expense)

<i>(in millions of Korean won)</i>	2019		2018	
Interest expense				
Borrowings and debentures	₩	423,696	₩	368,600
Others		74,312		43,055
		<u>498,008</u>		<u>411,655</u>
Less: Amounts on qualifying assets capitalized ¹		(25,753)		(15,256)
	₩	<u>472,255</u>	₩	<u>396,399</u>

¹ During the year ended December 31, 2019, the Group has capitalized borrowing costs on qualifying assets. The capitalization rate of borrowings used to determine the amount of borrowing costs to be capitalized is 2.50 ~ 4.47% (2018: 2.63% ~ 4.95%).

2) Finance costs (amortization expense on financial liabilities)

<i>(in millions of Korean won)</i>	2019		2018	
Amortization expense on financial liabilities	₩	24,605	₩	22,680

53. Income Tax Expense

(1) Income tax expense for the years ended December 31, 2019 and 2018, consists of the following

<i>(in millions of Korean won)</i>	2019		2018	
Current tax:				
Current tax on profits for the year	₩	264,480	₩	711,634
Adjustments in respect of prior years		(12,406)		3,903
Total current tax		<u>252,074</u>		<u>715,537</u>
Deferred tax:				
Increase (decrease) of temporary differences		145,471		(417,757)
Impact of change in tax rate		(7)		15
Total deferred tax		<u>145,464</u>		<u>(417,742)</u>
Income tax effect charged directly to equity		(375,253)		214,570
Changes in scope of consolidation		-		(11,865)
Income tax expense	₩	<u>22,285</u>	₩	<u>500,500</u>

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(2) The income taxes charged or credited directly to equity for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019			2018		
	Before tax	Tax effect	After tax	Before tax	Tax effect	After tax
Gain (loss) on valuation of financial assets at fair value through other comprehensive income	₩ 966,730	₩ (331,718)	₩ 635,012	₩ (184,328)	₩ 64,769	₩ (119,559)
Gain (loss) on valuation of investments in associates	(16,700)	(1,279)	(17,979)	11,449	(1,482)	9,967
Gain (loss) on valuation of derivatives qualifying cash flow hedge	(193,926)	64,870	(129,056)	8,260	(1,920)	6,340
Gain (loss) on translation of foreign currency financial statements	179,556	(34,804)	144,752	(5,180)	(5,741)	(10,921)
Remeasurements of the net defined benefit liability	(45,191)	11,776	(33,415)	(90,619)	24,134	(66,485)
Other comprehensive income of separate accounts	68,170	(26,574)	41,596	46,064	(10,771)	35,293
Gain on valuation of financial liabilities at fair value through profit or loss (credit risk fluctuation)	574	(139)	435	1,223	(358)	865
Adjustment amount for profit or loss (overlay adjustment)	348,640	(57,385)	291,255	(260,085)	31,158	(228,927)
	<u>₩ 1,307,853</u>	<u>₩ (375,253)</u>	<u>₩ 932,600</u>	<u>₩ (473,216)</u>	<u>₩ 99,789</u>	<u>₩ (373,427)</u>

(3) An explanation of the relationship between income tax expense and profit before tax for the years ended December 31, 2019 and 2018, is as follows:

<i>(in millions of Korean won)</i>	2019	2018
Profit before tax	₩ 253,339	₩ 1,299,841
Tax calculated at domestic tax rates applicable to profits in the respective countries ¹	64,386	467,656
Adjustments:		
Income not subject to tax	(58,473)	(89,105)
Expenses not deductible for tax purposes	40,540	40,455
Tax credit and tax reduction	(26,597)	(25,529)
Impact of change in tax rate	2,419	(3,007)
Others	11	110,031

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Income tax expense	₩	22,286	₩	500,501
Effective tax rate		8.80%		38.50%

(4) The movements in deferred tax assets and liabilities for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Beginning	Profit or loss	Other comprehensive income	Others	Ending
Trade receivables	₩ 301,241	₩ (13,322)	₩ -	₩ -	₩ 287,919
Accumulated deficit and others	112,845	40,976	-	-	153,821
Appropriated retained earnings	251,841	101,093	-	-	352,934
Inventories	12,167	2,646	-	-	14,813
Securities	292,345	(348,625)	(331,716)	-	(387,996)
Revaluation reserve	(147,603)	(12,962)	-	-	(160,565)
Accrued income	(58,240)	3,107	-	-	(55,133)
Gain on business split-off	(38,198)	-	-	-	(38,198)
Investments in subsidiaries and others	(1,242,869)	(30,170)	(124,487)	-	(1,397,526)
Others	(319,714)	487,046	80,950	(76,366)	171,916
	<u>₩ (836,185)</u>	<u>₩ 229,789</u>	<u>₩ (375,253)</u>	<u>₩ (76,366)</u>	<u>₩ (1,058,015)</u>

(in millions of Korean won)

	2018				
	Beginning	Profit or loss	Other comprehensive income	Others	Ending
Trade receivables	₩ 343,468	₩ (43,791)	₩ -	₩ 1,564	₩ 301,241
Accumulated deficit and others	120,655	(15,610)	-	7,800	112,845
Appropriated retained earnings	240,642	11,199	-	-	251,841
Inventories	8,656	3,932	-	(421)	12,167
Securities	(97,991)	23,443	367,225	(332)	292,345
Revaluation reserve	(163,716)	16,113	-	-	(147,603)
Accrued income	(61,795)	3,555	-	-	(58,240)
Gain on business split-off	(38,198)	-	-	-	(38,198)
Investments in subsidiaries and others	(1,135,246)	(80,687)	(22,742)	(4,195)	(1,242,869)
Others	(651,347)	345,252	18,681	(32,299)	(319,714)
	<u>₩ (1,434,872)</u>	<u>₩ 263,406</u>	<u>₩ 363,164</u>	<u>₩ (27,883)</u>	<u>₩ (836,185)</u>

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54. Earnings per Share

(1) Profits attributable to ordinary shares and 1st preferred shares for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Profit for the year	₩	89,962	₩	468,400
Dividend to third preferred share		(16,854)		(13,371)
Profit attributable to ordinary shares and first preferred shares	₩	73,108	₩	455,029

(2) Basic earnings per share for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
	Ordinary shares	1st preferred shares ²	Ordinary shares	1st preferred shares ²
Profit attributable to equity holders of the Company	₩	72,580	528	451,870
Weighted-average number of ordinary shares in issue		69,078,735	479,294	69,078,735
Basic earnings per share ¹ (in Korean won)	₩	1,051	1,101	6,541

¹ Basic earnings per share from continuing operations of 2019 and 2018 are identical to basic earnings per share.

² Preferred shares were issued under the former commercial law before amendments in 1997. These preferred shares hold the same priority as ordinary shares in terms of dividends payout and distribution of residual- properties, thus earnings per share were calculated accordingly. Dividends are paid by adding 1% of par value of ordinary shares to dividends per ordinary shares.

(3) For the years ended December 31, 2019 and 2018, there was no adjustment for number of ordinary shares in issue. Thus, the weighted-average number of ordinary shares in issue is identical to the number of issued shares at the beginning.

(4) The Group did not issue potential ordinary shares. Therefore, basic earnings per share are identical to diluted earnings per share.

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55. Related Party Transactions

(1) The Group's related parties as at December 31, 2019, are as follows:

Classification	Name of entity
Associates and joint venture	Yeochun NCC Co., Ltd., Hanwha General Chemical Co., Ltd., Bio Green Technology Sdn Bhd., Gulf Advanced Cables Insulation Company and others
Large-scale business group affiliates ¹	H-Solution (Formerly, Hanwha S&C Co., Ltd.), Hanwha Energy Corporation, Hanwha Total Petrochemical Co., Ltd. and others

¹ A large-scale business group affiliate (other related parties) does not correspond to the related parties defined in paragraph 9 of Korean IFRS 1024. However, the large-scale business group affiliation designated by the Fair Trade Commission is company classified as a related party in accordance with the resolution of the Securities and Futures Commission and in accordance with the substantive relationship stipulated in paragraph 10 of Korean IFRS 1024.

(2) Outstanding balances arising from sales/purchases of goods and services with related parties, including large-scale business group affiliates, as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019					
	Receivables			Payables		
	Trade receivables	Other receivables	Loans ²	Trade payables	Other payables	Borrowings
Associates and joint venture						
Galleriaforet Corp. ¹	₩ 30,286	₩ -	₩ -	₩ -	₩ -	-
Yeochun NCC Co., Ltd.	28,957	3,158	-	230,495	93,985	-
Hanwha General Chemical Co., Ltd.	2,458	1,122	-	3,165	78,734	5,000
Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.	-	-	35,586	-	-	-
Alterpower Digos Solar, Inc. ³	-	-	16,081	-	-	-
Gulf Advanced Cables Insulation Company	-	-	16,624	-	-	-
International Polymers Company	-	-	-	26,015	-	-
Luxbon Solar S.A.	-	-	12,199	-	-	-
Saudi Specialized Products Company	964	4,455	14,424	-	-	-

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Others	3,560	5,821	248,615	1,858	11,198	3,079
Large-scale business group affiliates						
Hanwha Energy Co., Ltd.	1,274	5	-	14,820	5,316	-
Hanwha Total Petrochemical Co., Ltd.	55,821	3,670	-	14,203	184,663	-
174 PG Torreon, S. de R.L. de C.V.	21,387	-	-	-	-	-
Hanwha Energy Corporation Japan	-	120	16,029	-	3	-
Hanwha Energy USA Holdings Corporation	5,661	2	-	-	-	-
Gwangju Belt-Highway Inc.	-	-	-	-	49	-
Others	3,334	1,269	1,868	2,833	13,041	-
	<u>₩ 153,702</u>	<u>₩ 19,622</u>	<u>₩ 361,426</u>	<u>₩ 293,389</u>	<u>₩ 386,989</u>	<u>₩ 8,079</u>

¹ As at December 31, 2019, the Group sets up a full provision against receivables from construction contract.

² Accrued revenue for the loan is included.

³ The entity's name has been changed from Enfinity Philippines Renewable Resources Fourth, Inc. during the year ended December 31, 2019.

(in millions of Korean won)

	2018					
	Receivables			Payables		
	Trade receivables	Other receivables	Loans ²	Trade payables	Other payables	Borrowings
Associates and joint venture						
Galleriaforet Corp. ¹	₩ 46,287	₩ -	₩ 1,500	₩ -	₩ -	₩ -
Yechun NCC Co., Ltd.	38,709	1,022	-	211,100	67,158	-
Jeju Ocean Science Museum Corporation	1,113	-	-	-	6,455	-
The Ulsan Harbour Bridge	-	-	-	-	133	-
WONJU GREEN CORP.	2,769	-	-	-	-	-
Hanwha General Chemical Co., Ltd.	2,050	61	-	2,713	69,481	-
Sermatech Korea Co., Ltd.	14	12	-	1,816	5,131	-
Daehan 5 Newstay Consignment Managemnet real	-	-	31,552	-	3,981	-

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estate Investment Co., Ltd.							
Arabia One For Clean Energy Investments PSC	-	-	558	-	-	-	-
Bio Green Technology Sdn Bhd. ³	-	444	624	91	-	-	-
Enfinity Philippines Renewable Resources Fourth, Inc.	-	-	12,510	-	-	-	-
Gulf Advanced Cables Insulation Company	-	632	15,733	-	-	-	-
International Polymers Company	-	1,695	-	29,674	-	-	-
Saudi Specialized Products Company	-	196	15,839	-	-	-	-
Others	263	1,301	274,776	39	2,013	3,036	
Large-scale business group affiliates							
Hanwha Energy Co., Ltd.	938	8	-	12,024	4,699	-	-
Hanwha Total Petrochemical Co., Ltd.	42,440	5,387	-	9,286	156,286	-	-
Q Solar A G.K.	-	-	-	-	1,609	-	-
SIT Co., Ltd.	34	-	-	1,295	-	-	-
Hanwha Energy Corporation Japan	-	113	17,306	-	7	-	-
Others	18,742	312	-	1,060	10,093	-	-
	<u>₩ 153,360</u>	<u>₩ 11,184</u>	<u>₩ 370,399</u>	<u>₩ 269,100</u>	<u>₩ 327,046</u>	<u>₩ 3,036</u>	

¹ As at December 31, 2018, the Group sets up a full provision against receivables from construction contract.

² Accrued revenue for the loan is included.

³ As at December 31, 2018, the Group sets up a full provision against loans.

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(3) Sales and purchases with related parties, including large-scale business group affiliates, for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Sales and others			Purchases and others	
	Sales	Other income	Dividend income	Purchases	Other expenses
Associates and joint venture					
International Polymers Company	₩ -	₩ -	₩ 13,866	₩ 169,815	₩ -
Sermatech Korea Co., Ltd.	186	1,736	3,481	22,932	1
Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.	21,567	-	-	-	-
A&D Credit Information Co., Ltd.	9	-	-	7,398	11
Yeochun NCC Co., Ltd.	504,747	3	70,000	1,521,095	1,556
Hanwha General Chemical Co., Ltd.	21,966	2	-	28,351	1,411
Others	17,659	10,058	6,807	600	-
Large-scale business group affiliates					
174 PG Torreon, S. de R.L. de C.V.	47,739	179	-	-	-
Daiyon Q Solar G.K.	5,285	-	-	-	-
Hanwha Energy USA Holdings Corporation	87,497	67,618	-	8	6
Hanwha Total Petrochemical Co., Ltd.	386,864	5	245,953	167,840	73
Hanwha Energy Co., Ltd.	24,578	2	-	151,446	681
Daesan Green Energy Co. Ltd.	33,551	-	-	-	-
SIT Co., Ltd.	651	2	-	11,517	28
Others	13,924	980	15,175	780	3,385
Total	₩ 1,166,223	₩ 80,585	₩ 355,283	₩ 2,081,782	₩ 7,152

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	2018				
	Sales and others			Purchases and others	
	Sales	Other income	Proceeds from disposal of property, plant and equipment	Purchases	Other expenses
Associates and joint venture					
Gyeongju Enviro Co., Ltd.	₩ 1,101	₩ -	₩ -	₩ -	-
Yeochun NCC Co., Ltd.	250,018	19	-	1,761,041	1,289
Jeju Ocean Science Museum Corporation	6,809	-	-	1,027	197
The Ulsan Harbour Bridge	2,235	-	-	7	-
Hanwha General Chemical Co., Ltd.	17,430	1	-	29,835	1,614
HANWHA Q CELLS Korea Corp ¹	295,749	11	-	820,081	-
Sermatech Korea Co., Ltd.	193	1,664	-	21,688	7
Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.	90,456	-	-	-	-
A&D Credit Information Co., Ltd.	-	49	-	7,847	-
Bio Green Technology Sdn Bhd.	-	31	-	690	-
International Polymers Company	-	74	-	155,008	3
Others	20,091	9,095	-	2,379	1
Large-scale business group affiliates					
Taekyung Chemical Co., Ltd. ²	42,239	-	-	10	-
Hanwha Energy Corporation	42,801	2	314	163,123	1,152
H-Solution	263	5	-	34	-
HANWHA S&C Co., Ltd. ³	5,592	8	-	71,297	79,369
Hanwha Total Petrochemical Co., Ltd.	503,027	12	-	264,564	83
Daiichi Q Solar G.K.	13,159	-	-	-	-
Daiyon Q Solar G.K.	5,537	-	-	-	-
Hanwha Q CELLS	36,774	292	-	30,084	569

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Americas Holdings. Corp. ⁴								
TRI ENERGY GLOBAL PTE. LTD.	341	-	-	-	-	-	-	-
Others	66,705	581	-	10,774	2,026			
Total	<u>₩ 1,400,520</u>	<u>₩ 11,844</u>	<u>₩ 314</u>	<u>₩ 3,339,489</u>	<u>₩ 86,310</u>			

¹ Since Hanwha Q Cells Korea Corp. merged into Hanwha Q CELLS & Advanced Materials Corporation on November 1, the transaction details are from January 1 to October 31.

² Taekyung Chemical Co., Ltd. was excluded from the scope of related parties as of December 13, and transaction details are from January 1 to December 13.

³ Since HANWHA S&C CO., LTD. merged into Hanwha System Corporation on August 1, the transaction details are from January 1 to July 31.

⁴ Since Hanwha Q CELLS Americas Holdings. Corp. included in the scope of related parties as of November 1, the transaction details are from January 1 to October 31.

(4) Changes in loans to related parties, including large-scale business group affiliates, for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Beginning	Increase	Decrease	Others ¹	Ending
Associates and joint venture					
Gulf Advanced Cables Insulation Company	₩ 15,733	₩ -	₩ -	₩ 891	₩ 16,624
Saudi Specialized Products Company	15,839	2,214	(3,354)	(274)	14,424
Crystal Solar	2,055	-	(190)	1	1,867
Bio Green Technology Sdn Bhd. ²	624	-	(119)	(42)	463
Galleriaforet Corp.	1,500	-	(1,500)	-	-
Alterpower Digos Solar, Inc.	12,510	-	-	3,570	16,081
Luxbon Solar S.A.	8,583	-	-	3,616	12,199
Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.	31,552	3,990	(30)	74	35,586
Others	264,696	-	(16,542)	(3)	248,152
Large-scale business group affiliates					
Hanwha Energy Corporation Japan	17,306	-	-	(1,277)	16,029

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¹ Others include accrued interest income and fluctuation of foreign exchange rate.

² As at December 31, 2019, the Company sets up a full provision against loans.

(in millions of Korean won)

	2018					
	Beginning	Increase	Decrease	Changes in scope of consolidation	Others ¹	Ending
Associates and joint venture						
Gulf Advanced Cables Insulation Company	₩ 14,775	₩ -	₩ -	₩ -	₩ 958	₩ 15,733
International Polymers Company	9,487	-	(8,260)	-	(1,227)	-
Saudi Specialized Products Company	10,418	4,681	-	-	740	15,839
Crystal Solar Inc.	1,802	1,658	(1,600)	-	195	2,055
Bio Green Technology Sdn Bhd. ²	569	31	-	-	23	624
Galleriaforet Corp.	-	9,700	(8,200)	-	-	1,500
Enfinity Philippines Renewable Resources Fourth, Inc. ³	-	-	-	12,510	-	12,510
Luxbon Solar S.A. ³	-	-	-	8,583	-	8,583
Others	298,934	18,612	(19,699)	-	(1,598)	296,249
Large-scale business group affiliates						
Primo Gunes Enerjisi A.S.	3,831	-	(2,447)	-	(1,384)	-
Hanwha Energy Corporation Japan	-	17,306	-	-	-	17,306

¹ Others include accrued interest income and fluctuation of foreign exchange rate.

² As at December 31, 2018, the Company sets up a full provision against loans.

³ This is a loan that transferred to the scope of consolidation since Hanwha Q Cells Korea Corp. merged into Hanwha Q CELLS & Advanced Materials Corporation for the year ended December 31, 2018.

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(5) Changes in borrowings to related parties for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Beginning	Increase	Decrease	Others	Ending
Associates and joint venture					
Hanwha Susung Special Purpose Acquisition	₩ 1,014	12	₩ -	₩ -	₩ 1,026
Hanwha Ace Special Purpose Acquisition 3rd CO., LTD	1,011	17	-	-	1,028
Hanwha Ace Special Purpose Acquisition 4th CO., LTD	1,011	15	-	-	1,026

(in millions of Korean won)

	2018				
	Beginning	Increase	Decrease	Others	Ending
Associates and joint venture					
Hanwha General Chemical Co., Ltd.	₩ 1,520	₩ 79,226	₩ (80,746)	₩ -	-
Hanwha Susung Special Purpose Acquisition	-	1,014	-	-	1,014
Hanwha Ace Special Purpose Acquisition 3rd CO., LTD	-	1,011	-	-	1,011
Hanwha Ace Special Purpose Acquisition 4th CO., LTD	-	1,011	-	-	1,011

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(6) Changes in lease liabilities for related parties, including large-scale business group affiliates, for the year ended December 31, 2019, are as follows:

(in millions of Korean won)

	2019		
	Beginning ¹	Changes	Ending
Associates and joint venture			
Yeochun NCC Co., Ltd.	₩ 10	₩ (10)	₩ -
Hanwha General Insurance Co., Ltd.	113	(107)	6
Large-scale business group affiliates			
Hanwha Total Petrochemical Co., Ltd.	128	(58)	70

¹ The effect of initial application of Korean IFRS 1116 is reflected.

(7) Equity contributions in cash to related parties, for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	Transaction	Related parties	2019	
Associates and joint venture	Capital increase	Sino Korea Life Insurance.co,ltd(China)	₩ 43,035	
		KDB Asia Private equity investment	1,139	
		NHN Payco Co., Ltd	50,000	
		Golden Gate Ventures x Hanwha Growth Fund GP, LLC	30	
		AI Alliance LLC	2,315	
		Hanwha Sbi Sepcial Purpose Acquisition Co., Ltd	10	
		CapBridgeHoldings Pte.Ltd.	4,793	
		Hanwha S-Term Company Bond Securities Self-Investment Trust Bond C-F	20,000	
		H2, Inc.	3,000	
		Others	26,778	
		Capital decrease	Seoul Global Bio Medical New Growth Power Investment Fund	864
		Disposal of shares	KoFC Kyobo Hanwha Growth Champ 2010-6 Private Investment Company	1,119
			2011 KIF-Hanwha IT specialty Investment Fund	1,195
			MYEONGGYEONG FS Co., Ltd.	98
JR Professional Investment Criminal Real Estate Investment Trust 15	11,441			

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KOTAM Aircraft Private Special Asset Investment Trust Security 2	4,461
KDB Asia Private equity investment	4,096
Others	5,418

(in millions of Korean won)

	Transaction	Related parties	2018
Associates and joint venture	Capital increase	P&W NGPF Manufacturing Company Singapore PTE. LTD.	₩ 4,492
		Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.	78,063
		KDB Asia Private equity investment	3,116
		AI Alliance LLC	2,204
		PBA-HANWHA ROBOTICS PTE.LTD.	392
		HANWHA KALYON GUNES TEKNOLOJILERI URETIM ANONIM SIRKETI	26,008
	Capital decrease	Seoul Global Bio Medical New Growth Power Investment Fund	3,552
		Air Innovation Korea Corp.	8,749
		2011 KIF-Hanwha IT specialty Investment Fund	2,880
		1st Science Technology Private Equity Fund	2,170
		KoFC Kyobo Hanwha Growth Champ 2010-6 Private Investment Company	500
	Disposal of shares	Hanwha Hawaii LLC and others	35,934
		Gyeongju Enviro Co., Ltd.	4,457

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(8) Payment guarantees to related parties, including large-scale business group affiliates, as at December 31, 2019, are as follows:

(in millions of Korean won and in thousands of US dollars and Japanese yen)

	Guarantee		Guaranteed amount	Purpose of payment guarantee	
Associates and joint venture	Gulf Advanced Cables Insulation Company	USD	5,067	Financial institution borrowings	
	International Polymers Company	USD	17,000		
	Saudi Specialized Products Company	USD	4,180		
	Burdur Enerji A.S.	USD	6,663		
	Alterpower Digos Solar, Inc. ¹	USD	52,000		
	Alterpower Specialist, Inc.	USD	1,000		
	Galleriaforet Corp.	KRW	57,000		
	Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.	KRW	14,196		Contract performance guarantee
	JEJU ACADEMY CORP.	KRW	62		
Large-scale business group affiliates	HW Solar Power 1 G.K.	JPY	355,332	Financial institution borrowings	
	HW Solar Power 4 G.K.	JPY	606,668		
	HW Solar Power 12 G.K.	JPY	1,280,362	Lease guarantee	
	HW Solar Power 5 G.K.	JPY	150,447		
	HW Solar Power 7 G.K.	JPY	189,198		
	HW Solar Power 9 G.K.	JPY	296,440		
	HW Solar Power 10 G.K.	JPY	208,587		
	HW Solar Power 13 G.K.	JPY	101,080		
HW Solar Power 26 G.K.	JPY	339,862			

¹ The entity's name has been changed from Enfinity Philippines Renewable Resources Fourth, Inc. during the year ended December 31, 2019.

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(9) Details of collateral provided by the Group for the funding sources of related parties as at December 31, 2019, are as follows:

(in millions of Korean won)

		Pledged asset	Book amount	Maximum collateral	Mortgagee
Associates and joint venture	Gyungbook Eco, Edu Co., Ltd	Shares	₩ 362	₩ 49,598	KBTL
	Ulsan Harbor Bridge Co., Ltd.	Shares	1,479	351,000	Kookmin Bank and others
	Wonju Green Corporation	Shares	347	54,860	Nonghyup Bank and others

(10) Details of cash deficiency support agreements provided by the Group for related parties as at December 31, 2019, are as follows:

(in millions of Korean won and in thousands of EUR)

		Type of business	Amount
Associates and joint venture	Luxbon Solar S.A	Operation and modular supply of solar power plants in portugal	EUR 17,670
	Wonju Green Corporation	SOC	KRW 20,000

¹ Additional losses may occur in relation to the above arrangements, but these effects were not reflected in the consolidated financial statements at the end of the current term because they are not likely to be incurred.

² Wonju Green Corporation is in the process of business restructuring, and in relation to this, the possible loss is recognized as a contingent loss. If the restructuring fails, there may be an obligation to supplement or provide funds, but it is not likely to happen.

(11) As at December 31, 2019, the Group is required to provide funds for the amount that is insufficient to repay the principal of the loan with termination notice or purchase value if the agreement is terminated or a purchase claim is made from the competent authority in connection with SOC projects by the related parties below

		Type of business
Associates and joint venture	Gyungbook Eco, Edu Co., Ltd	SOC
	Wonju Green Corporation	SOC

¹ Wonju Green Corporation is in the process of business restructuring, and in relation to this, the possible loss is recognized as a contingent loss. If the restructuring fails, there may be an

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obligation to supplement or provide funds, but it is not likely to happen.

(12) The conditioned-level debt acquisition agreement for the liability completion provided for related parties as at December 31, 2019, is as follows:

<i>(in millions of Korean won)</i>		Amount	
Associates	Daehan 5 Newstay Consignment Managemnet real estate Investment Co., Ltd.	₩	40,000

(13) The key management compensation for the years ended December 31, 2019 and 2018, consists of the following:

<i>(in millions of Korean won)</i>	2019		2018	
Salaries and other short-term employee benefits	₩	143,136	₩	131,046
Post-employment benefits		27,683		25,677
Other long-term benefits		413		73

(14) As at December 31, 2019, the Group paid ₩ 16,254 million to Hanwha Life Insurance Co., Ltd. and Hanwha General Insurance Co., Ltd., its subsidiaries, and others as a plan asset. Also, the Group carries commercial general liability insurance and others.

56. Commitment and Contingencies

(1) The outstanding borrowing agreements with banks as at December 31, 2019, are as follows:

	Limit	
	Currency	Amount
Bank overdraft	KRW	408,515
	USD	15,000
	EUR	8,000
	THB	30,000
Usance-related import	USD	1,043,340
	EUR	9,000
	JPY	2,500,000
D/A, D/P, local and foreign trade-related export	KRW	125,040
	USD	409,614
	THB	70,000
Other borrowings	KRW	4,189,429
	USD	1,959,240
	EUR	25,000
	JPY	4,966,667

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CNY	2,529,150
THB	90,000
CZK	1,168,860
MYR	627,837
VND	112,000,000
MXN	98,404

(2) As at December 31, 2019, 11 blank promissory notes and 20 blank checks and 22 promissory notes amounting to ₩ 153,691 million have been provided as collaterals for short-term and long-term debts, agreements for discounting notes receivable and performance guarantees and others, respectively.

(3) Other agreements as at December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Loan agreement	₩	3,961,792	₩	2,901,529
Contribution agreement		3,223,266		4,540,348
	₩	<u>7,185,058</u>	₩	<u>7,450,877</u>

(4) Payment guarantees provided for others as at December 31, 2019, are as follows:

<i>(in millions of Korean won and in thousands of foreign currency)</i>			
Guarantees received	Breakdown of guarantee	Amount	
Vendee in lot sale contracts	Joint surety of loan	KRW	2,548,969
Operation developers	Developer's lot sale guarantee	KRW	1,676,905
Private business places of authorized offices	Performance guarantee	KRW	255,125
Yeosu Regional of Oceans and Fisheries	License and permit bond	KRW	395
Commercial banks	Payment guarantee and others	KRW	259,537
Bank Yapicredit, Turkey	Payment guarantee in foreign currency	USD	9,296
NextEra Constructors, LLC.	Performance guarantees	USD	55,916
Zia Guclu	Performance guarantees	USD	68,577

¹ The maximum exposure to credit risk is identical to the maximum amount of guarantee provided as at December 31, 2019.

² The Group has provided financial guarantee and others for related parties as at December 31, 2019 (Note 55).

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In addition to above guarantees, the Group invested in S-Y Highway Co., Ltd. and 59 investees for private sector investment projects and environmental water-treatment projects under the Act on Private Investment for Social Overhead Capital. As at December 31, 2019, the Group provides financial assets at fair value through profit or loss of ₩ 67,398 million and investments in associates of ₩ 20,233 million as the right of pledge to the lenders of investees. Further, the Group provides investment securities in associates as collateral for financing related parties (Note 55).

(5) The Group provides a capital supplement agreement to the Korea Development Bank and others in connection with a total of ₩ 110 billion in facility loans related to the construction of solar cells manufacturing plant in Jincheon as at December 31, 2019.

(6) Credit guarantees provided to others on PF

1) Details of credit guarantees provided by the Group to developers for their borrowings as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Guarantee balances	Loan balances	Guarantee balances	Loan balances
ABCP	₩ -	₩ -	₩ 40,000	₩ 40,000
ABSTB	427,000	356,500	429,500	356,500
Other PF loan	16,444	16,444	120,162	120,918
	<u>₩ 443,444</u>	<u>₩ 372,944</u>	<u>₩ 589,662</u>	<u>₩ 517,418</u>

2) Loans to developers related to the Group's project as at December 31, 2019, are as follows:

(in millions of Korean won)

Customer	Lender	PF balances	Guarantees	Loan period	Progress	Description
Classeville	Korea Investment & Securities Co., Ltd.	ABSTB: ₩ 40,000	Joint surety	2019.11.08~2020.02.07	Completion	Refunding
Galleriaforet Corp.	HI SECURITIES CO., LTD.	ABSTB: ₩ 57,000	Joint surety	2019.11.22~2020.02.21	Completion	Refunding
Woorim moonhwasa	YOOJIN INVESTMENT SECURITIES Co., Ltd.	ABSTB: ₩ 64,500	Debt acquisition	2019.10.28~2020.01.28	Before construction commencement	Refunding
Joong Woo Construction Co., Ltd	Korea Investment & Securities Co., Ltd.	ABSTB: ₩ 195,000	Joint surety	2019.11.22~2020.02.21	Before construction commencement	Refunding
Deokcheon 2, 1 District Housing Reconstruction and Maintenance Cooperative	Woori Bank and 1 other	Loan: ₩ 4,182	Joint surety	2018.05.31~2021.05.28	Before construction commencement	New loan
GwangMyung 14R Housing Redevelopment and Maintenance business Cooperative	Woori Bank and 1 other	Loan: ₩ 3,320	Joint surety	2018.12.26~2022.08.31	Before construction commencement	New loan
Dabok Village Housing Reconstruction Project Cooperative	Woori Bank and 1 other	Loan: ₩ 8,942	Joint surety	2019.04.15~2023.06.30	Before construction commencement	New loan

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₩ 372,944

3) The Group provides conditioned contract of debt assumption for the liability completion amounting to ₩ 1,448,994 million for First E Development Co. and 21 others as at December 31, 2019.

(7) Guarantees provided to the Group as at December 31, 2019, are as follows:

(in millions of Korean won and in thousands of foreign currency)

Guarantor	Breakdown of guarantee		Amount
Standard Chartered	Payment guarantees in foreign currency and others	USD	10,000
Construction Guarantee Cooperative	Guarantees for construction and housing sale	KRW	2,311,702
Nonghyup Bank	Payment guarantees in foreign currency	USD	10,000
Korea Development Bank	BOND Guarantees about overseas construction and others	USD	55,222
Seoul Guarantee Insurance Co., Ltd.	Performance guarantees and others	KRW	4,199,560
		USD	9,833
		EUR	12,682
The Export-Import Bank of Korea	BOND Guarantees about overseas construction and others	KRW	257,844
		USD	1,516,634
		KWD	14,985
		DZD	919,648
Suhyup Bank	Payment guarantees in foreign currency	USD	12,000
Shinhan Bank	Payment guarantees for debentures and others	KRW	1,984
		USD	129,406
		EUR	1,706
Kookmin bank	BOND Guarantees about overseas construction and others	KRW	1,917
		USD	82,000
KEB Hana Bank	Payment guarantees in foreign currency and others	KRW	6,464
		USD	219,682
		EUR	7,452
		KWD	105
		SAR	47,667
Korea Software Financial Cooperative	Performance guarantees	KRW	134,863
Woori Bank	Payment guarantees in foreign currency	USD	50,000

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Engineering Guarantee Insurance	Performance guarantees and others	KRW	319,209
Korea Housing & Urban Guarantee Corporation.	Guarantees for construction and housing sale	KRW	2,816,025
Korea Federation of Small and Medium Business	Performance guarantees	KRW	130,267
Korea Defense Industry association	Contract, government ordered, payment, defects, bids	KRW	4,866,519
Arab Bank Singapore	Debt payment guarantees	USD	4,497
First Abu Dhabi Bank	Performance guarantees and others	USD	83,600
Others	Payment guarantees	KRW	173

(8) Details of assets provided as collateral for the Group's liabilities as at December 31, 2019, are as follows:

(in millions of Korean won and in thousands of foreign currency)

		Mortgage amount	Mortgagee	Classification
Inventories	USD	11,437	The Korea Development Bank and others	Collateral for borrowings and others
	MYR	93,707	Minister of Finance, Malaysia	
	JPY	835,134	Mizuho Bank	
Property, plant and equipment	KRW	3,569,578	The Korea Development Bank and others	
	USD	26,603	Woori Bank and others	
	JPY	4,046,051	Woori Bank and others	
	CNY	762,056	Bank of China and others	
	EUR	2,345	Ober Bank	
	MYR	446,232	Minister of Finance, Malaysia	
	GBP	84,480	The Korea Development Bank and others	
Investment property	KRW	466,559	KEB Hana Bank and others	
Intangible assets	KRW	7,946	The Korea Development Bank and others	
	USD	6,983	The Korea Development Bank and others	
	CNY	109,932	Bank of China and others	
Financial assets	KRW	2,724,893	The Korea	

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			Development Bank and others
	USD	237,387	The Korea Development Bank and others
	JPY	76,489	Fuyo General Lease and others
	MYR	287,061	Minister of Finance, Malaysia
	EUR	9,284	KEB Hana Bank and others
	AED	1,360	Emirates NBD Bank
Other assets	KRW	17,132	KEB Hana Bank and others

Shares of Hanwha Chemical Corporation, Hanwha Life Insurance Co., Ltd. and the Group's subsidiaries are provided as collateral for trading purposes, such as borrowings, as at December 31, 2019. The maximum amount of guarantee provided by collateral amounts to ₩ 1,041,935 million.

(9) Details of outwards and inwards agreements the Group has entered into for general, long-term and automobile insurance of Hanwha General Insurance Co., Ltd., a subsidiary, as at December 31, 2019, are as follows:

	Reinsurance company	Ratio	Insurance product
Proportional	Korean Reinsurance Company	10~30% of VaR	Auto insurance (excluding joint risk)
	Korean Reinsurance Company and others	15~70% of VaR	Fire insurance
	Korean Reinsurance Company and others	15~70% of VaR	Marine insurance
	Korean Reinsurance Company and others	20~90% of VaR	Special insurance
	Korean Reinsurance Company	25~65% of VaR	Long-term insurance (property, accident, disease and others)
	SCOR RE and others	5~60% of VaR	Long-term insurance (accident, disease and others)
Excessive	Korean Reinsurance Company and others	₩ 0.875 billion ~ Infinite,	Auto insurance (personal indemnification)
	Korean Reinsurance Company	₩ 1.26 billion ~ ₩ 5.75 billion	Auto insurance (auto-collateralization)
	Korean Reinsurance Company	₩ 0.6 billion ~ ₩ 98 billion	Long-term insurance (property and accident)
	SWISS RE and others	0~100% of excess amount	Other general

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(10) For some of the Group's borrowing agreements, when below standards are exceeded, it is considered to be an event of default. Standards are differently applied for each borrowing, and include an excess of debt ratio over certain level, capital to collateral ratio, total asset to disposal of assets ratio, exclusion of mutual investment restriction group. In addition, for the borrowings of ₩ 100 billion from Industrial and Commercial Bank of China, limit can be reduced or loan transactions can be temporarily paused by a bank notice when the Group's credit ranking falls by more than two levels by a certified credit rating agency. Private bonds (₩ 30 billion of private bond in Hanwha systems 3-1 and 3-2, respectively) can be early repaid in relation to level by an external credit rating agency. However, upon the occurrence of an event of default, an obligation to repay exists only when there are an approval and written notice from the creditors.

(11) Financial assets at fair value through profit or loss amounting to ₩ 3,026,048 million are provided as collateral in relation to bonds sold under repurchase agreement as at December 31, 2019.

(12) Certificate of beneficial interest in investor's deposit (trust) at Kookmin Bank in relation to replacement services of net settlement is provided as collateral for amounts of ₩ 37,000 million as at December 31, 2019.

(13) Related to trading finance and collateral loans, ₩ 733,292 million of securities that are received or pledged as collaterals are provided to KSFC as at December 31, 2019.

(14) The Group sold its shares in POSCO ENERGY Co., Ltd. to POSCO on July 11, 2005. According to the stock sale agreement, the Group is liable for 25% of third-party claims for damages related to the water facilities and drainages until the termination of the electric power supply agreement between POSCO ENERGY Co., Ltd. and Korea Electric Power Corporation or until the cause of such damage is remedied. Management believes that the outcome of these cases will not materially affect the Group's consolidated financial statements.

(15) As at December 31, 2019, the Group has 1,446 pending cases, including the aforementioned cases. The Group is the plaintiff in 716 cases aggregating to ₩ 303,536 million, EUR 3 million and CNY 220 million and the defendant in 730 cases aggregating to ₩ 741,033 million, EUR 7 million and CNY 11 million. Management believes that the outcome of these cases will not materially affect the Group's consolidated financial statements.

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(16) Grant of stock options to financial investors

As at December 31, 2019, the Group granted stock options (put back options) to the financial investors of the following developers.

Ulsan Green Co., Ltd.	
Exercise period	From the start to the end of business operation
Share to be purchased	Entire equity capital invested by the financial investors
Exercise price	Face value (₩ 3,507 million)
Condition for exercise	1) From the start date of business operation ~ 5 years: under 90% of the expected revenue 2) 5 ~ 10 years: under 85% of the expected revenue 3) After 10 years: under 80% of the expected revenue

Wonju Green Corporation	
Exercise period	After 2 years from the start date of business operation and up to 15 years
Share to be purchased	Entire equity capital invested by the financial investors
Exercise price	Face value (₩ 5,236 million)
Condition for exercise	Actual royalty income of a certain year is less the fixed ratio of standard expected royalty income(determined per year) of the year

Jeju Ecotech Co., Ltd.	
Exercise period	From the start to the end of business operation
Share to be purchased	Entire equity capital invested by the financial investors
Exercise price	Face value (₩ 898 million)
Condition for exercise	1) Cancel the designated participant or revoke the agreement 2) Whole or the part of PF agreement is ineffective due to the fault of the business and construction investors 3) Declare the loss of profit within period based on the agreement

(17) As at December 31, 2019, the Group provides a cash deficiency support agreement for its real estate development business amounting to ₩ 161,057 million to developers including Moonjang Construction Corp. and two others. In connection with the SOC project, the Group provides cash deficiency support agreements of up to ₩ 473,000 million with the investors of the construction and operation of the project for the shortfall of the loan, which is borne by 11 SOC corporations including Kyeonggi East-west Circulation Corp. Also, in relation to the wind power generation project, the Group provides conditioned contract of compensation for loan agreements of up to ₩ 268,860 million with the two corporations including YeongYang Eco Power Co., Ltd. Additional losses can incur in relation to this agreement. However, the accompanying consolidated financial statements do not include any effect from the possible losses because the losses are not probable to be realized. In connection with the SOC project, the construction

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investors have a contract to provide the deficit fund if the agreement is terminated or the purchase request from the competent administrative agency is insufficient to repay the loan with refund upon cancellation or the purchase price.

(18) Samsung C&T Corporation and Samsung SDI, which have the residual equity of Hanwha General Chemical Co., Ltd., have a preferential right of sales to the Group regarding the residual equity when Hanwha General Chemical Co., Ltd. goes public. If Hanwha General Chemical Co., Ltd. does not go public within six years (seven years if the Group requests) from the termination date of trade (April 30, 2015), Samsung C&T Corporation and Samsung SDI have a put option against the Group and the Group holds a call option regarding the residual equities of Samsung C&T Corporation and Samsung SDI. Furthermore, the Group has the right of preemption when the residual equities of Samsung C&T Corporation and Samsung SDI are sold. When the Group sells the shares, Samsung C&T Corporation and Samsung SDI have tag-along rights and the Group has drag-along rights.

(19) In order to develop new products, the Group has entered into a technology introduction contract with General Electric Company of USA and others.

(20) The Group entered into Risk and revenue Sharing program (RSP) with Pratt & Whitney in the USA and others to promote engine parts business and expand the mid- to long-term business model. Through RSP, the Group is allocated with benefits and risks from business including development, mass production, and aftermarket sales of airplane engines in proportion to its participation. Pratt & Whitney and others, who are Consortium leaders (OEM, Original Equipment Manufacturer) of the agreement, have been providing products and services to aircraft manufacturers such as Airbus and others and transportation service company such as Korean Air and others. The Group bears rights and obligations up to the proportion of its participation (1~3% for each program classified by types of engines supplied by the Group) according to the agreement.

Revenues in relation to the agreement mostly occur through supply of designated products, and some of the revenues occur by providing engine repair and other services. Also, costs of the agreement include manufacturing cost to supply products, business participation cost agreed to pay for participation in business, development cost to enhance capability of engines, program management cost, sales promotion cost paid to customers, and others.

In addition, the Group has been distributed with arrangements such as borrowing limits provided by the program in accordance with the agreement up to its percentage of shares. According to the agreement, the Group has provided ₩ 121,217 million of borrowing limits to Indigo Airline, Delta Airline, and others.

(21) The Group entered into an agreement for mutual growth of large and small business with Woori Bank and Korea Development Bank. In accordance with the agreement, the Woori Bank and Korea Development Bank supports small business that cooperates with the Group, where Woori Bank and Korea Development Bank sets up a special fund which amounts to twice the deposit of ₩ 23 billion from the Group.

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(22) The Group pledges to comply with the terms of credit ratings, EBITDA ratios and debt ratios in relation to some of borrowings, debentures and PF loans.

(23) The Group entered into shareholders' agreement with Recon Co., Ltd. a preferred share investor, in relation to the issuance of redeemable convertible preferred shares of Hanwha Engineering and Construction Corp. in the year ended December 31, 2014. Meanwhile, Recon Co., Ltd. executed an asset-based lending based on the right of disposal and collateral security right on the redeemable convertible preferred shares. The details of the contract are as follows:

A. Shareholders' agreement

	Details
Settlement	With respect to the entire shares of the redeemable convertible preferred shares, the amount equal to the net sale price less the initial issue price will be settled in cash on June 26, 2020. If the settlement amount is positive, the investors make payment to the Company, and if the settlement amount is negative, the Company makes payment to the investors.
Early settlement	The investors can claim a settlement before the settlement date in case the following circumstances arise. The calculation of the settlement amount is the same as the above. - Hanwha Engineering and Construction Corp. is unable to pay the dividend determined for the redeemable convertible preferred share to Recon Co., Ltd. - Rehabilitation, bankruptcy, workout or at the commencement of other similar proceedings for Hanwha Engineering and Construction Corp. - Credit rating of Hanwha Engineering and Construction Corp. is degraded to a rating equal to or below BBB-.
Appraisal rights	The Company has a right to purchase all or part of the redeemable convertible preferred shares held by the investors, on 25th of each month. The price determined by sum of issue price and commission rate varies with issuing time. (It cannot be issued after commencement of the settlement procedure)
Collateral	The 10,900,832 shares of Hanwha Chemical Co., Ltd. owned by the Company are provided as collateral for guarantees on performance of the settlement.

B. Redeemable convertible preferred shares

Details of the redeemable convertible preferred shares issued by Hanwha Engineering and Construction Corp. as at December 31, 2019, are as follows:

	Details
Purpose of the issuance	Securing liquidity and improving financial structure
Type of the issued shares	Non-cumulative non-participating preferred share
Total number of shares issued	1,435,406 shares (1,913,800 shares are issued and 478,394 shares were redeemed)
Issue price per share	₩ 209,000

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Voting right	No voting right
Rate of dividend	2017–2020: 3.17%, 8.23%, 3.73% and 0%, respectively After 2021: Preferred dividend could be changed by according to the method or procedure allowed by the statute.
Redemption right	1) Redemption: Hanwha Engineering and Construction Corp. has a right to request a redemption of all or part of the preferred shares, assuming that distributable income is available (Notice date: March 24, 2020/ Redemption date: June 26, 2020). 2) Redemption after maturity: Hanwha Engineering and Construction Corp. has a right to redeem all or part of the preferred shares every year, assuming that distributable income is available.
Conversion right	1) Conversion right: Preferred shareholders and publishing company have conversion right. 2) Exercise date: On 26th of each month from July 7, 2017, to June 26, 2024. 3) Conversion rate: 5 ordinary shares per 1 preferred share

C. Asset-backed securities loan

	Details
Underlying asset	Right of disposal and collateral security right on the redeemable convertible preferred shares of Hanwha Engineering and Construction Corp.
Date of loan	June 26, 2017
Date of maturity	Three years from date of loan (June 26, 2020)
Principal redemption	Lump-sum payment at maturity. However, if Hanwha Engineering and Construction Corp. exercises early redemption right or the Company exercises early appraisal rights, principal will be repaid early with relevant amount.
Securitization structure	Recon Co., Ltd. invests in redeemable convertible preferred shares of Hanwha Engineering and Construction Corp. after raising funds through asset backed securities loan. Hanwha Engineering and Construction Corp. repays the principal based on the preferred share dividend to Recon Co., Ltd.
Borrowings amount	₩ 300,000 million
Interest rate	5.00%

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(24) Details of securities borrowed as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	Counter-party	2019		2018	
Listed shares	Korea Securities Depository	₩	277,314	₩	163,018
Government bond/municipal bond	The Korea Securities Finance Corporation		230,000		422,211
		₩	<u>507,314</u>	₩	<u>585,229</u>

(25) Securities received as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Trustor securities in custody	₩	11,810,690	₩	13,141,902
Beneficial securities in custody		21,184,768		16,584,228
Other securities in custody		61,000		84,000
	₩	<u>33,056,458</u>	₩	<u>29,810,130</u>

(26) Accounts receivable from the companies, which are under the court receivership, as at December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	Amount	
Companies under legal management and commencement of composition	₩	857
Loss allowance ¹		700

¹ According to the plan for collection of the receivables, the Group recognized ₩ 700 million as provision for impairment after discounting at present value. However, recoverable amount of above receivables can be changed since corresponding companies are currently under the court receivership. The consolidated financial statements for the year ended December 31, 2018 were not reflected with these adjustments due to uncertainty.

(27) The Group has a purchase commitment of outstanding commercial papers with a maximum limit of ₩ 40 billion, which are not purchased or paid on the issue date. Also, the Group has acquired and held the ₩ 40 billion of remaining commercial papers according to such agreement as at December 31, 2019. As at December 31, 2019, the Group does not hold commercial papers and short-term bonds by the purchase commitment.

(28) Credit derivatives

As at December 31, 2019, the Group has entered into 21 credit derivative contracts, including CDS contracts, with the outstanding amount of ₩ 577.6 billion of asset position(9 credit derivative contracts) and ₩ 725.8 billion of liability position(12 credit derivative contracts). Accordingly, the Group has an obligation to pay the outstanding amount when certain specific credit events occur.

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(29) Commitment of loan on collateral and underwriting debenture

Commitment of loan on collateral and underwriting debenture as at December 31, 2019, is as follows:

<i>(in millions of Korean won)</i>	Project related to		Amount
Justred Co., Ltd.	Songdo C6-1 Block Section Office Development Project PF	₩	20,000
Capston The 8th Co., Ltd.	Leasehold fund guaranteeing lease revenue of Signature tower.		24,230

(30) Commitment of allowance for loss in relation to distribution of cooperative assets

Association is regulating commitment of provision for loss in relation to distribution of association assets. Investment is distributed to the Group, the general partner of each association, after provision for loss in accordance with commitment has been set. Since this commitment is affecting valuation of investments in partnership, details of commitment of provision for loss that is finalized at liquidation are as follows:

	Project related to
Seoul Global Bio-medical New Growth Engine Investment Fund ²	When the amounts after deducting operating expenses are under the total amount invested in capital, a provision is set for loss within ₩2.5 billion.
KoFC Value-up Private Equity Fund ¹	When the amounts after deducting operating expenses are under the total amount invested in capital, a provision is set for loss within ₩2.5 billion.

¹ KoFC Value-up Private Investment Equity Fund was sold to Hanwha Asset Management Co., Ltd., a related party, during the year ended December 31, 2015. However, deposits for Woori Bank was pledged as collateral upon the request from buyer (Note 27).

² As principal of investments which was previously allocated exceeds the total investments, no primary loss allowance will occur.

As at December 31, 2019, the maximum allowance for doubtful receivables related to the contract is ₩ 5,000 million, and the Group recognizes provisions amounting to ₩ 2,500 million for the case of assuming losses.

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(31) As at December 31, 2019, there is controversy regarding certain annuity pension payments of the immediate annuity products that the Group has sold in the past, and the amount and timing of the payment cannot be determined.

57. Cash Flow Information

(1) Details of cash used in operations for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Profit for the year	₩	253,339	₩	1,299,841
Addition of expenses not involving cash outflows:				
Finance income (non-financial business)		(58,885)		(75,194)
Finance cost (non-financial business)		496,860		419,079
Finance income (financial business)		(3,459,428)		(3,518,574)
Finance cost (financial business)		130,207		109,341
Impairment loss		188,882		32,975
Depreciation of property, plant and equipment		802,369		742,545
Depreciation of investment property		59,630		62,613
Amortization		166,909		156,321
Depreciation of right of use assets		144,110		-
Post-employment benefit		297,349		285,743
Provision		260,868		152,623
Loss on foreign currency translation		256,382		396,397
Gain on foreign currency translation		(1,124,805)		(1,115,209)
Share of profit of associates and joint ventures		(238,996)		(420,831)
Gain (loss) on valuation of financial instruments		(54,491)		541,577
Loss on disposal of financial instruments		246,531		152,031
Overlay adjustment		467,705		(381,915)
Reserves		4,645,780		4,289,371
Others		1,452,474		1,940,951
Changes in working capital:				
Trade receivables		40,291		411,174
Other receivables		94,628		20,971
Inventories		(5,773)		(295,760)
Loan receivables and other receivables		(2,359,586)		(1,945,540)
Financial assets at fair value through profit or loss		(2,858,745)		(2,374,218)
Other financial assets		(672,085)		338,998
Other assets		(528,169)		(76,496)
Trade payables		142,168		(767,028)

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Other payables	(83,267)	73,811
Defined benefit liabilities	(190,543)	(246,758)
Provisions	(67,054)	(33,023)
Other financial liabilities	1,653,066	(41,445)
Other liabilities	1,016,054	598,245
Separate assets	(642,378)	280,767
Separate liabilities	603,433	199,422
Deferred policy acquisition costs	(1,332,263)	(1,272,836)
Others	22,529	(88,841)
Cash used in operations	<u>₩ (234,904)</u>	<u>₩ (148,872)</u>

(3) Changes in liabilities arising from financing activities for the year ended December 31, 2019, are as follows:

(in millions of Korean won)

	2019			
	Beginning	Changes resulting from financing activities	Others ¹	Ending
Bank borrowings	₩ 10,075,774	₩ (131,780)	₩ 978,154	₩ 10,922,148
Other borrowings	2,021,656	164,341	700,840	2,886,837
Debentures	5,512,298	1,217,655	(955,218)	5,774,735
Deposits	683,781	8,017	15,457	707,255
Lease liabilities	49,227	(172,358)	774,127	650,996
Liabilities resulting from financing activities	<u>₩ 18,342,736</u>	<u>₩ 1,085,875</u>	<u>₩ 1,513,360</u>	<u>₩ 20,941,971</u>

¹ Others include interest expense and gain and loss on foreign currency translation.

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58. Assets Held for Sale

Assets held for sale as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	Predicted date of sale	2019		2018	
Assets held for sale					
Land	In 2020	₩	19,193	₩	16,113
Buildings	In 2020		309,371		18,964
Others	In 2020		188,494		45,457
Subtotal ¹		₩	517,058	₩	80,534
Assets and liabilities held for sale					
Automotive parts division		₩	-	₩	6,989
Hotel & Resort FC division			105,778		-

¹ Other expenses include impairment loss on assets held for sale amounting to ₩ 20,863 million.

59. Risk Management

(1) Financial risk management of non-financial business

The Group's activities expose it to a variety of financial risks: market risk (including currency risk and interest rate risk), credit risk and liquidity risk. The Group's overall risk management program seeks to minimize potential adverse effects on the Group's financial performance.

The objects of financial risk management are financial assets, including cash and cash equivalents, available-for-sale financial instruments, trade receivables and other receivables, and financial liabilities, including trade and other payables, borrowings, and debentures.

1) Market risk

① Foreign exchange risk

Foreign exchange risk of the Group arises when future commercial transactions or recognized assets or liabilities are denominated in a currency that is not the Group's functional currency. The Group is exposed to foreign exchange risk arising from various currency exposures, primarily with respect to USD, EUR and JPY. The Group operates hedging policies for each company within the Group, considering the nature of business and the existence of instruments to cope with the risks of exchange rate fluctuation. Additionally, the Group periodically evaluates and handles such risks exposed through managing system for receivables and payables denominated in foreign currencies, and reports the results to the management.

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The impacts of weakened/strengthened Korean won by 10% against foreign currencies, with all other variables held constant, on the profit before income tax for the year ended December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	10% increase		10% decrease	
USD	₩	(207,830)	₩	207,830
EUR		20,881		(20,881)
JPY		2,920		(2,920)

The above sensitivity analysis is performed based on monetary assets and liabilities denominated in a currency that is not the Group's functional currency.

② Interest rate risk

The Group's interest rate risk arises mainly from borrowings. Borrowings issued at variable rates expose the Group to cash flow interest rate risk, which is partially offset by currency swap. Also, fixed-rate borrowings expose the Group to fair value interest rate risk. The Group analyzes and manages its interest rate exposure through various manners, such as to share excess cash within the Group to minimize external borrowings, to avoid high rate borrowings, to reform capital structure, to manage an appropriate ratio of fixed-rate borrowings and variable rate borrowings and to monitor a fluctuation of domestic and foreign interest rates.

The impact of 1% higher/lower of interest rate (on floating rate borrowings) with all other variables held constant on the Group's profit before income tax for the year ended December 31, 2019, would have been ₩ 43,094 million lower/higher.

2) Credit risk

Credit risk is managed on a group basis. Credit risk arises from cash and cash equivalents, derivative financial instruments and deposits with banks and financial institutions, as well as credit exposures to wholesale and retail customers, including outstanding receivables and committed transactions. In order to manage credit risk, the Group opens and maintains its business only with customers whose credit qualities exceed a required minimum rating and periodically reevaluates credit qualities of customers to amend a credit limit, if necessary. As at December 31, 2019, management does not expect any losses from non-performance by counterparties. As at December 31, 2019, the maximum exposure to credit risk related to financial guarantees provided by the Group to related parties is ₩ 251,168 million (Note 55).

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3) Liquidity risk

The Group monitors rolling forecasts of its liquidity requirements to ensure it has sufficient cash to meet operational needs while maintaining sufficient headroom on its undrawn committed borrowing facilities at all times. The Group's treasury department invests surplus cash in time deposits and interest-bearing money market deposits, choosing instruments with appropriate maturities or sufficient liquidity to provide sufficient headroom.

Details of the Group's liquidity risk analysis as at December 31, 2019 and 2018, are as follows. The amounts disclosed in the table are the contractual undiscounted cash flows.

(in millions of Korean won)

	2019			
	Less than 1 year	Between 1 and 5 years	More than 5 years	Total
Bank borrowings ¹	₩ 5,861,610	₩ 3,162,737	₩ 610,168	₩ 9,634,515
Debentures ¹	1,772,146	3,388,945	61,112	5,222,204
Trade and other payables	3,010,231	160,381	114,498	3,285,110
Derivative financial liabilities ²	17,620	13,179	-	30,799
Other financial liabilities ³	847,417	372,761	703,316	1,923,495
	₩ 11,509,025	₩ 7,098,003	₩ 1,489,094	₩ 20,096,122

¹ Cash flows of related interest expenses are included.

² Cash flows of derivative financial instruments included time value and others.

³ Cash flows of accrued interest and interest expenses are excluded.

(in millions of Korean won)

	2018			
	Less than 1 year	Between 1 and 5 years	More than 5 years	Total
Bank borrowings ¹	₩ 5,480,993	₩ 3,204,092	₩ 167,186	₩ 8,852,271
Debentures ¹	1,838,478	2,644,635	-	4,483,113
Trade and other payables	3,005,634	119,279	54,806	3,179,719
Derivative financial liabilities ²	28,008	4,267	-	32,275
Other financial liabilities ³	723,137	38,077	515,604	1,276,818
	₩ 11,076,250	₩ 6,010,350	₩ 737,596	₩ 17,824,196

¹ Cash flows of related interest expenses are included.

² Cash flows of derivative financial instruments included time value and others.

³ Cash flows of accrued interest and interest expenses are excluded.

The Group has entered into both financial guarantee contracts and performance guarantee contracts, which are not considered in the above table. If a principal debtor fails to meet an obligation, additional cash outflows from the Group may be incurred within a year (Note 56).

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(2) Fair value measurement of non-financial businesses

Assets measured at fair value or for which the fair value is disclosed are categorized within the fair value hierarchy and the defined levels are as follows:

- Quoted prices (unadjusted) in active markets for identical assets or liabilities (Level 1).
- Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly (that is, prices) or indirectly (that is, derived from prices) (Level 2).
- Inputs for the asset or liability that are not based on observable market data (that is, unobservable inputs) (Level 3).

Fair value hierarchy classifications of the financial assets and the financial liabilities that are measured at fair value or their fair value is disclosed as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Level 1	Level 2	Level 3	Total
Recurring fair value measurements				
Assets				
Financial assets at fair value through profit or loss				
Equity securities	₩ 6,224	₩ -	₩ 5,125	₩ 11,349
Beneficiary certificates	-	3,997	15,840	19,837
Debt securities	9	-	130,957	130,966
Financial assets at fair value through other comprehensive income				
Equity securities	58	-	16,659	16,717
Debt securities	-	440	-	440
Derivative financial assets	-	48,092	17,749	65,841
	<u>₩ 6,291</u>	<u>₩ 52,529</u>	<u>₩ 186,330</u>	<u>₩ 245,150</u>
Liabilities				
Derivative financial liabilities	<u>₩ -</u>	<u>₩ 30,795</u>	<u>₩ -</u>	<u>₩ 30,795</u>
	<u>₩ -</u>	<u>₩ 30,795</u>	<u>₩ -</u>	<u>₩ 30,795</u>

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(in millions of Korean won)

	2018			
	Level 1	Level 2	Level 3	Total
Recurring fair value measurements				
Assets				
Financial assets at fair value through profit or loss				
Equity securities	₩ 5,270	₩ -	₩ 2,000	₩ 7,270
Beneficiary certificates	-	105	17,231	17,336
Debt securities	24	-	130,588	130,612
Financial assets at fair value through other comprehensive income				
Equity securities	65	-	23,110	23,175
Debt securities	-	650	-	650
Derivative financial assets	-	13,086	14,247	27,333
	<u>₩ 5,359</u>	<u>₩ 13,841</u>	<u>₩ 187,176</u>	<u>₩ 206,376</u>
Liabilities				
Derivative financial liabilities	₩ -	₩ 28,183	₩ 4,088	₩ 32,271
Trade and other payables	-	-	23,758	23,758
	<u>₩ -</u>	<u>₩ 28,183</u>	<u>₩ 27,846</u>	<u>₩ 56,029</u>

Changes in Level 3 of the fair value hierarchy for the recurring fair value measurements are as follows:

(in millions of Korean won)

	2019	2018
Beginning	₩ 159,332	₩ 55,302
Purchase	19,003	15,095
Sales	(6,181)	(3,379)
Gains and losses recognized in profit or loss	(10,040)	(5,747)
Gains and losses recognized in other comprehensive income	(43,181)	(5,024)
Others	67,397	103,085
Ending	<u>₩ 186,330</u>	<u>₩ 159,332</u>

Valuation techniques and inputs

Valuation techniques and inputs used in the fair value measurements categorized within Level 2 and Level 3 of the fair value hierarchy as at December 31, 2019, are as follows:

- Derivatives (currency forward, currency swap, interest rate swap)

The fair value of the foreign currency forward contracts is measured principally on the basis of the forward exchange rates disclosed in the market at the end of the reporting period for the periods in which they are consistent with the remaining period of the currency forward. If the forward exchange rate of the period consistent with the remaining period of the forward exchange contract

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is not disclosed in the market, the Group measures its value according to estimating forward exchange rate by applying interpolation method with each period of forward rate disclosed in the market, and in this case, period similar to the remaining period of forward exchange contracts is used. For currency forward, currency swap and interest rate swap for which forward exchange rate is not disclosed, the present value is measured based on evaluation reports received by financial institutions. The fair value measurement for the derivatives is categorized within Level 2 as inputs used for valuation are derived from observable market forward rate and others at the reporting period.

Details of derivative financial assets categorized as Level 3 are as follows:

Details	
Underlying assets	Residual equity of P&W NGPF Manufacturing Company Singapore. Ltd (70%)
Striking price of call option	70% of P&W NGPF Manufacturing Company Singapore. Ltd.'s net asset value plus \$11,800,000 at the time of the exercise
Striking period of call option	January 1, 2022, to December 31, 2026
Owner of call option	Hanwha Aerospace Co., Ltd.
Discount rate	Singapore Government bond interest rate curve

- Government and public bonds

The fair value of government and public bonds is calculated by discounting the future cash flow at the market interest rate that is applied to other companies that have similar credit ratings as the issuer of debt security. Therefore, the Group categorized the fair value measurement of government and public bonds as Level 2 in fair value hierarchy.

- Unlisted securities

The fair value of unlisted shares is measured using discounted cash flow model. To estimate future cash flows, certain assumptions which are not based on observable market price or ratio, such as revenue growth rate, pre-tax operating profit rate and discount rate, are used. WACC used to discount future cash flows are calculated by applying Capital Asset Pricing Model (CAPM) from similar listed corporations. The Group determined that key assumptions and estimation described above have significant impact on the fair value of unlisted shares and categorized the fair value measurement of unlisted shares as Level 3 in fair value hierarchy.

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(3) Financial risk management of financial business

1) Risk management policy

Insurance Business

The Group does its best to make stable growth and profit for shareholders and policyholders in managing insurance risk, interest rate risk, credit risk, market risk, liquidity risk and operation risk in accordance with its principle of the risk management.

① Objectives of the risk management

The Group's objectives of the risk management are to maximize its value and sustain its stable growth by preventing, evaluating and managing uncertainty and possibility of loss.

② Risk management strategy

In the short term, the Group establishes and manages maximum permissible limit to maintain entire risk level below or within a certain level of available capital. In addition, the Group operates the risk management process for investment activity and insurance product development. In the middle and long term, the Group seeks to maximize its value and profit-oriented business strategy, which reflects asset and liability management ("ALM") investment strategy (the characteristics of insurance asset management strategy) in its management plan and asset management plan. Also, risk management organization and management's reporting system maintain independence and principle of checks and balances.

③ Structure and function of the risk management organization

The Group has the risk management committee, the risk management action officers committee for insurance division, investment division and common division and the risk management team. The Group operates asset management committee, product development committee, operating expense management committee and reinsurance management committee with regard to worksite operations.

(i) Risk management committee

The risk management committee is composed of more than three directors who are elected at the board of directors. The risk management committee establishes standards and measures of the risk management and approves the permissible risk limit and others.

(ii) Risk management action officers committee

Risk management action officers committee is composed of members who are managers of each risk management department. The committee performs checking running state of the committee's decision, deliberation on detailed regulations for risk management, matters delegated by Risk

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management committee and others.

Categories and function of subcommittees:

Name of sub-committee	Major function
Asset management committee	Deliberation of quarterly asset management strategy and target portfolio, transaction of investment and loan, choice of asset management companies and others
Quoted interest rate committee	Deliberation of quoted interest rate
Product development committee	Deliberation of development and sale of insurance product and development of other product
Operating expense management committee	Discussion between divisions for operating expense and management of operating expense
Reinsurance management committee	Management of reinsurance ceded and assumed, selection of reinsurer, analysis for reinsurance transaction and others

④ Internal capital adequacy assessment and management procedures

The Group complies with the Risk-based capital (RBC) ratio required by the Financial Supervisory Service. The purpose of RBC ratio system is to reserve stockholders' equity enough to cover the unforeseen losses of an insurance company. This is for the insurance company to maintain its ability to pay to the customers.

Risk-based capital (RBC) ratio is the total available capital of the Group divided by the Group's required capital (standard solvency margin amount). Available capital consists of share capital, reserves, and retained earnings. Required capital is calculated based on the diversification of insurance, interest rate, credit, market and operation risks.

Financial Supervisory Service requires RBC ratio of over 100%. When RBC ratio is below 100%, worsening of deficiency is prevented by timely corrections on each RBC ratio. The Group is in compliance with the RBC ratio regulated by the supervisory office as at December 31, 2019.

The purpose of RBC ratio system is to reserve stockholders' equity enough to cover the unforeseen losses of an insurance company. This is for the insurance company to maintain its ability to pay to the customers.

Risk-based capital (RBC) ratio	Complementary Measures
Recommend business improvement 50% - 100%	Recommend increase / decrease of equity capital, restrict any new business, and others
Demand business improvement 0% - 50%	Demand change of management members, suspend of partial operations, and others
Recommend business improvement Below 0%	Cancellation of share, operation transfer, merger, contract transfer and others

The Group divides risk into insurance, interest rate, credit, market and operation risk for the calculation of risk-based capital. The Group takes RBC influence into consideration for portfolio

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strategy. The Group measures the level of internal risk using internal risk model for insurance, interest rate, credit and market risk.

Investment and Securities Business

The Group is exposed to various financial risks while engaged in the operating activities; the types include credit risk, liquidity risk, market risk and operational risk. The purpose of the Group's overall risk management policy is to maximize revenue compared to the risk management within the appropriate level, and for that purpose, the Group performs awareness and definition of the danger, measurement and evaluation and control and reporting.

① Basic principles

Basic principles of the risk management are as follows:

- Risk management is the final responsibility of the board of directors, and the risk management objectives and policies are the core of the business strategy.
- Clear understanding of the risks of various types and appropriate system for risk management should be established.
- Risk management should be accomplished in all teams and shall be performed independent of the sales activities.
- The risk management organization in charge of comprehensive risk management and control functions should be formed and manage risks that may occur in various management activities. The Group operates the risk management committee, the working-level risk management committee and the risk management department for risk management.

② Board of Directors

As the top body of the risk management organization, the Board of Directors performs to appoint and dismiss the risk management committee, to deliberate and vote the establishment of risk management policy; and to report business planning, results and implementation of risk management.

③ Risk management committee

Installed in the board of directors, the risk management committee exercises overall rights in the risk management. The risk management committee performs to establish the risk management policy and strategy, to appoint the CRO and to set the overall company risk limits.

④ Risk management execution committee

As the decision-making party installed in the risk management committee, the risk management execution committee performs to set and allocate departmental risk limits, to introduce computerized systems of risk management and to deliberate and vote such transactions above a certain size.

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⑤ Investment Assessment Risk Management Committee

As the working-level decision-making party, the working-level risk management committee performs to approve the risk management measurements and review adequacy and to deliberate and vote such transactions above a certain size, which are not raised up to the risk management execution committee.

⑥ Risk management team

The risk management team performs various practices, such as implementation of the risk management policy and strategy decisions in the committee, measurement and reporting of the individual risks to support committee, etc.

2) Insurance risk management

Insurance Business

① Concept

Insurance risk is the risk, other than financial risk, transferred from the holder of a contract to the issuer. It is composed of insurance value risk and reserve risk. Insurance value risk is the risk of loss due to difference between premium that is received from policyholders and actual claims paid. Reserve risk is the risk of loss due to difference between reserve for outstanding claims and actual claims paid in the future.

② Status of exposure of insurance risk

Insurance risk is the probability of loss due to the difference between the insurance premium received from the policyholder and the actual payment. Exposure pursuant to the RBC standard as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Life insurance				
Death	₩	606,841	₩	626,061
Disability		48,796		54,163
Hospitalization		334,987		337,519
Operation/diagnosis		793,546		765,957
Medical expense		249,090		228,851
Other life insurance		86,170		82,225
	₩	2,119,430	₩	2,094,776

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<i>(in millions of Korean won)</i>	2019		2018	
Non-life insurance				
General insurance	₩	235,284	₩	193,489
Long-term insurance		821,904		695,692
Automobile insurance		575,802		578,841
	₩	<u>1,632,990</u>	₩	<u>1,468,022</u>

③ Status of exposure of reserve risk

Exposure pursuant to the RBC standard as at December 31, 2019 and 2018, is as follows:

<i>(in millions of Korean won)</i>	2019		2018	
General insurance	₩	124,509	₩	114,801
Automobile insurance		151,681		124,989
	₩	<u>276,190</u>	₩	<u>239,790</u>

④ Measurement method

Both standard measurement method and internal model are used to measure the insurance risk. Standard measurement method (Article 7-2 Clause 2 of the Regulation on Supervision of Insurance Business) means calculation of insurance risk by the RBC standard provided by Korean Financial Services Commission ("FSC"). Reserve risk is calculated on non-life insurance contracts under Article 1-2 item 11 of the Regulation on Supervision of Insurance Business.

The amount of insurance risk, calculated using an internal model, is calculated by estimating risk insurance premium for the next 10 years, which is applied by experimental statistics to contracts held during measurement of insurance risk, which is the difference between maximum probability and average level of insurance claims paid and applying value at risk ("VaR"), which applies experimental scenario.

⑤ Management method

The Group operates ALM system and insurance risk measurement system to measure the amount of insurance risk. The amount of insurance risk, which is calculated quarterly, is reported to the risk management committee in a risk analysis report.

⑥ Reinsurance policy

The Group manages reinsurance for improving ability to pay claims at concerned risk exposure level and effective diversification of risks.

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The concentration level to top 5 reinsurers as at December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

	2019			
	More than AA-	A+ ~ A-	Below BBB+	Others
Premium for reinsurance ceded	₩ 1,429,396	₩ -	₩ -	₩ 64,281

(in millions of Korean won)

	2018		
	More than AA-	A+ ~ A-	Below BBB+
Premium for reinsurance ceded	₩ 1,344,974	₩ -	₩ -

Premium for reinsurance ceded for reinsurer category as at December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

	2019			
	More than AA-	A+ ~ A-	Below BBB+	Others
Premium for reinsurance ceded	₩ 1,504,732	₩ 66	₩ -	₩ 74,282

(in millions of Korean won)

	2018			
	More than AA-	A+ ~ A-	Below BBB+	Others
Premium for reinsurance ceded	₩ 1,414,802	₩ 435	₩ -	₩ 4,039

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⑦ The amount of guarantee risk to variable insurance

Details of guarantee risk to variable insurance as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Premium income	Policyholder's reserve	Reserve for guaranteed benefit	Amount of risk to minimum guaranteed benefit
Variable whole life insurance	₩ 93,721	₩ 433,896	₩ 154,320	₩ 30,141
Variable annuity life insurance	1,022,742	7,834,459	100,700	136,333
Variable universal indemnity life insurance	803,568	2,476,681	276,422	219,725
Variable universal saving life insurance	138,198	1,230,953	628	1,945
Others	678,232	4,489,425	887,013	246,645
	<u>₩ 2,736,461</u>	<u>₩ 16,465,414</u>	<u>₩ 1,419,083</u>	<u>₩ 634,789</u>

(in millions of Korean won)

	2018			
	Premium income	Policyholder's reserve	Reserve for guaranteed benefit	Amount of risk to minimum guaranteed benefit
Variable whole life insurance	₩ 62,594	₩ 390,423	₩ 116,556	₩ 18,605
Variable annuity life insurance	1,214,221	7,803,343	61,495	106,277
Variable universal indemnity life insurance	908,286	2,294,926	194,725	144,076
Variable universal saving life insurance	167,121	1,277,490	3,158	3,308
Others	714,654	4,261,989	702,151	151,727
	<u>₩ 3,066,876</u>	<u>₩ 16,028,171</u>	<u>₩ 1,078,085</u>	<u>₩ 423,993</u>

⑧ The analysis of insurance contract liability in relation to its remaining maturity is as follows:

(in millions of Korean won)

	2019				
	Less than 1 year	Between 1 and 5 years	Between 5 and 10 years	More than 10 years	Total
Premium reserves ¹	₩ 1,148,579	₩ 9,140,273	₩ 7,272,113	₩ 73,004,126	₩ 90,565,091

¹ Premium reserve is calculated based on surrender value.

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(in millions of Korean won)	2018				
	Less than 1 year	Between 1 and 5 years	Between 5 and 10 years	More than 10 years	Total
Premium reserves ¹	₩ 1,082,940	₩ 8,409,847	₩ 7,396,128	₩ 58,318,749	₩ 75,207,664

¹ Premium reserve is calculated based on surrender value.

3) Interest rate risk management

Insurance Business

① Concept

Interest rate risk is risk of loss due to fluctuation of interest rate in the future market and the difference between the maturity structure of asset and liability.

② Measurement method

Both standard measurement method and internal model are used to measure the interest rate risk. Under standard measurement method (Article 7-2 of the Regulation on Supervision of Insurance Business), interest risk is measured by RBC standard provided from KFSC.

Internal model is subject to assets and liabilities of general accounts, pension savings and unit linked insurance. For the calculation of the amount of interest rate, the Group estimates future cash flow of assets and liabilities and then applies Duration Gap method using the value of assets and liabilities and the effective duration and expected fluctuations of maximum value of net assets method with probabilistic scenario (probabilistic interest rate VaR) to the calculation.

③ Management method

(i) The Group reports the amount of interest risk calculated by duration gap method and applied probabilistic scenario to the risk management committee on a quarterly basis. The Group specially establishes and manages maximum permissible limit of the amount of interest risk calculated by duration gap method.

(ii) The Group does its best to expand safe assets such as long-term treasury bonds and others in the middle and long term and reduce the mismatch of duration of assets and liabilities by managing sales ratio of floating-rate type product.

(iii) The Group sets portfolios for medium-and long-term goal through ALM investment strategy reflected cash flow of insurance liabilities, and sets interest rate guidelines for insurance products using market interest rates.

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(iv) ALM investment strategy and standard interest rates for public announcement are determined by risk management committee, and guidelines of interest rates for public announcement and application (includes guaranteed minimum interest rate of floating-rate type products) examined by risk management council.

(v) Product committee determines interest rates for public announcement and application (includes guaranteed minimum interest rate of floating-rate type products) according to the guidelines.

④ Status of floating-rate-type liabilities for minimum guaranteed interest rate

Exposure of floating-rate-type liabilities for minimum guaranteed interest rate level by the RBC standard as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019					Total
	Below 0% ¹	0% ~ 2%	2% ~ 3%	3% ~ 4%	More than 4%	
Floating-rate-type liabilities ²	₩ 7,596,736	₩ 21,186,100	₩ 9,694,215	₩ 10,570,962	₩ 2,753,246	₩ 51,801,259

¹ Liabilities without minimum guarantee option, are presented as "Below 0%."

² Liabilities that are fixed rate type and floating rate type are classified as the type at the time of closing date of the fiscal year.

<i>(in millions of Korean won)</i>	2018					Total
	Below 0% ¹	0% ~ 2%	2% ~ 3%	3% ~ 4%	More than 4%	
Floating-rate-type liabilities ²	₩ 6,440,017	₩ 15,743,792	₩ 13,646,540	₩ 13,763,074	₩ 4,577,554	₩ 54,170,977

¹ Liabilities without minimum guarantee option, are presented as "Below 0%."

² Liabilities that are fixed rate type and floating rate type are classified as the type at the time of closing date of the fiscal year.

4) Credit risk management

① Concept

Credit risk is the risk that one party to a financial instrument will cause a financial loss for the other party by failing to discharge an obligation.

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② Measurement method

Insurance Business

Both standard measurement method and internal model are used to measure the credit risk. Standard measurement method (Article 7-2 Clause 4 of the Regulation on Supervision of Insurance Business) means calculation of credit risk by the RBC standard provided from FSC. If the Group uses an internal model, it calculates portfolio credit risk using Credit Manager (Credit Metrics measurement method), which is a credit risk measurement engine provided by MSCI. Approximately 20 global companies such as JP Morgan, Moody's, S&P, KMV, Royal Bank of Canada and 250 other companies all over the world use Credit Manager to calculate their risk.

③ Management method

Insurance Business

(i) Management by permissible limit

The Group calculates VaR on a monthly basis, which is the maximum unsuspected loss (99% confidence level) to investment portfolio due to the deterioration of credit rating or bankruptcy of lender and investment instrument. The Group manages to keep VaR less than the available capital by providing permissible limit to the VaR.

(ii) Management by individual evaluation to lender and investment instrument

When operating an asset, the Group evaluates individual lender and investment instrument at asset RM division. As a result of the evaluation, the Group invests in lender and investment instrument.

(iii) Management by diversified investment and operating limit

The Group manages limits for industry, group, lender and product to prevent concentration risk and for low grade assets which have high risk.

(iv) Overlapping management to high-risk assets

When the Group invests in high-risk assets (derivative and alternative investment), it conducts more intensive analysis than low-risk assets. The risk management team analyzes credit risk, and the asset RM division analyzes capability to repay the principal and pay interest.

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Investment and Securities Business

(i) Recognition and measurement of expected credit losses

The Group recognizes expected credit losses considering all reasonable and supportable information that is available without undue cost and effort since initial recognition of financial instruments.

The Group classifies credit risk into three different stages according to changes in credit risk indicators and occurrence of impairment events since initial recognition of financial instruments. As a result of this classification, the Group applies 12-month expected credit losses for those whose credit risk has not increased significantly (Stage 1), and lifetime expected credit losses for those whose credit risk has increased significantly (Stage 2) and those which are credit-impaired (Stage 3). For the purpose of this classification, the Group compares the risk of a default occurring on the financial instrument as at the reporting date with the risk of a default occurring on the financial instrument as at the date of initial recognition. If the significant increase of credit risk on a financial instrument subject to lifetime expected credit losses in the previous reporting period, is determined to be no longer present, such instrument shall be measured using 12-month credit losses at the current reporting date. The Group can apply a simplified approach and apply lifetime expected credit losses without evaluating increase of credit risk for some other financial assets.

For financial assets at amortized cost, off-balance-sheet item (loans commitment and financial guarantee contracts), the credit risk is considered to have increased significantly since initial recognition if any of the following indicators are present.

<Financial Assets Measured at Amortized Cost>

- Deposits: For deposits at financial institutions whose external credit ratings are within the investment qualification grade, credit risk is considered low. In addition, the credit risk is considered to have increased significantly if the number of days past due for principal or interest on a financial asset is 30 days or more.

- Credit contribution: The entity sets up a sufficient percentage of collateral for normal bond recovery at initial execution, so if the collateral ratio is satisfied as at the end of the reporting period, the credit risk is considered low. The credit risk is considered to have increased significantly for bonds subject to closed-trading because their collateral ratio is less than 140%.

- Consignor account receivable: In the case of a normal consignor account receivable, the Group determines that the credit risk is low because it establishes a sufficient percentage of collateral for normal bond recovery during initial execution. The credit risk is considered to have increased significantly in the case of sales of security due to insufficient payment in the customer account at the date of settlement of the securities transaction.

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- Other financial assets: For bonds that do not result in a delay in principal or interest on a financial asset, credit risk is considered low. The credit risk is considered to have increased significantly if the number of days past due on principal or interest is 30 days or more

<Off-balance Account (Loan Commitments and Financial Guarantee Contracts)>

For loan commitments and financial guarantee contracts, credit risk is considered to have increased significantly if the number of days past due on principal or interest of the related financial asset is 30 days or more. In addition, the criteria for classifying asset soundness under the Financial Investment Business Regulations are considered to have increased credit risk significantly for loan commitments and financial guarantee contracts that are blacklist. Credit risk is considered low if there is no delay in principal or interest on the related financial assets and if the rating is rated as normal on the basis of the classification of asset soundness under the Financial Investment Business Regulations.

(ii) Financial assets defaulted and credit-impaired

The Group defines a financial asset as default if it has an objective reason to reduce reliably estimated future cash flows since its initial acquisition. These objective reasons are as follows:

- If a default is expected due to a continuation of principal and interest deferral (including an unquestionable 90 days or more in arrears)
- A deterioration in credit standing, with checking transactions suspended.
- The bankruptcy or bankruptcy of a debtor.
- The occurrence of a major lawsuit or claim of indemnity that could have effect on the existence of a debtor.
- In case the project itself is on the verge of being abolished due to a delay in the project schedule due to important factors at stake in the project's success or not, and the debtor's financial situation is not good.
- The occurrence of other events that may have a significant effect on the solvency of the debtor.
- In case of non-recoverable balance occurring after execution of security sales (in case of credit contribution and consignor account receivable)
- In case the external credit rating assessed by a credit rating agency has dropped significantly.

In addition, the definition of default is identical to 'bankruptcy (impairment)' stated in the regulatory capital management policy and therefore, the Group considers that the best estimates will be used in measurement of impairment of financial assets.

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(iii) A method of organizing a set when measuring ECLs

The Group assesses credit risk by considering the product attributes, size and condition of the assets measured for ECLs according to significant increases in credit risk and calculates the loss provision individually and collectively accordingly. If the ECLs are separately identifiable among the assets from which the impairment (Stage 3) occurred and the assets with significant increases in credit risk, the ECLs are calculated by estimating the future cash flows of the individual assets. The target assets, excluding individual targets, are classified into groups of assets managed by a similar credit risk and are collectively assessed. The asset group consisted of similar or homogeneous assets considering the nature of the credit risk and types of products that could occur. ECLs on a group of financial assets are calculated using a formalized approach defined by the credit risk management index used to identify the group of assets.

(iv) The write-off financial asset

The Group will write-off any or all portions of the loan or debt securities that it deems to be impracticable to collect the principal and interest on the principal. Generally, when a borrower is deemed to have no sufficient resources or income to cover the principal and interest payments, the write-off is made in accordance with the Group internal regulations, but with approval from an external authority, if necessary. The Group may continue to exercise its right of recovery in accordance with its own recovery policy even after the financial assets are discharged. Subsequent assets recovered are deducted from ECLs in the income statement.

(v) Assumptions and techniques and input variables used to measure ECLs

The credit risk measurement factors were estimated externally from the credit rating, and from the statistical techniques developed internally and past experience data, and they were adjusted through the reflection of forward-looking information.

For financial assets subject to individual assessment, ECLs are calculated by considering estimates of future cash flows of individual assets and collateral or other credit enhancements. For financial assets such as credit contribution and consignor account receivable subject to collective evaluation, ECLs are calculated by taking into account the cumulative recovery rate of the past.

On the other hand, the credit risk measurement component is applied as follows when applying the expected loss calculation methodology of Basel when measuring ECLs.

- Probability of default (PD)

The Group apply the default rate obtained from the credit rating agency. Based on the statistical model, the PD was estimated to reflect the characteristics of the counterparty and the exposure.

- Loss Given default (LGD)

LGD means the degree of loss expected in the event of bankruptcy. In general, the Group uses a 45% loss rate for bankruptcy and a 75% loss rate for unsecured and subordinate financial assets.

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- Exposure at default (EAD)

EAD means the expected exposure at the time of bankruptcy. EAD of a financial asset is the same as the total carrying amount of the asset and the exposure to default on loan commitments and financial guarantee contracts is calculated as the sum of the amount of use and the amount expected to be further used.

- Expiration

When measuring ECLs on a financial asset, the Group reflects the period over which the ECLs are measured based on the contractual maturity.

- Reflection of forward-looking information

The Group reflects forward-looking information based on various information when measuring expected credit losses. To predict such forward-looking information, the Group utilizes economic forecasts disclosed by domestic and foreign research institutes or government and public organizations.

④ Maximum exposure to credit risk

The maximum exposure to credit risk related to financial instruments as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Insurance Business		
Cash equivalents	₩ 848,027	₩ 1,838,710
Deposits	745,905	766,085
Financial assets at fair value through profit or loss	5,548,184	1,605,366
Financial assets at fair value through other comprehensive income	24,554,026	21,902,726
Financial assets at amortized cost	31,944,199	32,319,331
Loans	28,795,748	26,920,204
Other financial assets	2,354,664	1,451,255
Derivative financial assets	283,452	364,881
	₩ 95,074,205	₩ 87,168,558

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<i>(in millions of Korean won)</i>	2019		2018	
Investment and Securities Business				
Financial assets at fair value through profit or loss	₩	5,854,949	₩	4,136,098
Derivative financial assets		175,562		128,396
Financial assets at amortized cost				
Cash equivalents		92,695		109,750
Deposits		404,617		623,268
Loans		1,249,692		980,728
Other financial assets		546,358		633,930
		<u>2,293,362</u>		<u>2,347,676</u>
Off-balance account				
Purchase agreement amount ¹		40,000		80,900
Commitment of loan on collateral and underwriting debenture ¹		44,232		63,535
		<u>84,232</u>		<u>144,435</u>
	₩	<u>8,408,105</u>	₩	<u>6,756,605</u>

¹ The Group has obligation of provision for loss related to distribution of association's assets except for the assets above.

⑤ Status of exposure for credit rating

Exposure of bonds, loans and OTC derivatives by credit rating as at December 31, 2019 and 2018, are as follows:

Insurance Business

(i) Bonds

<i>(in millions of Korean won)</i>	2019						
	Risk free	AAA	AA+ ~ AA-	A+ ~ BBB-	Below BBB-	Others	Total
Government and public bonds	₩ 13,398,010	₩ -	₩ -	₩ -	₩ -	₩ -	₩ 13,398,010
Special bonds	4,714,257	8,476,917	82,645	-	-	29,677	13,303,496
Financial bonds	-	68,821	591,767	53,546	-	92,082	806,216
Corporate bonds	-	2,557,442	1,407,043	30,243	-	101,896	4,096,624
Overseas securities	8,078,450	11,324,974	5,628,463	803,999	-	785,138	26,621,024
	<u>₩ 26,190,717</u>	<u>₩ 22,428,154</u>	<u>₩ 7,709,918</u>	<u>₩ 887,788</u>	<u>₩ -</u>	<u>₩ 1,008,793</u>	<u>₩ 58,225,370</u>

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<i>(in millions of Korean won)</i>	2018						
	Risk free	AAA	AA+ ~ AA-	A+ ~ BBB-	Below BBB-	Others	Total
Government and public bonds	₩ 12,603,332	₩ -	₩ -	₩ -	₩ -	₩ -	₩ 12,603,332
Special bonds	5,402,624	7,949,360	113,856	-	-	-	13,465,840
Financial bonds	-	211,913	628,715	-	-	-	840,628
Corporate bonds	-	1,601,384	1,804,734	183,129	-	-	3,589,247
Overseas securities	7,298,617	11,355,719	5,428,008	976,833	-	-	25,059,177
Others	-	132,672	137,900	-	-	-	270,572
	<u>₩ 25,304,573</u>	<u>₩ 21,251,048</u>	<u>₩ 8,113,213</u>	<u>₩ 1,159,962</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ 55,828,796</u>

(ii) Loans

<i>(in millions of Korean won)</i>	2019							
	Risk free	AAA	AA+ ~ AA-	A+ ~ BBB-	Below BBB-	Non-rating	Others	Total
Call loans, unsecured loans, CP, loans secured by third- party guarantee	₩ 2,055,147	₩ 174,700	₩ 421,388	₩ 78,907	₩ -	₩ 4,972,915	₩ 2,084,927	₩ 9,787,984
Loans secured by real estate	-	391,231	40,000	-	-	2,485,547	5,516,660	8,433,438
Policy loans	-	-	-	-	-	-	7,762,516	7,762,516
Other loans	2,501,012	100,000	1,044	62,734	-	100,058	81,775	2,846,623
	<u>₩ 4,556,159</u>	<u>₩ 665,931</u>	<u>₩ 462,432</u>	<u>₩ 141,642</u>	<u>₩ -</u>	<u>₩ 7,558,521</u>	<u>₩ 15,445,878</u>	<u>₩ 28,830,561</u>

The amount is classified on the basis of principal of loans.

<i>(in millions of Korean won)</i>	2018							
	Risk free	AAA	AA+ ~ AA-	A+ ~ BBB-	Below BBB-	Non-rating	Others	Total
Call loans, unsecured loans, CP, loans secured by third- party guarantee	₩ 2,250,413	₩ -	₩ 219,261	₩ 112,445	₩ -	₩ 2,902,535	₩ 3,058,539	₩ 8,543,193
Loans secured by real estate	117	-	40,000	86,967	-	2,778,700	4,908,672	7,814,456
Policy loans	-	-	-	-	-	-	7,326,592	7,326,592
Other loans	967,725	1,499,265	202,167	268,389	30,341	302,566	11,452	3,281,905
	<u>₩ 3,218,255</u>	<u>₩ 1,499,265</u>	<u>₩ 461,428</u>	<u>₩ 467,801</u>	<u>₩ 30,341</u>	<u>₩ 5,983,801</u>	<u>₩ 15,305,255</u>	<u>₩ 26,966,146</u>

The amount is classified on the basis of principal of loans.

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Investment and Securities Business

(i) The credit risk of financial assets measured at amortized cost

The exposure of financial assets measured at amortized cost and off-balance agreement by credit risk rating as at December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

	2019		
	12 months expected credit losses measurement	Overall period Expected credit losses	Total
Deposit and other loan receivables			
AA- to AAA+	₩ 49,475	₩ -	₩ 49,475
A- to A+	38,823	-	38,823
BBB- to BBB+	243,724	11,421	255,145
	<u>332,022</u>	<u>11,421</u>	<u>343,443</u>
Purchase agreement, payment guarantee, purchase commitment			
AA- to AAA+	-	-	-
A- to A+	40,000	-	40,000
BBB- to BBB+	20,000	24,232	44,232
	<u>60,000</u>	<u>24,232</u>	<u>84,232</u>
	<u>₩ 392,022</u>	<u>₩ 35,653</u>	<u>₩ 427,675</u>

(in millions of Korean won)

	2018		
	12 months expected credit losses measurement	Overall period Expected credit losses	Total
Deposit and other loan receivables			
AA- to AAA+	₩ 58,803	₩ -	₩ 58,803
A- to A+	-	51,855	51,855
BBB- to BBB+	-	317,072	317,072
	<u>58,803</u>	<u>368,927</u>	<u>427,730</u>
Purchase agreement, payment guarantee, purchase commitment			
AA- to AAA+	40,900	-	40,900
A- to A+	40,000	-	40,000
BBB- to BBB+	28,400	35,135	63,535
	<u>109,300</u>	<u>35,135</u>	<u>144,435</u>
	<u>₩ 168,103</u>	<u>₩ 404,062</u>	<u>₩ 572,165</u>

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Changes in provision for financial assets measured at amortized cost for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		
	12 months expected credit losses	Overall period Expected credit losses	Total
Beginning	₩ 2,208	₩ 3,410	₩ 5,617
Impairment loss on credit losses	(640)	1,284	643
Ending	₩ 1,567	₩ 4,693	₩ 6,261

(in millions of Korean won)

	2018		
	12 months expected credit losses	Overall period Expected credit losses	Total
Beginning	₩ 280	₩ -	₩ 280
Impairment loss on credit losses	1,928	3,410	5,338
Ending	₩ 2,208	₩ 3,410	₩ 5,618

(ii) The credit risk of debt securities

The exposure of debt securities at fair value through profit or loss by credit risk rating as at December 31, 2019 and 2018, is as follows:

(in millions of Korean won)

	Financial assets at fair value through profit or loss	
	2019	2018
AAA	₩ 3,802,738	₩ 2,325,839
AA+ ~ BBB-	1,523,567	1,512,180
BB	-	514
Non-rating ¹	35,472	49,562
	₩ 5,361,777	₩ 3,888,095

¹ The bonds did not receive any external evaluation. It does not imply a bond with a significant credit risk.

The credit quality of securities was classified using credit ratings calculated by credit rating agencies such as Korea Investors Service, Inc., Korea Asset Pricing Corporation, NICE P&I Co., Ltd., FN Asset Evaluation Co., Ltd.

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⑥ Concentration level for industry

The concentration level by industries of bonds and loans as at December 31, 2019 and 2018, is as follows:

Insurance Business

(in millions of Korean won)	2019						
	Governmental and Public Institutions (Government and Municipal bonds)	Financial and Insurance	Electricity, Gas, Steam and Water Supply	Construction	Real Estate and Leasing Service	Others	Total
Debt securities	₩ 21,177,515	₩ 12,896,449	₩ 4,906,785	₩ 2,277,745	₩ 1,075,258	₩ 15,891,619	₩ 58,225,371
Loans ¹	-	3,180,427	1,277,037	209,970	3,990,376	20,172,751	28,830,561
	<u>₩ 21,177,515</u>	<u>₩ 16,076,876</u>	<u>₩ 6,183,822</u>	<u>₩ 2,487,715</u>	<u>₩ 5,065,634</u>	<u>₩ 36,064,370</u>	<u>₩ 87,055,932</u>

¹ Loans are classified by principal amount.

(in millions of Korean won)	2018						
	Governmental and Public Institutions (Government and Municipal bonds)	Financial and Insurance	Electricity, Gas, Steam and Water Supply	Construction	Real Estate and Leasing Service	Others	Total
Debt securities	₩ 19,785,413	₩ 13,974,089	₩ 4,557,766	₩ 2,160,343	₩ 1,406,824	₩ 13,944,362	₩ 55,828,797
Loans ¹	164,874	3,231,631	955,300	313,344	3,759,724	18,541,273	26,966,146
	<u>₩ 19,950,287</u>	<u>₩ 17,205,720</u>	<u>₩ 5,513,066</u>	<u>₩ 2,473,687</u>	<u>₩ 5,166,548</u>	<u>₩ 32,485,635</u>	<u>₩ 82,794,943</u>

¹ Loans are classified by principal amount.

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Investment and Securities Business

The configuration details by industries of debt securities (including corporate bill securities) and loans as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Amount	Ratio (%)	Amount	Ratio (%)
Financial assets at fair value through profit or loss (financial assets held for trading)				
Government and government-investment institutions	₩ 2,691,389	40.66	₩ 1,543,317	31.66
Finance and insurance industries	1,242,342	18.77	1,062,890	21.80
Others ¹	1,428,045	21.57	1,281,889	26.30
Financial assets at amortized cost (loans)				
Finance and insurance industries	2,357	0.04	1,229	0.03
Others ¹	1,255,472	18.96	985,355	20.21
	₩ 6,619,605	100.00	₩ 4,874,680	100.00

¹ All non-financial and non-government classifications and loans with an individual counterpart were classified as others.

The configuration details by country of debt securities (including corporate bill securities) and loans as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Amount	Ratio (%)	Amount	Ratio (%)
Financial assets at fair value through profit or loss (financial assets held for trading)				
Republic of Korea	₩ 5,142,190	77.68	₩ 3,735,349	76.63
Others	219,587	3.32	152,746	3.13
Financial assets at amortized cost (loans)				
Republic of Korea	1,254,462	18.95	986,584	20.24
Others	3,366	0.05	-	-
	₩ 6,619,605	100.00	₩ 4,874,680	100.00

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5) Market risk management

① Concept

Market risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market prices.

② Measurement method

Insurance Business

Both standard measurement method and internal model are used to measure the market risk. Under the standard measurement method (Article 7-2 of the Regulation on Supervision of Insurance Business), both general market risk and variable annuity insurance guarantee risk are measured using risk index by the RBC standard. If the Group uses an internal model, it calculates credit risk by Credit Manager (Credit Metrics measurement method), which is a credit risk measurement engine provided by MSCI.

③ Management method

Insurance Business

(i) Management by permissible limit of VaR

The Group calculates VaR daily, which is maximum unsuspected loss (99% confidence level) to investment portfolio due to fluctuation of stock prices, interest rate and exchange rate. The Group manages to keep VaR less than the available capital as providing permissible limit to the VaR.

(ii) Management by loss limit

The Group establishes loss limit for trading assets and high-risk assets. If loss from the trading assets and the high risk assets is exceeding the limit, the Group sells them to prevent additional loss. The Group manages to keep loss from the trading assets and the high-risk assets less than the loss limit.

(iii) Management by operating limit

The Group establishes operating limit for investment category to prevent excessive investment on specific investment category.

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Investment and Securities Business

For the management of market risk, the Group measures ongoing market risk over the entire assets and liabilities, which are changed according to fluctuations in the market factors. Market risk is measured and managed in accordance with standard methods on the financial investment industry standards regulation and the VaR calculated by the amount of risk by the internal model. In addition, the Group manages the market risk by setting the sensitivity limits and the loss limits, including the operating limits. The Group's VaR is calculated in 99% of trust level-based retention period of one day, and it means that the actual loss in excess of the calculated VaR causes one day of 100 business days on average.

④ VaR of market

Investment and Securities Business

The details of VaR of current market are as follows:

<i>(in millions of Korean won)</i>	2019¹		2018¹	
Spot investment	₩	27,370	₩	7,194
Beneficiary certificate		1		627
Bond		9,833		7,479
Listed derivatives		6,980		99,557
OTC derivatives		6,548		56,253
Deposits and others		3		2

¹ 10-day VaR is calculated on the basis of the retention period of one day.

⑤ Sensitivity analysis to risk factors

The Group operates daily, weekly, monthly and quarterly sensitive analysis for 50 scenarios, which are historical scenarios, user-designated scenarios, etc. The result of sensitive analysis which was performed based on exchange rate, interest rate, and stock prices to analyze the effect of the scenario test is as follows:

<i>(in millions of Korean won)</i>	Effect on profit or loss²		Effect on equity²	
Exchange rate ¹				
₩100 increase against won-dollar exchange rate	₩	165,698	₩	11,602
₩100 decrease against won-dollar exchange rate		(165,698)		(11,602)
Interest rate				
100bp increase		(40,546)		(1,884,672)
100bp decrease		44,608		2,130,444

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Stock index		
10% increase	146,158	9,787
10% decrease	(146,158)	(9,787)

¹ Sensitive to fluctuation of exchange rate, including effects on profit and equity from fluctuation of assets and liabilities denominated in foreign currency and derivatives.

² The Group separately manages the owned assets and financial assets at fair value through profit or loss, derivatives held for trading are managed at income level and financial assets at fair value through other comprehensive income is managed at equity level.

6) Liquidity risk management

① Concept

Liquidity risk is the risk that an entity will encounter difficulty in meeting obligations associated with financial liabilities.

② Management method

Insurance Business

The Group manages liquidity by considering the total monthly cash flows of daily insurance cash flows.

Investment and Securities Business

The Group manages liquidity risk for all assets, liabilities and off-balance transactions related to investment securities business. Cash flow distributed by assets- and liabilities-backed sector liquid gap and liquid ratio is measured to manage enterprise-wide liquidity risk. By setting the limits to the departments, funds are managed not to exceed the appropriate scale of financing.

③ The details of the remaining maturity of liabilities including the interest amount for the period as at December 31, 2019 and 2018, are as follows.

(in millions of
Korean won)

	2019				Total
	Less than 1 year	Between 1 and 5 years	Between 5 and 10 years	More than 10 years	
Insurance Business					
Other financial liabilities	₩ 1,990,279	₩ 295,675	₩ 420,237	₩ -	₩ 2,706,191
Derivative financial liabilities	352,086	253,502	284	1,691	607,563
	<u>₩ 2,342,365</u>	<u>₩ 549,177</u>	<u>₩ 420,521</u>	<u>₩ 1,691</u>	<u>₩ 3,313,754</u>

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<i>(in millions of Korean won)</i>	2018				
	Less than 1 year	Between 1 and 5 years	Between 5 and 10 years	More than 10 years	Total
Insurance Business					
Other financial liabilities	₩ 1,474,296	₩ 290,299	₩ 426,204	₩ -	₩ 2,190,799
Derivative financial liabilities	211,529	109,704	-	527	321,760
	<u>₩ 1,685,825</u>	<u>₩ 400,003</u>	<u>₩ 426,204</u>	<u>₩ 527</u>	<u>₩ 2,512,559</u>
<i>(in millions of Korean won)</i>	2019				
	Less than 1 month	Between 1 and 3 months	Between 3 and 12 months	More than 12 months	Total
Investment and Securities Business					
Withheld liabilities	₩ 463,696	₩ -	₩ -	₩ -	₩ 463,696
Financial liabilities at fair value through profit or loss	506,590	191,289	371,137	1,604,012	2,673,028
Borrowings	3,099,043	1,336,776	124,494	138	4,560,451
Debentures	1,609	500	5,870	324,580	332,559
Derivative financial liabilities	9,106	19,854	34,118	67,427	130,505
Other financial liabilities	429,525	1,948	51,569	47,245	530,287
Purchase agreement amount ¹	40,000	-	-	-	40,000
Commitment of loan on collateral and underwriting debenture ¹	44,232	-	-	-	44,232
	<u>₩ 4,593,801</u>	<u>₩ 1,550,367</u>	<u>₩ 587,188</u>	<u>₩ 2,043,402</u>	<u>₩ 8,774,758</u>

¹ Purchase agreement amount and commitment of loan on collateral and underwriting debenture are included in the earliest time bucket as its possibility of occurrence is uncertain. As at December 31, 2019, the Group bears obligation of allowance for loss in relation to distribution of cooperative assets (Note 56).

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	2018				
	Less than 1 month	Between 1 and 3 months	Between 3 and 12 months	More than 12 months	Total
Investment and Securities Business					
Withheld liabilities	₩ 404,079	₩ -	₩ -	₩ -	₩ 404,079
Financial liabilities at fair value through profit or loss	476,254	27,442	183,363	1,284,996	1,972,055
Borrowings	2,035,760	1,052,797	206,968	149	3,295,674
Debentures	228	500	2,184	64,456	67,368
Derivative financial liabilities	8,076	34,030	75,978	126,074	244,158
Other financial liabilities	323,969	-	43,872	4,571	372,412
Purchase agreement amount ¹	80,900	-	-	-	80,900
Commitment of loan on collateral and underwriting debenture ¹	63,535	-	-	-	63,535
	<u>₩ 3,392,801</u>	<u>₩ 1,114,769</u>	<u>₩ 512,365</u>	<u>₩ 1,480,246</u>	<u>₩ 6,500,181</u>

¹ Purchase agreement amount and commitment of loan on collateral and underwriting debenture are included in the earliest time bucket as its possibility of occurrence is uncertain. As at December 31, 2018, the Group bears obligation of allowance for loss in relation to distribution of cooperative assets (Note 56).

7) Operating risk management

① Concept

Operating risk is the risk of financial risk and non-financial risk due to inappropriate internal processes, manpower, external events, reputation and regulations. Operating risk management improves safety and soundness of the Group by identifying weaknesses in the internal process and systematic complement.

② Management method

The Group collects data by event types, causes and task types. Based on the accumulated data, the Group measures Op-VaR and reports to the risk management committee. In addition, the Group monitors the KPI-like unqualified contract index, incomplete selling rate, number of internal complaints and others and reports these to the risk management committee on a quarterly basis.

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(4) Fair value hierarchy (financial business)

Assets measured at fair value or for which the fair value is disclosed are categorized within the fair value hierarchy and the defined levels are as follows:

- Quoted prices (unadjusted) in active markets for identical assets or liabilities (Level 1).
- Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly (that is, prices) or indirectly (that is, derived from prices) (Level 2).
- Inputs for the asset or liability that are not based on observable market data (that is, unobservable inputs) (Level 3).

Fair value hierarchy classifications of the financial assets and the financial liabilities that are measured at fair value or their fair value is disclosed as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Level 1	Level 2	Level 3	Total
Financial assets				
Financial assets at fair value through profit or loss	₩ 3,310,745	₩ 9,913,843	₩ 12,196,316	₩ 25,420,904
Financial assets at fair value through other comprehensive income	5,767,928	19,417,318	1,131,092	26,316,338
Derivative financial assets	3,939	350,541	104,533	459,013
	<u>₩ 9,082,612</u>	<u>₩ 29,681,702</u>	<u>₩ 13,431,941</u>	<u>₩ 52,196,255</u>
Financial liabilities				
Financial liabilities at fair value through profit or loss	₩ 447,319	₩ 53,796	₩ 2,171,913	₩ 2,673,028
Derivative financial liabilities	21,555	666,190	50,086	737,831
	<u>₩ 468,874</u>	<u>₩ 719,986</u>	<u>₩ 2,221,999</u>	<u>₩ 3,410,859</u>

(in millions of Korean won)

	2018			
	Level 1	Level 2	Level 3	Total
Financial assets				
Financial assets at fair value through profit or loss	₩ 2,746,737	₩ 8,621,112	₩ 8,797,087	₩ 20,164,936
Financial assets at fair value through other comprehensive income	3,955,926	19,310,986	190,326	23,457,238
Derivative financial assets	5,873	411,748	75,656	493,277
	<u>₩ 6,708,536</u>	<u>₩ 28,343,846</u>	<u>₩ 9,063,069</u>	<u>₩ 44,115,451</u>
Financial liabilities				
Financial liabilities at fair value through profit or loss	₩ 465,707	₩ 29,066	₩ 1,477,282	₩ 1,972,055
Derivative financial liabilities	115,871	373,564	76,483	565,918

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₩	581,578	₩	402,630	₩	1,553,765	₩	2,537,973
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Changes in Level 3 of the fair value hierarchy for the recurring fair value measurements are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
Beginning	₩	7,509,304	₩	6,032,148
Purchase		8,940,084		4,976,920
Sales		(6,105,739)		(3,677,852)
Transfer out of Level 3 ¹		(116,484)		-
Transfer into Level 3		-		35,358
Others ²		634,627		(2,909)
Gains and losses recognized in profit or loss		312,012		142,254
Gains and losses recognized in other comprehensive income		36,138		3,384
Ending	₩	11,209,942	₩	7,509,304

¹ During the year ended December 31, 2019, they are reclassified to Level 1 and Level 2 since valuation method of financial assets has been changed to assessment based on the observable inputs or prices in active markets following KOSDAQ listing.

² The impact of changes in consolidations scope is included.

(5) Capital risk management

The purpose of the consolidation entity's capital management is to maintain an optimal capital structure to protect its ability as a continuing entity to provide benefits to shareholders and stakeholders and to reduce capital costs.

The consolidation entity manages capital based on the capital procurement ratio, as is the case with other companies in the same industry. The capital procurement ratio is calculated by dividing the net debt into total capital. The net debt is the amount of cash and cash equivalents deducted from the gross borrowing (borrowing and debentures in the consolidated statement of financial position) and the total capital is the sum of the net debts added to the "capital total" of the consolidated statement of financial position.

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The gearing ratios as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Total borrowings	₩ 14,127,143	₩ 16,977,899
Less: cash and cash equivalents	<u>(4,574,949)</u>	<u>(5,058,739)</u>
Net debt (A)	9,552,194	11,919,160
Total equity (B)	<u>18,263,971</u>	<u>16,953,036</u>
Total capital (A+B)	₩ 27,816,165	₩ 28,872,196
Gearing ratio (A/(A+B))	34.34%	41.28%

Details of financial information in accordance with trust type of Investment and Securities business as at December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	Specified money in trust	
Assets		
Cash and deposits	₩	105,899
Stocks		57,226
Investments		10,464
Bonds		142,823
Corporate accommodation note		709,344
Asset-backed short-term receivables		637,970
Derivatives-combined securities		29,928
Purchase under repurchase agreements		14,426
Beneficiary certificates		13,490
Monetary bond		678,799
Foreign bond		634,266
Beneficiary certificates in foreign currency		18,212
Other assets		<u>37,231</u>
	₩	<u>3,090,077</u>
Liabilities:		
Specified money in trust	₩	2,366,907
Property trust		682,999
Unearned revenues		4,223
Accrued trust fee		1,686
Accrued trust income		34,258
Other payables		<u>3</u>
	₩	<u>3,090,077</u>

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Details and transactions of identifiable accounts of specified money in trust as at December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	Category	2019
Bonds under repurchase agreements	Purchase	₩ 6,188,095
	Sale	6,179,402

60. Changes in Accounting Policies

The Group has adopted Korean IFRS 1116, retrospectively, from January 1, 2019, but has not restated comparatives for the 2018 reporting period, as permitted under the specific transitional provisions in the standard. The reclassifications and the adjustments arising from the new leasing rules are, therefore, recognized in the consolidated statement of financial position on January 1, 2019.

On adoption of Korean IFRS 1116, the Group recognized lease liabilities in relation to leases which had previously been classified as 'operating leases' under the principles of Korean IFRS 1017. These liabilities were measured at the present value of the remaining lease payments, discounted using the lessee's incremental borrowing rate as at January 1, 2019. The lessee's weighted average incremental borrowing rate applied to the lease liabilities on January 1, 2019 was 1.8% ~ 6.1%.

For leases previously classified as 'finance leases', the Group recognized the carrying amount of the lease asset and lease liability immediately before transition as the carrying amount of the right-of-use asset and the lease liability at the date of initial application. The measurement principles of Korean IFRS 1116 are only applied after that date.

Details of lease liabilities as at January 1, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019
Operating lease commitments disclosed as at December 31, 2018	₩ 437,002
Discounted using the lessee's incremental borrowing rate of at the date of initial application	(42,467)
Add: finance lease liabilities recognized as at December 31, 2018	49,227
Less: short-term leases not recognized as a liability	(18,185)
Less: low-value leases not recognized as a liability	(7,386)
Less: others	(147)
Lease liability recognized as at January 1, 2019	418,044
Of which are:	
Current lease liabilities	118,104
Non-current lease liabilities	299,940

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₩ 418,044

(1) Changes in right-of-use assets for the year ended December 31, 2019, are as follows:

(in millions of Korean won)

	2019									
	Land	Buildings	Structures	Machinery	Vehicles	Tools and equipment	Leased properties	Others	Total	
Beginning	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -
Changes in accounting policy	35,173	125,373	10,251	81,214	16,936	11,996	67,122	40,261	388,326	
Acquisitions	1,962	251,194	3,806	2,627	9,743	571	38,457	32,671	341,031	
Disposals	-	(8,881)	-	-	(471)	-	(8,110)	(11,978)	(29,440)	
Depreciation	(3,924)	(43,442)	(2,785)	(6,977)	(10,619)	(5,487)	(48,233)	(22,643)	(144,110)	
Others	(3,491)	5,233	(1)	(270)	(414)	(1)	19,008	(889)	19,175	
Ending	₩ 29,720	₩ 329,477	₩ 11,271	₩ 76,594	₩ 15,175	₩ 7,079	₩ 68,244	₩ 37,422	₩ 574,982	

(2) Changes in lease liabilities for the year ended December 31, 2019, are as follows:

(in millions of Korean won)

2019

Beginning	₩ 49,227
Changes in accounting policies	368,817
Acquisitions	410,860
Disposals	(27,490)
Interest expense	7,551
Payment	(172,358)
Others	14,389
Ending	<u>₩ 650,996</u>

(3) Classification of current portion of lease liabilities as at December 31, 2019, is as follows:

(in millions of Korean won)

2019

Less than 3 months	₩ 23,545
Between 3 months and 1 year	104,536
Between 1 year and 5 years	288,624
More than 5 years	234,291
	<u>₩ 650,996</u>

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(4) The consolidated statement of comprehensive income shows the following amounts relating to leases:

<i>(in millions of Korean won)</i>	2019
Depreciation of right-of-use assets	₩ 144,110
Interest expense relating to lease liabilities	7,551
Expense relating to short-term leases	22,606
Expense relating to leases of low-value assets	5,481
Expense relating to variable lease payments not included in lease liabilities	30,150
Gain from subleases of right-of-use assets	496

The total cash outflow for leases in 2019 was ₩ 230,595 million.

61. Information about Non-controlling Interests

(1) Changes in accumulated non-controlling interests

The profit or loss allocated to non-controlling interests and accumulated non-controlling interests of subsidiaries that are material to the Group for the years ended December 31, 2019 and 2018, is as follows:

<i>(in millions of Korean won)</i>	2019						
	Percentage of ownership (%)	Percentage of voting rights (%)	Accumulated non-controlling interests at the beginning of the year	Profit or loss allocated to non-controlling interests	Dividends paid to non-controlling interests	Others	Accumulated non-controlling interests at the end of the year
Hanwha Life Insurance Co., Ltd.	55.0	48.0	₩ 5,493,791	₩ 77,851	₩ (122,697)	₩ 987,028	₩ 6,435,973
Hanwha Chemical Corporation	63.4	63.1	3,722,458	(65,582)	(20,994)	31,564	3,667,446
Hanwha Aerospace Co., Ltd.	66.7	66.7	1,838,075	76,836	-	6,047	1,920,958

<i>(in millions of Korean won)</i>	2018						
	Percentage of ownership (%)	Percentage of voting rights (%)	Accumulated non-controlling interests at the beginning of the year	Profit or loss allocated to non-controlling interests	Dividends paid to non-controlling interests	Others	Accumulated non-controlling interests at the end of the year
Hanwha Life Insurance Co., Ltd.	55.0	48.0	₩ 4,843,698	₩ 195,295	₩ (110,165)	₩ 564,963	₩ 5,493,791
Hanwha Chemical Corporation	63.7	63.5	3,781,809	30,375	(36,697)	(53,029)	3,722,458
Hanwha Aerospace Co., Ltd.	67.0	67.0	1,492,606	10,041	-	335,428	1,838,075

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(2) Summarized financial information on subsidiaries

The summarized financial information for each subsidiary with non-controlling interests that are material to the Group before intercompany eliminations is as follows:

1) Summarized consolidated statements of financial position as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	Hanwha Life Insurance Co., Ltd.			
	2019		2018	
Assets for financial business	₩	141,850,087	₩	130,849,493
Liabilities for financial business		127,856,812		120,083,577
Equity		13,993,275		10,765,916

(in millions of Korean won)

	Hanwha Chemical Corporation			
	2019		2018	
Current assets	₩	5,322,650	₩	5,012,471
Non-current assets		10,358,478		10,219,005
Current liabilities		5,831,012		5,132,516
Non-current liabilities		4,044,269		3,871,864
Equity		5,805,847		6,227,096

(in millions of Korean won)

	Hanwha Aerospace Co., Ltd.			
	2019		2018	
Current assets	₩	4,563,607	₩	3,876,999
Non-current assets		4,144,804		3,519,687
Current liabilities		3,329,042		3,144,141
Non-current liabilities		2,524,014		1,616,795
Equity		2,855,355		2,635,750

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2) Summarized consolidated statements of comprehensive income for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	Hanwha Life Insurance Co., Ltd.			
	2019		2018	
Operating revenue	₩	24,978,492	₩	23,453,995
Profit for the year		58,667		414,947

(in millions of Korean won)

	Hanwha Chemical Corporation			
	2019		2018	
Operating revenue	₩	9,503,286	₩	9,046,042
Profit for the year	₩	(248,865)	₩	160,445
Other comprehensive income		(1,955)		(85,137)
Total comprehensive income	₩	(250,820)	₩	75,308

(in millions of Korean won)

	Hanwha Aerospace Co., Ltd.			
	2019		2018	
Operating revenue	₩	5,264,114	₩	4,453,177
Profit for the year	₩	162,427	₩	49,251
Other comprehensive income		(14,300)		(1,961)
Total comprehensive income	₩	148,127	₩	47,290

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3) Summarized consolidated statements of cash flows for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	Hanwha Life Insurance Co., Ltd.	
	2019	2018
Cash flows from operating activities	₩ 1,007,494	₩ 1,642,876
Cash flows from investing activities	(2,172,863)	(1,832,157)
Cash flows from financing activities	273,131	1,433,437
Net increase (decrease) in cash and cash equivalents	(892,238)	1,244,156
Cash and cash equivalents at the beginning of year	1,838,710	582,203
Exchange gains on cash and cash equivalents	4,232	12,351
Cash and cash equivalents at the end of year	₩ 950,704	₩ 1,838,710

(in millions of Korean won)

	Hanwha Chemical Corporation	
	2019	2018
Cash flows from operating activities	₩ 1,206,117	₩ 726,704
Cash flows from investing activities	(1,110,655)	(434,645)
Cash flows from financing activities	(42,617)	(69,584)
Net increase in cash and cash equivalents	52,845	222,475
Cash and cash equivalents at the beginning of year	1,024,121	804,983
Exchange gains (losses) on cash and cash equivalents	7,550	(3,337)
Cash and cash equivalents at the end of year	₩ 1,084,516	₩ 1,024,121

(in millions of Korean won)

	Hanwha Aerospace Co., Ltd.	
	2019	2018
Cash flows from operating activities	₩ 715,142	₩ 56,343
Cash flows from investing activities	(643,527)	(213,054)
Cash flows from financing activities	289,352	332,716
Net increase in cash and cash equivalents	360,967	176,005
Cash and cash equivalents at the beginning of year	636,722	461,380
Exchange gains (losses) on cash and cash equivalents	2,433	(663)
Cash and cash equivalents at the end of year	₩ 1,000,122	₩ 636,722

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(3) Transactions with non-controlling interests

Effects arising from transactions with non-controlling interests on the equity attributable to owners of the parent for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019¹		2018¹	
Carrying amount of the non-controlling interests increased	₩	498,297	₩	1,060,047
Hybrid securities/paid-in capital increase/consideration paid to non-controlling interests		498,297		1,060,047
Excess of consideration paid recognized in parent's equity	₩	-	₩	-

¹ Major transactions with non-controlling interests for the years ended December 31, 2019 and 2018, are issue of hybrid securities of Hanwha Life Insurance Co., Ltd.

62. Unconsolidated Structured Entities

(1) The Group is involved in structured entities by investing SOC, asset securitization, structured finance and investment funds. Details of structured entities' major information are as follows:

Business	Description	Remarks (nature, purpose, activities and others)
Non-financial business	SOC	The private sector investor ('SOC') which is classified as unconsolidated structured entity constructs and transfers the infrastructure for public services such as roads, ports, railroads, schools and environmental infrastructure to the public sector and is paid for the operating and maintaining the infrastructure to return the construction cost in accordance with service concession arrangement.
Financial business	Asset-backed securitization	The Company is engaged in issuing asset-backed securities based on securitized assets as underlying assets and distributes principals and dividends of the asset-backed securities with sources such as borrowings or proceeds from management, operation and disposition of the securitized asset. The Group transfers risks related to purchase agreements of asset-backed securities or issuance of asset-backed securities with credit offerings. In relation to this, the Group recognizes interest income or commission income. Although an entity that provides funds and arrangements such as assuming conditional liabilities exists prior to the Group's financial support, if the unconsolidated structured entities fail to refinance, the Group could be exposed to the risks of having to purchase the financial assets that had been

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Business	Description	Remarks (nature, purpose, activities and others)
		issued.
	Structured finance	<p>The Company was incorporated as a separate real estate project financing investment entity to efficiently carry out the Company's business. The funds are raised through channels such as equity investments, loans from financial institutions and participating organizations.</p> <p>Project financing investment entity is a way of funding large scale businesses with risks. The project financing investment company invests in qualifying companies not based on credit or physical collateral of the Company leading the project, but the economic feasibilities of the specific project. Investors of the entity benefit from the income arising from the ongoing projects and the Group recognizes interest income, income from valuation of equity investments and dividend income.</p> <p>Although an entity that provides funds, joint guarantees, unsubordinated credit offerings and others exists prior to the Group's financial support, if the funds are not collected by the predetermined schedule or if circumstances such as cessation of a project occurs, the Group could be exposed to principal losses due to decrease in value of equity investments or losses arising from uncollectible loans.</p>
	Investment fund	<p>The Company, an investment trust company, delegates investment and management to fund managers according to the trust agreement and distributes operating profit to the investors.</p> <p>The Group, an investee of the investment trust, recognizes income from valuation of equity investments and dividend income in proportion to its share ratio. If the value of investment trust decreases, the Group will be exposed to the risk of principal losses.</p>
	Investment association	<p>The Company, an investment trust association, delegates investment and management to managing partner according to the trust agreement and distributes operating profit to the limited liability managing partner.</p> <p>The Group, as an investor in investment association, recognizes income (loss) on valuation of equity investments and dividend income in proportion to its share ratio. If the value of investment association decreases, the Group will be exposed to the risk of principal losses.</p>

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(2) Details of unstructured entities' scale and the Group's risks to unstructured entities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)	2019						
	SOC	Asset securitization	Structured finance	Investment funds	Investment association	Others	Total
Assets in the consolidated statement of financial position							
Trade and other receivables	₩ 34,026	₩ -	₩ -	₩ -	₩ -	₩ -	₩ 34,026
Securities	26,139	3,272,945	1,484,006	7,742,034	-	663,685	13,188,809
Investments in associates	8,431	-	90,757	29,632	41,286	-	170,106
Loans	-	900,972	5,653,295	3,357,571	-	1,265,875	11,177,713
	<u>₩ 68,596</u>	<u>₩ 4,173,917</u>	<u>₩ 7,228,058</u>	<u>₩ 11,129,237</u>	<u>₩ 41,286</u>	<u>₩ 1,929,560</u>	<u>₩ 24,570,654</u>
Liabilities in the consolidated statement of financial position							
Other provisions	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -
	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>
Maximum exposure to loss ¹	₩ 531,834	₩ 4,213,917	₩ 8,537,767	₩ 13,515,277	₩ 5,000	₩ 2,134,637	₩ 28,938,432

¹ Financial assets and financial liabilities were measured based on the book value; financial guarantee contracts, loan commitments and financing arrangements were measured based on the contractual limit amount. In addition, the maximum exposure amount above is the total amount that does not reflect the effect of the Group's hedging activities to reduce the risk of exposure to unconsolidated companies.

(in millions of Korean won)	2018						
	SOC	Asset securitization	Structured finance	Investment funds	Investment association	Others	Total
Assets in the consolidated statement of financial position							
Trade and other receivables	₩ 71,375	₩ -	₩ -	₩ -	₩ -	₩ -	₩ 71,375
Securities	42,799	276,842	1,840,846	2,844,243	-	-	5,004,730
Investments in associates	3,898	-	75,338	48,700	16,711	-	144,647
Loans	-	363,710	4,695,721	248,417	-	-	5,307,848
	<u>₩ 118,072</u>	<u>₩ 640,552</u>	<u>₩ 6,611,905</u>	<u>₩ 3,141,360</u>	<u>₩ 16,711</u>	<u>₩ -</u>	<u>₩ 10,528,600</u>
Liabilities in the consolidated statement of financial position							
Other provisions	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -
	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>
Maximum exposure to loss ¹	₩ 655,072	₩ 784,987	₩ 7,870,772	₩ 3,717,107	₩ 24,461	₩ -	₩ 13,052,399

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¹ Financial assets and financial liabilities were measured based on the book value, financial guarantee contracts, loan commitments and financing arrangements were measured based on the contractual limit amount. In addition, the maximum exposure amount above is the total amount that does not reflect the effect of the Group's hedging activities to reduce the risk of exposure to unconsolidated companies.

63. Business Combination

On September 30, 2019, Hanwha Aerospace Co., Ltd. acquired 100% shares of EDAC Technologies Holding Company, which is controlling EDAC Technologies LLC, an American aircraft engines and components manufacturer in order to secure its business capacity in advance and expand the market, and changed its name to Hanwha Aerospace USA.

Details of consideration transferred in the business combination, are as follows:

(in millions of Korean won)

Name of company	Main business	Acquisition date	Consideration transferred
Hanwha Aerospace USA	Manufacture of aircraft engines and component	2019.09.30	₩ 239,682

Details of assets acquired and liabilities assumed as a result of the business combination, are as follows:

(in millions of Korean won)

	Amount
Fair value of identifiable assets	₩ 310,054
Cash and cash equivalents	8,517
Trade and other receivables	19,009
Other assets	7,089
Inventories	55,078
Property, plant and equipment	84,194
Intangible assets	136,167
Fair value of identifiable liabilities	238,924
Trade and other payables	22,150
Borrowings and debentures	114,964
Other liabilities	66,334
Deferred tax liabilities	35,476
Net identifiable assets acquired	71,130
Goodwill	168,552
	<u>₩ 239,682</u>

The revenue and loss for the year of Hanwha Aerospace USA after the acquisition date, which are included in statement of profit or loss, are ₩ 49,876 million and ₩ 82 million, respectively. If Hanwha Aerospace USA was consolidated on January 1, 2019, the revenue and profit for the year included in consolidated statement of profit or loss would have been ₩ 193,691 million and

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₩ 54,881 million, respectively, for the year ended December 31, 2019.

64. Events after the Reporting Period

(1) Merger between Hanwha Chemical Corporation and Hanwha Q CELLS & Advanced Materials Co., Ltd.

On January 1, 2020, Hanwha Chemical Corporation merged Hanwha Q CELLS & Advanced Materials Co., Ltd., its subsidiary, and the registration date of merger is January 6, 2020. After the merger, Hanwha Chemical Corporation changes its name to Hanwha Solutions Corporation.

(2) Participation in paid-in capital increase

Hanwha Life Insurance Co., Ltd. decided to invest ₩ 510,000 million by participating in paid-in capital increase of Hanwha Asset Management Co., Ltd. at the Board of Directors held on February 28, 2020.

(3) Spin-off and transfer of shares

Hanwha Hotel & Resort Inc. spun off and newly established food distribution and school meal business division on February 1, 2020 and held 100% shares of a newly established company. Hanwha Hotel & Resort Inc. transferred all the shares to WINPLUS INC. on February 28, 2020.