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Institute for Energy Economics and Financial Analysis
IEEFA.org

Doosan Heavy

Time for a Forensic Audit

Executive Summary

The stock market appears to have lost faith in Doosan Heavy.

The past five years have not been easy for South Korea's KOSPI index, but they have been dire for Doosan Heavy shareholders. While the KOSPI has been lacklustre, falling 4.0%, Doosan Heavy has fallen 74.8% and now has a market capitalization of just USD 1.0 billion.

What's the fundamental problem?

SOUTH KOREA'S LEADING POWER EQUIPMENT COMPANY APPEARS TO HAVE MISREAD THE DIRECTION OF POWER MARKETS over the past three years as the global energy transition triggered a reckoning for the heavy equipment industry.[1]

Like many national champions in the power sector, the company has lost much of its domestic and global growth potential. For companies like Doosan Heavy which have focused on traditional nuclear and fossil fuel technology, it has resulted in a dramatic re-rating as the market has shrunk and competition with North Asian rivals has reached new heights. For financial analysts, the challenge now is to determine whether Doosan Heavy's core business can meet its financial and business obligations.

To buy time, Doosan Heavy has been racing to grab projects in competitive overseas markets, hoping to gain an edge from access to concessionary loans from the Export-Import Bank of Korea (KEXIM) and Korea Development Bank (KDB), government-backed lenders. This is a common but financially risky strategy for all concerned. These are often low-margin carbon-heavy projects that are unlikely to plug the holes in Doosan's cash flow. Moreover, Korea's subsidized debt often does little more than de-risk initial approvals for controversial projects that sometimes struggle to progress due to changes in local market conditions. These delays have the potential to damage Doosan's cash flow and credibility, as well as the banks that are assuming it is business as usual in global power markets.

[1] IEEFA has covered the impact of energy transition on the strategy of two global power equipment leaders in two reports: Marubeni's Coal Problem and General Electric Misread the Energy Transition.

UNFORTUNATELY FOR DOOSAN, THEIR STRATEGY MISSTEPS HAVE CREATED FINANCIAL RISKS THAT CAN NO LONGER BE HIDDEN.

IEEFA's review of Doosan Heavy's 2018 and first half 2019 financial accounts confirms that the company's accounts come with material red flags that raise important questions about the company's financial and strategic challenges. The careful wording of the audited accounts signals that the company may be close to the boundaries of international accounting standards. This should be of concern to South Korea's top financial regulator, the Financial Supervisory Service (FSS) as well as leading domestic and global lenders.

As investors in the Korean market are well aware, auditing scandals have penalized Korean investors over the past two decades and recent problems have encouraged the Financial Services Commission (FSC) and the Financial Supervisory Service (FSS) to renew their vigilance. Added caution from the credit rating agencies who rate the bonds for investors should also be encouraged.

BASED ON IEEFA'S REVIEW, DOOSAN HEAVY'S 2018 AUDITED FINANCIAL ACCOUNTS OFFER UP AT LEAST 10 RED FLAGS. This view is validated by an analysis of the more recent, but unaudited, first half 2019 results. Taken together, Doosan Heavy's financial results raise important fiduciary questions not just for Doosan Heavy shareholders, but also for the bankers, investors, and counter-parties who may be asked to untangle the company's finances.

Doosan Heavy's 10 Red Flags
1) Five audits, three auditors
2) Five years of losses
3) Shrinking order book
4) Questionable cash flow
5) Heavy reliance on adjustments
6) Unstable funding partners
7) Share price collapse
8) No confidence from equity analysts
9) BBB with a negative outlook from credit ratings agencies
10) Misleading project announcements

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Auditors and Key Audit Matters

Perhaps the first lesson that fledgling financial professionals learn about analysing accounts is to check who the auditor is and whether they have given a company's financial accounts a so-called "clean" opinion. The auditors do not prepare the accounts; that is the job of the company. The auditor's job is to say whether the accounts present what is known as a true and fair view of the company's financial position. When regulators, investors, and bankers see a clean opinion, they have reason to believe they can rely on the numbers.

Governance experts—and retired auditors—will be the first to tell you that one sign of weak internal controls and audit risk is when a company frequently changes auditors. Auditors are subject to high levels of regulation in Korea[2] and, although the "Big Four" normally compete aggressively for business, auditor changes often attract the attention of investors.[3]

How has Doosan Heavy done by this measure?

The first red flag for Doosan Heavy is that over the past five years, the company has had three different auditors: Ernst & Young Han Young (2014-2015)[4], Deloitte Korea (2016), and now Samjong KPMG (2017-2018). This alone may give customers, lenders, and investors reason to examine the audited accounts to understand any new issues.

Over the past five years, Doosan Heavy has had three different auditors.

A second and very fundamental red flag for Doosan Heavy is that although Samjong KPMG did sign off on the company's 2018 audited accounts, the opinion includes a number of significant statements about additional steps they took in order provide a foundation for their opinion. These are statements that investors and audit specialists would notice because these "Key Audit Matters" (KAM) focus on issues that required auditor attention where there may be a higher risk of so-called "material misstatement" and where significant management and auditor judgment may have been required.[5]

It is notable that in 2018 Samjong KPMG revised the KAM language used in 2017 concerning the steps they took to verify Doosan Heavy management's approach to revenue recognition and the recoverability of trade receivables. These two accounting issues are sensitive because management has a high degree of control over the method for calculating and presenting the progress of projects and their related financial impacts. Samjong KPMG notes that: "Therefore, due to exposure to the risk of overstatement of revenue due to error in judgment or intent, we

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[2] Asian Corporate Governance Association (ACGA), CG Watch 2018: Hard decisions, December 2018.
[3] Accountancy Age, Changing auditors: switch hitch, 14 December 2006.
[4] Doosan Heavy, Audit Report 2014-2018.
[5] IFAC, International Standard on Auditing (ISA) 701 (NEW), Communicating Key Audit Matters in the Independent Auditor's Report, 14 January 2015.

identified the recognition of revenue under the input method as a key audit matter".[6]

Samjong KPMG's intentions are clear. While using language is not dissimilar to disclosures for other Korean companies, Samjong KMPG highlights the 18 specific steps that KPMG took to verify both the data and the methodology used by Doosan Heavy in arriving at their reported revenue and trade receivables.

Why is this language so complex and sensitive? The answer is that both accounting items are essentially estimates. Under accrual accounting norms, these numbers do not necessarily relate to cash that actually changes hands or realized profit. That is meaningful at a time when Doosan Heavy would be expected to be very focused on converting receivables to cash and winning new projects that can generate the cash needed to pay lenders.

The KAM statement offers up three clues about areas that Samjong KPMG focused on in 2018. New language in the statement related to revenue recognition indicates they assessed the "appropriateness of the estimation of penalty for delay" and tested certain internal controls related to the recoverability of trade receivables. Both items could relate to the valuation of amounts that may be affected by disputed project payments.

Of note, Samjong KPMG also states they sent "confirmation letters to major customers". Presumably the intent here would be to provide independent verification of contract terms and amounts that may be recovered. It should be noted, however, there is no indication that responses to these letters were actually obtained, as was similarly the case in Samjong KPMG's audit of South Korean steel-making company POSCO's 2018 results.[7]

The Accounts Show Stress Not Strength

Samjong KPMG's carefully written audit opinion can be read as a health warning, but in many ways, it is simply a curtain raiser for financial analysts.

Although Doosan Heavy's high-level corporate messaging has been almost consistently optimistic with frequent references to its nascent efforts to gain a foothold in clean power technologies,[8] its financial health has remained inextricably linked to a high-risk pipeline of domestic and developing market fossil fuel projects.

The company's slow motion transition plan began to become unstuck in 2017 when South Korea joined their global peers in recalibrating their high dependence on an aging nuclear power fleet and inaugurated a new focus on the renewable energy options that are now re-shaping global power markets.

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[6] Doosan Heavy, Consolidated Financial Statements, December 31, 2018 and 2017, p 3.
[7] POSCO, Audit Report 2018 and 2019, 2018, p 7.
[8] Doosan Heavy, Green Energy, accessed 2019, and Doosan Heavy, Integrated Solutions for a Better Life, 2016 (see p. 8 for comments on "eco-friendly" plans).

The shift robbed Doosan Heavy of its protected pipeline of profitable domestic projects and forced the company into direct competition with Chinese and Japanese equipment providers for an assortment of projects in Southeast Asia and the Middle East.

The damage to Doosan Heavy's financials has been significant, underscoring the company's compromised fundamentals.

The damage to Doosan Heavy's financials has been significant. The company has not reported a profit since 2013.

The company has not reported a profit since 2013 and has reported a non-stop string of losses totalling more than KRW 2.6 trillion (USD 2.1 billion) despite its heavy reliance on an array of financial and accounting moves and annual restatements.

Not only is the company struggling with a structurally unprofitable business model, it faces existential questions about how its funding needs can keep pace with the investment required to develop distinctive clean technology solutions that fast-growing Asian power markets will reward.

Table 1: Doosan Heavy Income Statement (2014-2018)

Income Statement KRW million	2014	2015	2016	2017	2018
Total Revenue	17,971,644	14,470,550	13,952,279	13,841,326	14,761,064
Cost of Revenue, Total	14,903,360	12,283,243	11,526,074	11,390,013	12,191,489
Gross Profit	3,068,284	2,187,307	2,426,205	2,451,313	2,569,575
Operating Income	856,313	(421,521)	667,365	854,619	942,013
Operating Margin	4.8%	-2.9%	4.8%	6.2%	6.4%
Interest Inc.(Exp.),Net-Non-Op., Total	(874,496)	(943,317)	(625,377)	(186,196)	(556,547)
Gain (Loss) on Sale of Assets	41,565	(2,592)	2,619	(1,427)	(7,362)
Other, Net	(228,442)	(245,256)	(288,906)	(536,127)	(483,333)
Net Income Before Taxes	(205,060)	(1,612,685)	(244,298)	130,869	(105,229)
Provision for Income Taxes	(104,805)	131,052	133,105	173,006	219,872
Net Income After Taxes	**(100,255)**	**(1,743,737)**	**(377,404)**	**(42,137)**	**(325,101)**

Source: Thomson Reuters, adjusted for restatements affecting reported results for 2014, 2015, 2016, 2017, and 2018.

Doosan Heavy's financial challenges reflect the company's focus on the power and infrastructure business, both domestically in South Korea and globally where they sell both power equipment and water treatment units and provide engineering services that include overseeing large scale construction projects. Key subsidiaries include Doosan Infracore and Doosan Engineering & Construction. The company had a heavily leveraged balance sheet, with a net debt to equity ratio of 267% excluding minorities, at the end of 2018.

In table 2 below, some key features of Doosan Heavy's financial operations stand out. Highly reliant on project revenues which are typically reported on a percentage of completion basis, the company's quarterly results demonstrate some key stress points that define the company's financial fragility.

Despite the optically steady revenue profile each quarter, the company's reported net profit has tended to weaken and then turn into a loss in the 4th quarter of each year. The deterioration of the operating margin started at the gross margin level as costs ate into revenues and were then aggravated by a seemingly regular pattern of higher year-end non-operating expenses. The largest of these expenses in the fourth quarter of 2018 were write-offs for other bad-debt expenses of KRW 346 billion (USD 285.2 million).

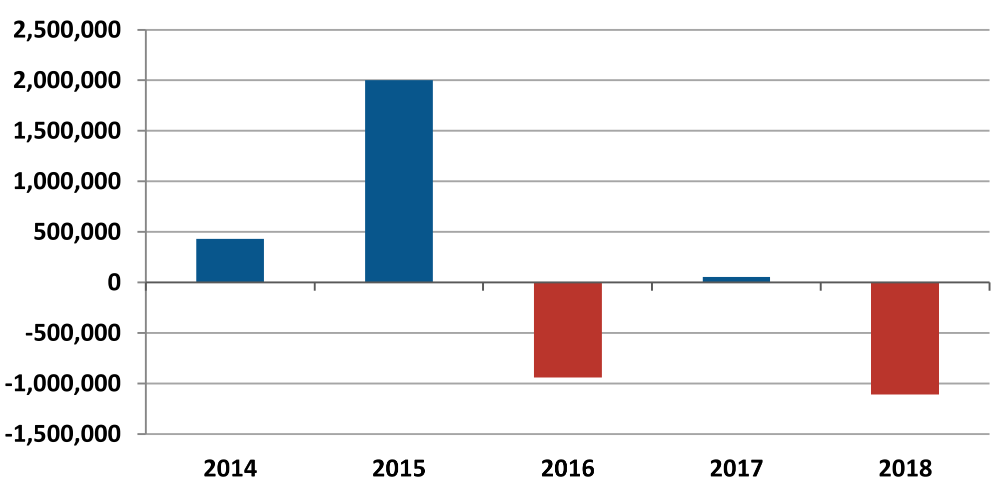
Table 2: Doosan Heavy Quarterly Results (2015-1H2019)

Doosan Heavy Quarterly Results (2015-1H2019)											
KRW m	**2015**	**2016**	**2017**	**2018**	**2019**	**Operating Margin**	**2015**	**2016**	**2017**	**2018**	**2019**
Q1	3,599,104	3,198,063	3,273,463	3,573,712	3,828,733	**Q1**	3.1%	7.0%	7.1%	8.5%	8.4%
Q2	3,735,404	3,598,417	3,630,110	3,833,352	3,977,645	**Q2**	4.4%	7.3%	8.3%	9.5%	9.7%
Q3	3,419,823	3,074,412	3,301,269	3,387,503		**Q3**	0.5%	5.1%	5.9%	6.2%	
Q4	3,716,219	4,081,387	3,636,484	3,966,497		**Q4**	n.m.	3.8%	5.1%	3.1%	
FY	14,470,550	13,952,279	13,841,326	14,761,064		**FY**	n.m.	5.7%	6.6%	6.8%	
Net Profit						**Other Non-Operating Expenses**					
Q1	(106,018)	72,877	44,220	49,680	55,151	**Q1**	(38,702)	(28,594)	(52,012)	(68,798)	(30,172)
Q2	(56,234)	46,825	(23,673)	100,754	162,744	**Q2**	(51,240)	(65,573)	(77,264)	(47,319)	(47,476)
Q3	(389,735)	4,522	16,775	56,347		**Q3**	(109,897)	(26,092)	(58,889)	(29,868)	
Q4	(1,191,750)	(501,628)	(79,459)	(531,882)		**Q4**	(701,748)	(468,840)	(208,827)	(451,676)	
FY	(1,743,737)	(377,404)	(42,137)	(325,101)		**FY**	(901,587)	(589,099)	(396,992)	(597,661)	

Source: Thomson Reuters.

To get a better understanding of Doosan's troubled state of affairs, it is useful to take a careful look at three core operating fundamentals: the order book, the consolidated cash flow, and its financing patterns.

Figure 1: Doosan Heavy's Net Change in Order Book (KRW millions)



Source: Doosan Heavy reports, IEEFA.

Doosan's financial outlook is critically dependent on its ability to match its equipment and engineering, procurement and construction (EPC) capabilities to a fast-changing and highly competitive market. While power equipment and EPC work has traditionally driven the company's revenues and cash flow, the group also has companies that pursue water infrastructure, mass transit, and housing construction projects.

The drought in Doosan Heavy's order book will almost certainly translate into increasingly weak revenues.

Despite the combined capabilities of the group, the company's recent track record raises necessary questions about whether the order book is in structural decline, having seen a net decline of KRW2.0 trillion (USD 1.7 billion) since 2016. For Doosan Heavy, the drought in the order book will almost certainly translate into increasingly weak revenues.

Based on IEEFA's review of the company's disclosure on major projects, the most significant high-profile projects in its project pipeline have now reached completion. This increases pressure on management to find a replacement for significant projects such as the 2800 megawatt (MW) Rabigh power plant in Saudi Arabia, the 1200MW Vinh Tan 4 coal power project in Vietnam, and the 1509MW Fadhili combined heat and power plant in Saudi Arabia.

The worrying state of the order book helps explain Doosan Heavy's increasingly aggressive pursuit of coal-fired power projects in countries such as Vietnam and Indonesia where they must rely on generous taxpayer-supported export credit agency (ECA) finance to find a way into highly competitive projects. It also explains why Doosan Heavy is increasingly assertive in talking up high value coal EPC projects in their pipeline, like the 2x1000MW Jawa 9 & 10 project in Indonesia and the 1320MW Van Phong 1 project in Vietnam which they estimate to be worth as much as an KRW 2.1 trillion (USD 1.8 billion) combined.[9]

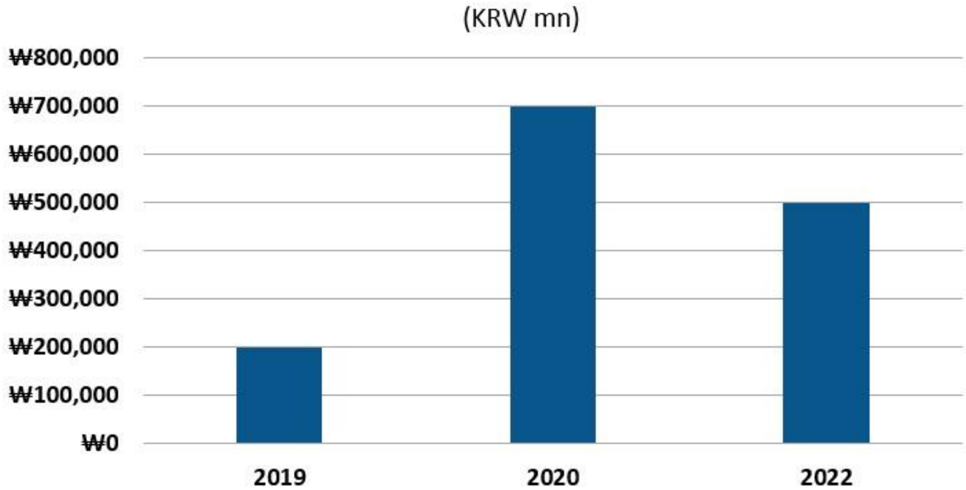
The company's urgent need for new business is no surprise.

Without revenue momentum, the cash picture and the company's ability to service its debt becomes a critical problem. Cash flow analysis is a crucial cross-check to see whether a company's reported losses are mirrored by similar problems in generating cash. This is particularly true when, like Doosan Heavy, the company's highly leveraged balance sheet is already under pressure.

Doosan Heavy needs to be positioned to refinance KRW 1.2 trillion (USD 1.0 billion) in the next 2.5 years.

[9] Doosan Heavy, '19 1Q Results Review, April 2019.

Figure 2: Doosan Heavy's Debt Maturities 2019 - 2022



Source: Thomson Reuters.

This is where the cash picture begins to get murky. While it is obvious that Doosan's set-up does not support profitable operations, the company has employed a range of strategies to keep the optics of its leverage and cash flow situation steady.

The key to Doosan's survival has been the sale of its stake in Doosan Bobcat. Not only did this significantly boost cash flows from investment in 2016, it made it possible for Doosan Heavy to meet some pressing bond maturities.

Table 3: Doosan Heavy Operating Cashflow Analysis (2015-1H2019)

Operating Cashflow Analysis KRW m	EY 2015	Deloitte 2016	KPMG 2017	KPMG 2018	Unaudited 1H 2019
Operating cashflow					
Net income (loss)	-1,750,899	-215,525	-109,688	-421,725	240,301
Adjustments	**2,796,808**	**1,667,515**	**1,927,881**	**1,977,141**	**743,941**
Changes in operating assets and liabilities	-479,968	39,886	-902,981	-76,278	-1,328,015
Cash from operating activities	**565,941**	**1,491,876**	**915,212**	**1,479,138**	**-343,773**
Interest received	41,863	39,863	48,820	44,527	17,534
Interest paid	-576,554	-495,762	-450,279	-441,770	-194,956
Dividends received	1,716	304	2,418	2,528	1,273
Income tax paid	-107,338	-68,714	-86,846	-94,863	-75,865
Net cash flows provided by (used in) operating activities	**-74,372**	**967,567**	**429,325**	**989,560**	**-595,787**
Cash inflows from investing activities	842,311	1,970,231	529,248	495,302	333,962
Cash outflows from investing activities	-1,222,027	-1,165,464	-986,385	-1,288,270	-657,238
Net change in investing cashflow	-379,715	804,767	-457,137	-792,968	-323,276
Total change in financing cashflow	1,058,645	-2,251,619	703,612	-110,116	377,070
Effect of exchange rates on cash	-9,110	-41,177	-78,198	18,705	41,444
Change in cash	**595,448**	**-520,463**	**597,602**	**105,182**	**-500,549**
Cash at beginning of year	**1,297,560**	**1,893,008**	**1,372,545**	**1,970,147**	**2,075,329**
Cash at end of year	**1,893,008**	**1,372,545**	**1,970,147**	**2,075,329**	**1,574,780**
Total of unusual adjustments	**1,413,280**	**326,650**	**709,608**	**724,173**	**98,998**
Unusual items as a % of adjustments	**50.5**	**19.6**	**36.8**	**36.6**	**13.3**

Source: Doosan Heavy Audited Accounts (2015-2018) and Unaudited 1H 2019 Accounts, IEEFA estimates.
Note: IEEFA defines unusual or less common adjustments as those relating to valuation, bad debt, and impairment losses, FX, warranties, valuation gains, and "others". Larger items highlighted in blue.

IEEFA's examination of the details of Doosan Heavy's cash flow statement shows that some unusual items are behind the company's surprisingly stable operating cash position, highlighted in table 3 above. While the pressure on financing stands out, it is important to note how reliant Doosan Heavy is on the "adjustments" item (highlighted in blue in table 3) to support operating cash flows.

Normally, the three most common adjustments to operating cash flow are non-cash items including interest expense, depreciation, and amortization.

In Doosan Heavy's adjustments[10] however, management restates other less common items from the income statement using their estimates for the cash value of items such as bad debt and impairment losses, the treatment of foreign exchange, warranties, and valuation gains and losses. From an analyst's perspective, this suggests that Doosan Heavy's financial management strategies have become quite complex despite the company's continued commitment to its traditional core businesses.

[10] See Note 35 in Doosan Heavy's 2018 accounts and Note 36 in the 2015-2017 accounts for details on adjustments, in Doosan Heavy, Audit Report 2007 – 2018.

The net effect for Doosan Heavy is that a number of relatively opaque items are playing a key role in the adjustments line. In 2017 and 2018, items that IEEFA found as usually being particularly dependent upon management and auditor judgment account for 36.7% of the adjustments. This matters because the value of these unusual adjustments totalled KRW 3.3 trillion (USD 2.7 billion) since 2015 and could have been crucial to delivering positive operating cash flow in 2017. This may be one reason why Samjong KPMG devoted extra time to the analysis of how management has handled expected credit losses, as discussed in the Key Audit Matters section in this report.

Table 4: Doosan Heavy Cashflow Adjustments (2015-1H2019)

Adjustments KRW m	EY 2015	Deloitte 2016	KPMG 2017	KPMG 2018	Unaudited 1H 2019
Interest expense	630,155	518,020	503,226	515,983	257,258
Depreciation and amortization	585,480	532,258	513,111	499,052	254,138
Income tax expense	167,893	290,587	201,936	237,933	133,547
Losses from bad debt expenses	606,287	234,846	174,283	411,378	5,933
Losses from valuation of assets	517,977	299,560	387,054	171,422	179,444
Losses from impairment	398,630	265,525	43,930	59,647	346
Severance payment and retirement benefits	148,379	126,093	117,217	109,806	52,357
Net loss (gain) on foreign currency translation	184,580	45,645	-140,586	47,507	48,633
Provision of warranties (reversal)	28,230	-13,949	323,342	67,524	6,061
Gains on valuation and derivatives	-440,039	-286,990	-238,499	-173,441	-188,963
Others	-30,764	-344,080	42,867	30,330	-4,813
Total adjustments	**2,796,808**	**1,667,515**	**1,927,881**	**1,977,141**	**743,941**
Total of first three usual adjustments	1,383,528	1,340,865	1,218,273	1,252,968	644,943
As a % of adjustments	49.5	80.4	63.2	63.4	86.7
Total of unusual adjustments	1,413,280	326,650	709,608	724,173	98,998
Unusual adjustments % of total	50.5	19.6	36.8	36.6	13.3

Source: Doosan Heavy Audited Accounts, IEEFA estimates.
Note: IEEFA defines unusual adjustments as valuation, bad debt, and impairment losses, FX, warranties, valuation gains, and "others". Larger items highlighted in blue.

What does this mean in practical terms?

Essentially, Doosan has been reporting higher cash by capturing the apparent difference between the way a number of items were valued in the income statement and how they were presented in the cash flow statement.

As a result, Doosan Heavy's cash flow statement, which should be the gold standard when it comes to judging the sustainability of a company's operations, may be more vulnerable to estimation errors and less robust than would normally be expected. If some of these valuation-sensitive adjustments do not represent actual cash, it is possible that the company's financial burden could be higher than reported.

Table 5: Doosan Heavy Investing and Financing Cashflow (2015-1H2019)

Investing and financing cashflow KRW m	EY 2015	Deloitte 2016	KPMG 2017	KPMG 2018	Unaudited 1H 2019
Decrease in short term financial instruments	202,204	297,899	28,514	62,614	73,491
Sale of business unit	128,317	1,154,822	0	0	0
Others	511,791	517,511	500,733	432,688	260,471
Total cash inflows from investing activities	842,311	1,970,231	529,248	495,302	333,962
Acquisition of plant property and equipment	-388,748	-290,903	-277,269	-231,414	-191,462
Acquisition of intangible assets	-253,852	-248,694	-277,895	-309,784	-148,709
Others	-579,427	-625,868	-431,221	-747,072	-317,067
Total cash outflows from investing activities	-1,222,027	-1,165,464	-986,385	-1,288,270	-657,238
Net change in investing cashflow	**-379,715**	**804,767**	**-457,137**	**-792,968**	**-323,276**
Net increase (decrease) in short term borrowings	1,172,996	-865,054	941,740	-836,548	516,456
Net increase (decrease) in long term borrowings	-1,607,294	-1,940,439	-1,999,145	-80,833	-1,052,463
Net change in asset backed loans	91,069	31,214	105,982	180,531	92,500
Net change in bonds	664,499	614,447	2,128,041	542,740	412,471
Net change in treasury stock	-9,998	147,892	0	-135	0
Net change in hybrid securities	0	0	-475,775	-345,431	0
Net change in shares of subsidiaries	916,678	-91,903	118,324	463,549	476,565
Total dividends	-169,725	-147,808	-115,668	-65,636	-42,077
Others	421	32	113	31,647	-26,382
Total change in financing cashflow	**1,058,645**	**-2,251,619**	**703,612**	**-110,116**	**377,070**

Source: Doosan Heavy Audited Accounts, IEEFA estimates.

Doosan Heavy's reliance on adjustments to support the company's cash metrics is just one element of the company's cash puzzle.

Over the past three years, the company has turned to different sources of cash for financing each year. As noted, in 2016, Doosan plugged the hole by raising KRW 1.2 trillion (USD 954 million) from the listing of Doosan Bobcat. In 2017, still benefitting from the 2016 balance sheet clean up, the company turned to the bond market raising net KRW 2.1 trillion. In 2018, the story was different again, with the company relying on a mix of bond financing, asset back loans, and selling shares in subsidiaries.

In 2019, the pressure on Doosan Heavy rose as the company's poor 2019 outlook triggered alarm, particularly for subsidiary Doosan Engineering & Construction. To solve the problem, Doosan Heavy was forced to do a KRW 417.8 billion rights issue in March 2019 to inject cash into its subsidiary, effectively putting a floor under ballooning accounts receivables. This under-subscribed rights issue was interpreted negatively by the stock market when it was announced in late February, resulting in a 27.1% decline for the shares in that month.[11]

[11] Daishin Securities, Massive Rights Issue Planned, 21 February 2019 via Thomson Reuters.

Typically, companies only take a step to recapitalize a subsidiary when they are committing to formal steps to restructure and address fundamental strategic issues.

In Doosan Heavy's case, problems in the marketplace and pressure on the balance sheet are intertwined. Moreover, weakness in the power equipment market globally is now a recurring theme due to the shift toward renewables. Many Korean market analysts may have failed to appreciate this given Doosan's optimism about overseas project wins.

Table 6: Doosan Heavy Debt Ratios (2017-1H2019)

Doosan Heavy Debt Ratios	KPMG 2017	KPMG 2018	Unaudited 1H 2019
Assets / equity	7.37	8.85	7.55
Total liabilities / equity	543%	663%	548%
Debt / capital	327%	382%	314%
Net debt / equity	269%	308%	267%
Cash and ST investments	2,341,785	2,503,297	2,107,194

Source: Doosan Heavy Audited Accounts, IEEFA estimates.

Note: Ratios exclude minority interests.

As discussed above, Doosan Heavy is a company that, in recent years, has had a pattern of reporting better performance in the first half of the year, with negative surprises tending to come in the final quarter.

So far this year, the company's financing efforts have been focused on paying down long-term borrowings. This is a crucial task for Doosan.

IEEFA estimates that the current portion of long-term debt now accounts for 60% of total debt, signalling the need for continued efforts to raise new sources of funding in light of negative operating trends. And although the debt ratios improved slightly in the first half of the year, underlying cash flow trends were negative, suggesting that the positive trend for debt ratios could reverse if markets prove unreceptive through to the end of the year.

Table 7: Doosan Heavy Bonds by Type (2015-1H2019)

Bonds by Type KRW m	31-Dec-18 interest rate	EY 2015	Deloitte 2016	KPMG 2017	KPMG 2018	Unaudited 1H 2019
Public subscription bonds	2.38 - 5.37	2,532,788	1,802,434	1,422,724	1,007,860	1,284,080
Private subscription bonds (PPE as collateral)	4.50 - 6.03	340,000	405,000	445,000	332,000	263,000
Convertible bonds	3.20 -	311,112	152,630	6,265		
Bonds with stock warrants	1.00 - 4.00		143,423	1,286,218	1,224,770	1,076,755
Foreign currency bonds (KEXIM and Kookmin guarantee)	2.13 - 5.19	585,599	737,185	640,590	686,994	671,107
Subtotal		3,769,499	3,240,672	3,800,797	3,251,624	3,294,942
Add: Redemption premium			30,658	131,761	123,208	110,610
Less: Exchange rights adjustment			-27,522	-234,115	-184,365	-153,765
Less: Current portion of long-term bonds		-1,321,578	-1,465,158	-1,057,349	-1,109,493	-1,419,217
Less: Discount on bonds		-15,993	-24,959	-41,027	-27,941	-19,878
Long-term bonds		**2,431,928**	**1,753,691**	**2,600,067**	**2,053,033**	**1,812,692**
Short-term bonds as disclosed in Balance Sheet		**1,321,578**	**1,465,158**	**1,057,349**	**1,109,493**	**1,419,217**
Total bonds		**3,753,506**	**3,218,849**	**3,657,416**	**3,162,526**	**3,231,909**
% guaranteed by KEXIM and Kookmin		15.6	22.9	17.5	21.7	20.8

Source: Doosan Heavy Audited Accounts, IEEFA estimates.

One final aspect of the company's funding picture deserves close attention.

The mix of debt on the balance sheet has been shifting toward shorter term debt, rising KRW 1.0 trillion to KRW 6.3 trillion (USD 5.2 billion) at the end of the first half of the year. This is a shift that could be expected to raise refinancing pressures as well as questions about the company's ability to continue to find funding in volatile market conditions.

It is also notable that Doosan Heavy's reliance on funding provided with guarantees from KEXIM and KB Kookmin Bank is a significant and rising portion of the company's bond exposure.

Equity and Bond Analysts Are Waving a White Flag

The financial market's lack of confidence in Doosan Heavy's business prospects has been impossible to ignore as the shares have crumbled over the past two and half years.

Since the beginning of January 2017, Doosan Heavy shares have fallen 75.1% with the final sharp decline taking place earlier this year after the company announced the rights issue. Based on the closing price as of 2 September 2019, Doosan Heavy's market capitalization was KRW 1.2 trillion (USD 1.0 billion), a market value that makes it hard to easily compare the company to its preferred global power equipment peer group.

Figure 3: Doosan Heavy 5-Year Share Price Performance 2014 - 2019

Source: Thomson Reuters data.

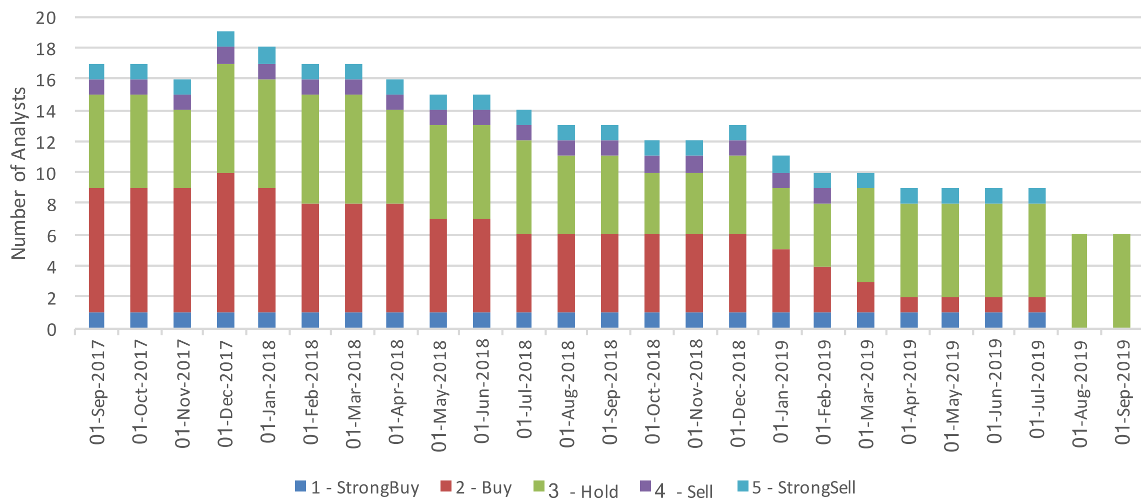
As Doosan Heavy's financial distress has become apparent, the equity and bond rating communities have adopted a defensive posture that is familiar to investors and capital market traders in Asia.

Equity analysts, who often prefer to be positive in print, have beat an orderly group retreat since the beginning of 2019. The reality of Doosan Heavy's strategic challenges has been confirmed by weak results and problems in Doosan Heavy's target markets have become more evident.

Equity analysts' ratings once featured a spread of views with a sprinkling of valuation-based buy ratings. In December 2018 however, sentiment shifted, and the buy ratings began to dwindle before vanishing completely by August 2019.

In the meantime, the shrinking pool of analysts covering Doosan Heavy have adopted nuanced hold ratings despite cutting target prices by 36.1%, a step that implies limited confidence in the company's growth prospects and valuation. The cost to investors has been huge over the past 12 months as conflicted analysts were missing in action, while the shares underperformed the KOSPI market index by 61.4%.

Figure 4: Doosan Heavy – Analyst Ratings



Source: Thomson Reuters.

A similar retreat is evident from the domestic credit rating agencies. IEEFA's review of available reports suggests they have been more active in responding to Doosan Heavy's apparent distress.

Korea Investors Service (KIS) which is owned by Moody's, and Korea Ratings which is controlled by Fitch, have been backing away from supportive ratings for Doosan Heavy's debt over the past six months. The most recent blow came in May when both ratings agencies cut their ratings to BBB with a negative outlook—a rating just one notch above non-investment grade.[12]

The May KIS report is notable for its carefully structured assessment of the mis-match between Doosan Heavy's current cash generation potential and pressing cash obligations. The report raises concerns that the revenue potential of the company may not be sufficient to permit the company to stabilize its financial structure.

The lack of confidence in Doosan Heavy's outlook could be read as a warning for Doosan management and potential customers given the size of the 2020 bond maturities.

Project Wins Do Not Equal Cash

One of the most important issues to consider as Doosan Heavy works to stabilize its financials is that, despite clear signs of financial pressure, the company continues to conduct its public affairs as if their product and service offerings remain a good fit for its target markets—and that those markets are healthy.

[12] The Korea Times, Doosan Corp., Doosan Heavy hit with ratings downgrade, 13 May 2019 and Korea Ratings, accessed June 2019.

A careful reading of recent press announcements and the company's regular investor briefings material is filled with positive suggestions of new projects that could return the company to good health.[13]

Unfortunately for investors, there remain many good reasons to be cautious.

It is noticeable that Doosan Heavy's regular investor disclosure includes assertive statements about new project wins that do not necessarily provide a realistic picture of the risks that continue to surround their target markets or their project pipeline.

With cash flow a critical concern, the timing of project wins and actual commencement, as well as the likely margin, must be evaluated with great care. This is where Doosan's disclosure record is not entirely reliable. In presentations prepared in April and July 2019 for investor relations purposes, the company claimed that it had "secured' the Van Phong 1 and Jawa 9 & 10 projects.

To assess how these projects will affect Doosan Heavy's financial situation, however, more details are required. For example, to forecast the pace of cash conversion, it is important to know that a project win may not be the measure of whether a project will progress and immediately generate cash in 2019. The key issue is whether all of the approvals are in place and whether the project has been financed. In the case of Van Phong 1, both steps have now been achieved[14] and analysts should feel reassured near-term.

Many global and regional banks have already signalled their intention to step back from lending to new coal projects in developing countries.

That is not the case with Jawa 9 & 10, however. For the Jawa 9 & 10 project, the key decision-maker will be KEXIM. Without KEXIM's funding umbrella and insurance, the banks that have indicated a willingness to fund may drift away. Many global and regional banks have already signalled their intention to step back from lending to new coal projects in developing countries such as Indonesia. This makes them sensitive to questions about the governance of projects like Jawa 9 & 10 which has attracted controversy due to questions about the approval process for the project at a time when the top management of Indonesia's state-controlled power company, Perusahaan Listrik Negara (PLN), may not have been acting in the public interest.[15]

For example, there may be questions to consider about the suitability of Barito Pacific, the 49% owner of the project, as a de facto project sponsor. Although the company has long been active in the resources and chemical sectors, it lacks a track

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[13] Doosan Heavy, IR Materials, 2011 – 2019.
[14] JBIC, Project Finance for Van Phong 1 Coal-Fired Power Generation Project in the Republic of Vietnam, 19 April 2019.
[15] The Jakarta Post, KPK completes investigation into Sofyan Basir over Riau-1 power plant, 11 June 2019.

record in the thermal power industry. The company has, however, recently emerged as a major player in geothermal power via subsidiary Star Energy. This raises the possibility that Barito Pacific's various interests could raise the bar on due diligence for funders, especially given Star Energy's dependence on PLN for the approvals needed to expand their geothermal fleet.

Funders should be alert to persistent risks on the ground concerning high profile environmental and health issues associated with coal-fired power projects like Jawa 9 & 10. In a recent Korean court case, questions have been raised about the impact of the project on local Indonesian residents in Java. A petition for a preliminary injunction was filed in Seoul Central District Court in late August, seeking to stop Korean public financial institutions such as KEXIM, KDB, and Korea Trade Insurance Corporation (K-Sure) from funding Jawa 9 & 10.[16]

In addition to the risks associated with Jawa 9 & 10, there are issues associated with other Indonesian projects in Doosan Heavy's pipeline that may deserve careful review.

Doosan Heavy announced on September 9th that they won a contract valued at KRW 120 billion (USD 99.2 million) to supply generating equipment by 2023 for a 110MW coal power unit in Sulawesi.[17] On the face of it, this should be good news for Doosan Heavy. It is noteworthy, however, that the Palu 3 project has previously faced questions about environmental compliance issues—something that could slow project implementation if the issues have not been adequately addressed by the project sponsor.[18]

There are issues associated with Indonesian projects in Doosan Heavy's pipeline that may deserve careful review.

These project wins, and Doosan Heavy's stated optimism about future prospects in Indonesia, are coming at a sensitive time.

PLN's leadership is currently in transition and the August blackout in Java has heightened political sensitivity about PLN's ability to improve its operational performance. This is not a small matter for PLN given ongoing questions about the lack of transparency around planning and procurement decisions.[19]

These problems have the potential to raise risks for Korean companies seeking to do business with PLN, especially at a time when a company such as Hyundai Engineering & Construction has been in the spotlight due to an admission of

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[16] The Korea Herald, Indonesians seek injunction in Seoul to stop coal-fired plants, 29 August 2019.

[17] Pulse, Doosan Heavy clinches $100.6 mn parts supply order for Indonesian power plant, 9 September 2019.

[18] Sourcewatch, Palu power station, accessed June 2019.

[19] The Jakarta Post, Jokowi disappointed at PLN crisis management, 5 August 2019.

corruption related to the Cirebon 2 coal-fired power project in West Java, Indonesia.[20]

Who Will Pay the Risk Penalty for Business as Usual Due Diligence?

The complexities of analysing Doosan Heavy's project pipeline offer an object lesson concerning the level of professional scepticism needed when monitoring debt-heavy companies in industries that are in the throes of transition. This is something that auditors are expected to apply in the case of companies like Doosan Heavy in order to ensure that investors can count on the company's financial disclosures.

The red flags detailed in this report are a powerful reminder of the importance of the critical legal and regulatory fundamentals that underpin a company's ability to access regulated public markets. This matters because, although the Doosan Group is a venerable Korean chaebol with a well-connected controlling shareholder, the financial problems the company now faces cannot be solved easily, even by the powerful Ministry of Trade Industry and Energy (MOTIE) which oversees the Korean power sector.

The financial problems Doosan Heavy now faces cannot be easily solved.

Many of Doosan Heavy's problems reflect the upheaval taking place in global power markets. Any indication that the company is over-reliant on short-term funding to paper over long-term strategic failings naturally raises questions about whether Doosan Heavy can be expected to meet its obligations to customers, its employees, or the market. The financial cost of strategic competition between power equipment companies from North Asia's heavy-weight markets is not something that markets can ignore.

This means that policymakers should take heed that leading investors may continue to question how much risk they are willing to take in this troubled sector. When company fundamentals are also in doubt, the risk to policymakers overseeing complicated credit decisions may be higher.

Important national funders such as KEXIM and KDB would also be well advised to ensure that Doosan Heavy's financial reporting and disclosure practices are aligned with the standards expected by relevant financial regulators.

Not every red flag is a danger sign, but good investors know when to push for answers to hard questions.

[20] The Korea Times, Hyundai admits bribing Indonesian politician for power plant construction, 2 May 2019.

About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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