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The Role of Internally Financed Capex in Rising Chinese Corporate Debts

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Abstract

This paper aims to identify potential drivers behind China's rising corporate leverage, using an international aggregate panel dataset. We find strong evidence of significantly negative effects of the internally financed share of capital expenditure on the change of corporate debt/GDP: a rise in internally generated funds relative to gross capital formation consistently slows corporate debt buildup. While our core finding is robust to choices of benchmark models, control variables and data samples, this negative effect appears more pronounced in China's case. Our regressions also suggest more important roles played by real economic factors than monetary factors. While the investment rate contributes to rising corporate debt, a higher saving rate dampens corporate leveraging. Finally, we present some evidence of consistently negative impacts of government debt on corporate leveraging, suggesting possible interactions between corporate and government debts. Overall, our empirical evidence points to the declining

investment efficiency as a possible important driver behind China’s high and rising corporate leverage, in light of its high investment rate and low internally funded capex ratio.

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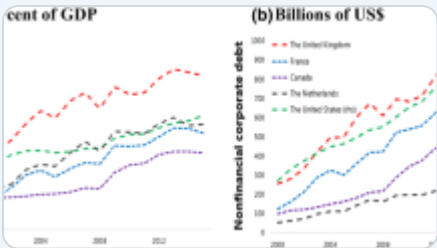
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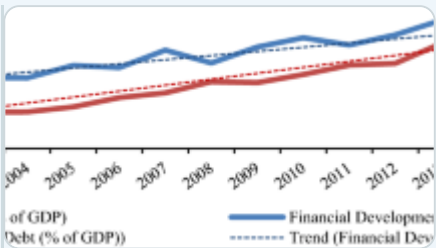
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1. During 2008–2018, the Chinese household debt rose much faster than the corporate debt, yet starting from a very low base of below 20% of GDP in 2008, compared to almost 100% for the corporate debt then. Meanwhile, the Chinese corporate debt rose at a somewhat faster pace than that of the earlier decade, accounting for more than half of the climb in the country’s overall debt/GDP ratio since the global financial crisis.
2. An alternative to our indicator of the share of internally financed capex would be the operating cash flow to capex ratio, to measure the financial autonomy of a firm (Alexandre and Charreaux [2004](#)). Such an indicator is typically derived from firm-level data: a potential future research topic.
3. IMF has provided its own estimate of China’s augmented fiscal deficit, mostly by taking into consideration debt issued by LGFVs. However, their estimate of augmented debt is only available since 2012 and its methodology can be debated (IMF [2017](#)).
4. The estimation results under benchmark estimation Eqs. (B), (C) and (D) are quite similar and will not be reported in the paper.
5. The potential weakness of the difference-GMM estimator is that lagged levels are often rather poor instruments for first-differenced variables. The system-GMM estimator includes lagged levels as well as lagged differences (Arellano and Bover [1995](#); Bond et al. [2001](#)).

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Appendices

Appendix A: Variables definitions and data sources

Corporate debt	Credit to non-financial corporations from all sectors at market value in percentage of GDP. Data sources: BIS, OECD and IMF
Internally funded corporate capital expenditure	Ratio of corporate earnings to gross capital formation of non-financial corporates. Corporate earnings defined as disposable income of non-financial corporates adjusted for the net acquisition of non-financial assets. Data sources: OECD, and authors' calculation
Government debt	Credit to general government from all sectors at market value in percentage of GDP except Argentina, Brazil, China, Indonesia, India, Mexico, Russia, Saudi Arabia and South Africa and emerging markets (as a whole) for which we use the only available nominal values in percentage of GDP instead. Data sources: BIS, OECD and IMF
Crisis	Dummy variable of the global financial crisis. Two alternatives: (1) crisis 0810 takes value 1 for the crisis period of 2008–2010, and 0 otherwise (Moore and Mirzaei 2016). (2) crisis 0716 is given by the indicator function $I = 1$ if $t \geq 2007$ (Cheung et al. 2018)
China	Dummy variable for China. It takes value 1 for all period of China, and 0 otherwise

GDP growth rate	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates of GDP are based on constant 2010 US dollars. Data source: World Bank WDI (NY.GDP.MKTP.KD.ZG)
GDP per capita in purchasing power parity (PPP)	Gross domestic product measured in purchasing power parity and divided by midyear population. Data are in constant 2011 international \$. Data sources: World Bank WDI (NY.GDP.PCAP.PP.KD)
Saving rate	Gross domestic savings in percentage of GDP. Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption). Data sources: World Bank WDI (NY.GDS.TOTL.ZS)
Investment rate	Gross capital formation in percentage of GDP. Data sources: World Bank WDI (NE.GDI.TOTL.ZS)
Industry, value added	Industry, value added in percentage of GDP. Data source: World bank WDI (NV.IND.TOTL.ZS)
Corporate debt to equity ratio	Ratio of corporate debt to total market capitalization of listed domestic companies in percentage of GDP. Market capitalization is the share price times the number of shares outstanding (all classes) for listed domestic companies, end of year values. Data sources: BIS, World Bank WDI (CM.MKT.LCAP.GD.ZS), and authors' calculation
Bond yield	Year-end 10-year government bond yield. Data sources: OECD and Bloomberg
Global growth rate	Annual percentage growth rate of GDP at market prices based on constant local currency and constant 2010 US dollars. Data sources: World Bank and OECD
G3 policy rate	Averaged policy interest rate of USA, Japan and Euro area. Lombard rate of Bundesbank is used for the euro area for the period from 1995 to 1998. Yearly averaged data and year-end data are both used. Data sources: BIS, St. Louis FED and Bundesbank
USDNEER	Nominal effective exchange rate of the US Dollar, based on a broad basket of trade partner countries. Annual average of monthly data or year-end monthly data. Data sources: BIS
USTIPS	Year-end US 10-Year Treasury Inflation (or Protected)-Indexed Securities yield, percent per annum. Measured as the difference between 10-year US government bond yield and 10-year US breakeven inflation rate, which represents a measure of expected inflation in the next 10 years. Data sources: Bloomberg
Expected USD	Expected effective appreciation of US dollar over the next 12 months. Measured as the ratio of the effective 12 M US dollar forward exchange rate to the NEER, based on a

Appreciation	narrow basket of trade partner countries. Annual average of monthly or daily data. Data sources: BIS and Bloomberg
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The debt statistics of BIS updated on December 10, 2018 has been accessed on December 20, 2018

List of countries (41)			
Australia	Estonia	Lithuania	Slovenia
Austria	Finland	Luxembourg	South Africa
Belgium	France	Mexico	Spain
Brazil	Germany	Netherlands	Sweden
Canada	Greece	New Zealand	Switzerland
Chile	Hungary	Norway	Turkey
China	Ireland	Peru	United Kingdom
Colombia	Italy	Poland	United States
Costa Rica	Japan	Portugal	
Czech Republic	Korea, Rep.	Russia	
Denmark	Latvia	Slovak Republic	

Appendix B: Descriptive statistics

Variable	Obs	Mean	SD	Min	Max

Variable	Obs	Mean	SD	Min	Max
Corpdebt	838	79.857	47.065	10.742	385.600
ΔCorpdebt	797	1.796	7.740	− 34.000	115.900
IFCE	790	0.917	0.343	− 0.323	2.925
GovDebt	872	54.410	35.560	4.700	214.300
ΔGovDebt	831	0.809	6.018	− 42.100	51.100
Growth	898	2.979	3.362	− 14.814	25.557
PPP	902	29,952.690	16,047.960	2564.071	97,864.200
ΔPPP	861	545.247	984.762	− 5801.609	11,919.720
Invest	902	23.586	5.126	9.819	47.686
Industry	887	26.780	6.011	10.671	47.559
ΔIndustry	846	− 0.187	1.112	− 6.005	13.116
Globalgrowth	902	2.955	1.297	− 1.734	4.448
USDNEER	902	107.353	9.619	90.561	124.537
ΔUSDNEER	861	1.417	5.427	− 7.423	12.912
G3Rate	902	1.603	1.292	0.142	3.667
ΔG3Rate	861	− 0.160	0.621	− 1.967	0.833

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Variable	Obs	Mean	SD	Min	Max
BondYield	713	4.905	3.918	− 0.135	78.090
Debt2Equity	833	2.704	3.988	0.116	60.789
USTIPS	779	1.769	1.343	− 0.765	4.257
Δ USTIPS	738	− 0.182	0.624	− 1.128	1.498
Saving rate	902	25.291	7.854	8.331	54.651
Expected USD appreciation	738	0.903	0.081	0.768	1.046

The descriptive statistics of the variables in first difference (Δ) are also reported for non-stationary variables

Appendix C: Unit root analysis

We perform three main panel unit root tests to ensure that all the variables included are stationary: the W t -bar test of Im et al. ([2003](#)) with the W_IPS statistic, the Fisher-type test of Maddala and Wu ([1999](#)) with the P-MW statistic and the Z test of Choi ([2001](#)) with Z_CHOI statistic. We run these three tests on two specifications: (1) series only with a constant; (2) series with both a constant and trend. Our rules of thumb are the following: we conclude with stationarity (or non-stationarity) if more than three of six statistics reject (don't reject) the null hypothesis of unit root; we conclude with trend stationarity if more than one test statistics out of three show stationarity with the specification of both constant and trend. For global factors that are the same for each country, we perform two unit root tests for times series: the KPSS test (Kwiatkowski-Phillips-Schmidt-Shin [1992](#)) and Ng-Perron test (Ng and Perron [2001](#)). We apply first KPSS test with the specification including a trend and constant. According to the significance of the trend, we proceed with KPSS test (LM-statistic) and Ng-Perron test (with MZa and MZt statistics) for the chosen specification (trend and constant/constant). We

conclude with stationarity (or unit root) if more than one statistics give the same conclusion of stationarity (or unit root). In sum, for both panel variables and the ones constructed with single time series (i.e., global factors), only the level is used for stationary variables while only the first difference is used for non-stationary variables and trend-stationary variable for precautionous reason.

Variable	W_IPS		P_MW		Z_CHOI		Decision
	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend	
Panel unit root tests							
CorpDebt	1.73162	0.79629	72.0376	83.2772	1.81649	1.43835	Non-stat.
IFCE	− 3.83248***	− 3.13355***	133.806***	142.369***	− 3.54595***	− 4.45349***	Stationary
Growth	− 12.0654***	− 9.63171***	297.905***	239.182***	− 11.5073***	− 8.93756***	Stationary
PPP	1.97683	0.61966	83.1302	72.6696	2.03109	0.96003	Non-stat.
Invest	− 3.77857***	− 4.97668***	128.441***	153.407***	− 3.77194***	− 4.52228***	Stationary
Industry	− 1.99771**	− 0.03233	112.574**	87.9366	− 0.43331	0.19980	Non-stat.
Debt2Equity	− 8.22439***	− 4.63829***	356.519***	162.966***	− 7.89897***	− 4.58199***	Stationary
BondYield	− 3.49761***	− 6.44322***	330.667***	142.168***	− 0.37257	− 3.84067***	Stationary
GovDebt	1.27889	0.09918	73.4323	91.3652	1.65731	0.56783	Non-stat.

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Variable	W_IPS		P_MW		Z_CHOI		Decision
	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend	
Saving rate	– 4.13477***	– 3.21125***	134.769***	123.604**	– 4.05120***	– 3.02592***	Stationary
Time series unit root tests	LM (KPSS)		MZa (Ng–Perron)		MZt (Ng–Perron)		
	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend	
Globalgrowth	0.163079		– 11.0561**		– 2.35112**		Stationary
G3Rate		0.056020		– 8.40132		– 2.00595	Non-stat.
USTIPS		0.112803		– 9.60162		– 2.10256	Non-stat.
USDNEER	0.105109		– 1.58485		– 0.65211		Non-stat.
Expected USD appreciation		0.221598**		– 22.9252**		– 3.33409**	Stationary

The optimal number of lags is chosen by minimizing the AIC. ***, *, * are significance at 1, 5, and 10%, respectively, for rejecting the unit root null hypothesis (or the stationarity null hypothesis). W_IPS denotes the standardized IPS statistic based on simulated approximated moments (Im, Pesaran and Shin [2003](#), Table 3). P_MW denotes the Fisher’s test statistic proposed by Maddala and Wu ([1999](#)) and on individual ADF *p* values. Under H0; P_MW has a χ^2 distribution with 2 *N* of freedom when *T* tends to infinity and *N* is fixed. Z_CHOI is the Choi ([2001](#)) standardized statistic used for large *N* samples: under H0; Z_MW has a *N* (0,1) distribution when *T* and *N* tend to infinity. MZa and MZt denote two statistics proposed by Ng–Perron ([2001](#), Table 1). LM denotes de

LM-statistic proposed by Kwiatkowski–Phillips–Schmidt–Shin ([1992](#), Table [1](#)) with the null of the stationarity

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