HOUSEHOLD DEBT, CORPORATE DEBT, AND THE REAL ECONOMY: SOME EMPIRICAL EVIDENCE

Donghyun Park, Kwanho Shin, and Shu Tian

NO. 567

December 2018

ADB ECONOMICS WORKING PAPER SERIES

ASIAN DEVELOPMENT BANK

ADB

ADB Economics Working Paper Series

Household Debt, Corporate Debt, and the Real Economy: Some Empirical Evidence

Donghyun Park, Kwanho Shin, and Shu Tian

No. 567 | December 2018

Donghyun Park (dpark@adb.org) is a principal economist and Shu Tian (stian@adb.org) is an economist at the Economic Research and Regional Cooperation Department, Asian Development Bank. Kwanho Shin (khshin@korea.ac.kr) is a professor at the Department of Economics, Korea University.

This working paper was initially prepared for the Asian Development Bank Institute's 21st Annual Conference: Managing Private and Local Government Debt in Asia, 30 November–1 December 2017. This was also used as a background paper for the Asian Development Outlook 2018. We thank Jaeyoung Yoo for his excellent research assistance, and Cynthia Castillejos-Petalcorin for her superb editorial work.

ASIAN DEVELOPMENT BANK

ADB


Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO)

6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Tel +63 2 632 4444; Fax +63 2 636 2444
www.adb.org

ISSN 2313-6537 (print), 2313-6545 (electronic)
Publication Stock No. WPS189775-2
DOI: http://dx.doi.org/10.22617/WPS189775-2

Notes:
In this publication, "$" refers to United States dollars.
ADB recognizes "Korea" as the Republic of Korea.
Corrigenda to ADB publications may be found at http://www.adb.org/publications/corrigenda.

CONTENTS

TABLES AND FIGURES

TABLES

FIGURES

ABSTRACT

The rapid accumulation of private debt is widely viewed as a major risk to financial and economic stability. This paper systematically and comprehensively assesses the effect of private debt buildup on economic growth. In the spirit of Mian, Sufi, and Verner (2017) that separately examine the effects of two types of private debt, i.e., household debt and corporate debt, on growth in developed economies, this study specifically provides new evidence on the growth–private debt nexus in both advanced and emerging market economies (EMEs). Moreover, we construct financial peaks in terms of the speed of debt accumulation rather than crisis dates and find that in both advanced and EMEs, corporate debt buildups cause more financial peaks than household debt buildups. Further, corporate debt-induced financial recessions inflict a bigger damage on output than household debt-induced financial recessions in EMEs. Overall, our evidence suggests that policy makers would do well to closely monitor not only household debt but also corporate debt.

Keywords: business cycle, corporate debt, crisis, debt, economic growth, household debt, output, private debt

JEL codes: E32, E44, G01

I. INTRODUCTION

The rapid accumulation of private debt is widely viewed as a major risk to financial and economic stability.[1] Of course, the unsustainable buildup of public debt due to unsound fiscal policies has also led to many crises.[2] The eurozone sovereign debt crisis was a recent fiscal crisis in advanced economies, and there were many episodes of fiscal crisis in emerging market economies (EMEs). While public debt often had a devastating impact on the financial system and real economy, the impact of private debt can be equally pronounced. The global financial crisis (GFC) of 2008–2009, which was preceded by a rapid buildup of household debt in the United States (US), severely disrupted the global financial system and world economy.[3] Prior to the Asian financial crisis of 1997–1998, East Asian banks and companies borrowed US dollars short term to finance investment projects that generate local currency revenues in the long term.[4] Recently, the private sectors of EMEs borrowed heavily during the post-GFC low global interest rate environment.[5] Large and rising household debt is a growing concern in Malaysia, the Republic of Korea, and Thailand, as is fast-expanding corporate debt in the People's Republic of China.[6]

It is worth noting that the growth of private debt is not necessarily a cause for concern in and of itself, especially in EMEs with relatively underdeveloped finance sectors.[7] Private debt expansion can simply reflect the development of the financial system from a low base. Nevertheless, the unsustainable rapid expansion of private debt can trigger financial instability, and eventually harm economic growth.[8] For example, excessive leverage by firms and households can inflate asset prices. When the bubble bursts, banks and other financial institutions will suffer a surge of bad loans and thus lend less, hurting investment and consumption. Since it generally takes some time for banks to repair their balance sheets, the disruption of credit to firms and households will persist for a while. Further, firms and households cut back on investment and consumption to repair their own damaged balance sheets. This is why recessions stemming from financial stress tend to be deeper and more persistent than other types of recessions, exacerbating the volatility of the business cycle.[9]

The central objective of our paper is to systematically assess the effect of private debt buildup on economic growth. We contribute to the existing empirical literature on the private debt–growth nexus in three important ways. First, while Mian, Sufi, and Verner (2017) examine the real impacts of both corporate debt and household debt in global economies, their focus is mostly on advanced economies. Given the structure heterogeneity between advanced and EMEs, it is worthwhile to comprehensively understand the debt–growth nexus in these two groups of economies. This study thus differs from the existing literature by providing more comprehensive evidence on real impacts (on

---

1 For example, see Glick and Lansing (2010) and Mian and Sufi (2014), and the literature reviewed in the next section.

2 See Baum, Checherita, and Rother (2013); Checherita and Rother (2012); Égert (2015); Kumar and Woo (2010); and Reinhart and Rogoff (2010).

3 See, for example, Mian and Sufi (2014) for the danger of household debt buildup.

4 The double mismatch of currency and maturity has been pointed out as one of the causes of crises in EMEs since the seminal paper by Eichengreen and Hausman (1999). See, for example, Lee (2017) for the case of the Republic of Korea.

5 See, for example, Bernardini and Forni (2017).

6 See ADB (2017).

7 In fact, there is a huge literature that emphasizes a positive impact of financial development on growth. See Levine (2005) for the survey.

8 Many papers surveyed in the next section emphasize the speed of expansion, not the level of financial debts that constitutes a risk of the economy. In particular, Schularick and Taylor (2012) emphasize that rapid credit growth is capable of creating its very own shocks, sometimes leading to financial crises.

9 Jordà, Schularick, and Taylor (2013) find that recessions followed by more credit-intensive expansions are costlier and deeper, leading to slower recoveries.

output, consumption, investment, and asset–price growth) of the two different types of private debts in EMEs.[10] This extension is important because EMEs witnessed rapid built-up in the aftermath of the GFC while the private debt level in advanced economies were largely stable as shown in Figure 1. Moreover, as key growth driver in the global economy, empirical evidence from EMEs also sheds policy implications on how to prevent possible downside risk of fast leverage buildup to sustain economic growth. Second, we define financial peaks, which are distinct from normal peaks, solely in terms of the speed of private debt accumulation rather than actual banking or currency crisis dates.[11] In contrast, most studies define financial peaks as peaks that precede financial crises.[12] Finally, we analyze financial peaks driven by either household or corporate debt to see whether there are any differences in recession dynamics. Again, financial peaks driven by household and corporate debts are defined by comparing the speed of household and corporate debt accumulations.

Our empirical analysis yields a number of interesting findings. The level of household debt is smaller than the level of corporate debt in both advanced economies and EMEs, but it increases slightly faster and is less volatile. We find that household debt accumulation is associated with higher output growth in the very short run, but lower output growth after 3 years. On the other hand, corporate debt buildup is not associated with higher output growth even in the short run and is associated with lower output growth in 1–3 years.[13] Around half of the negative growth effect of private debt buildup can be explained by asset price inflation in advanced economies and much more in EMEs. Interestingly and significantly, we find that more financial peaks are driven by corporate debt rather than household debt in both advanced economies and EMEs. Further, the damage from corporate debt-induced financial recessions is similar to the damage from household debt-induced financial recessions in advanced economies and larger in EMEs. Finally, our evidence indicates that larger excess credit to both households and corporations during expansions entails more painful recessions after financial peaks.

The rest of the paper is organized as follows. In section II, we review the empirical literature on the economic effect of private debt accumulation. In section III, we describe the data and their summary statistics. In section IV, we examine how buildups of household and corporate debts predict the future dynamics of output, consumption, investment, and asset prices. In section V, we take a closer look at the role of household and corporate debts in shaping recession paths. In this section, we identify normal versus financial peaks, and investigate whether the two types of peaks entail any differences in how household and corporate debts affect postpeak recession path. Section VI concludes the paper.

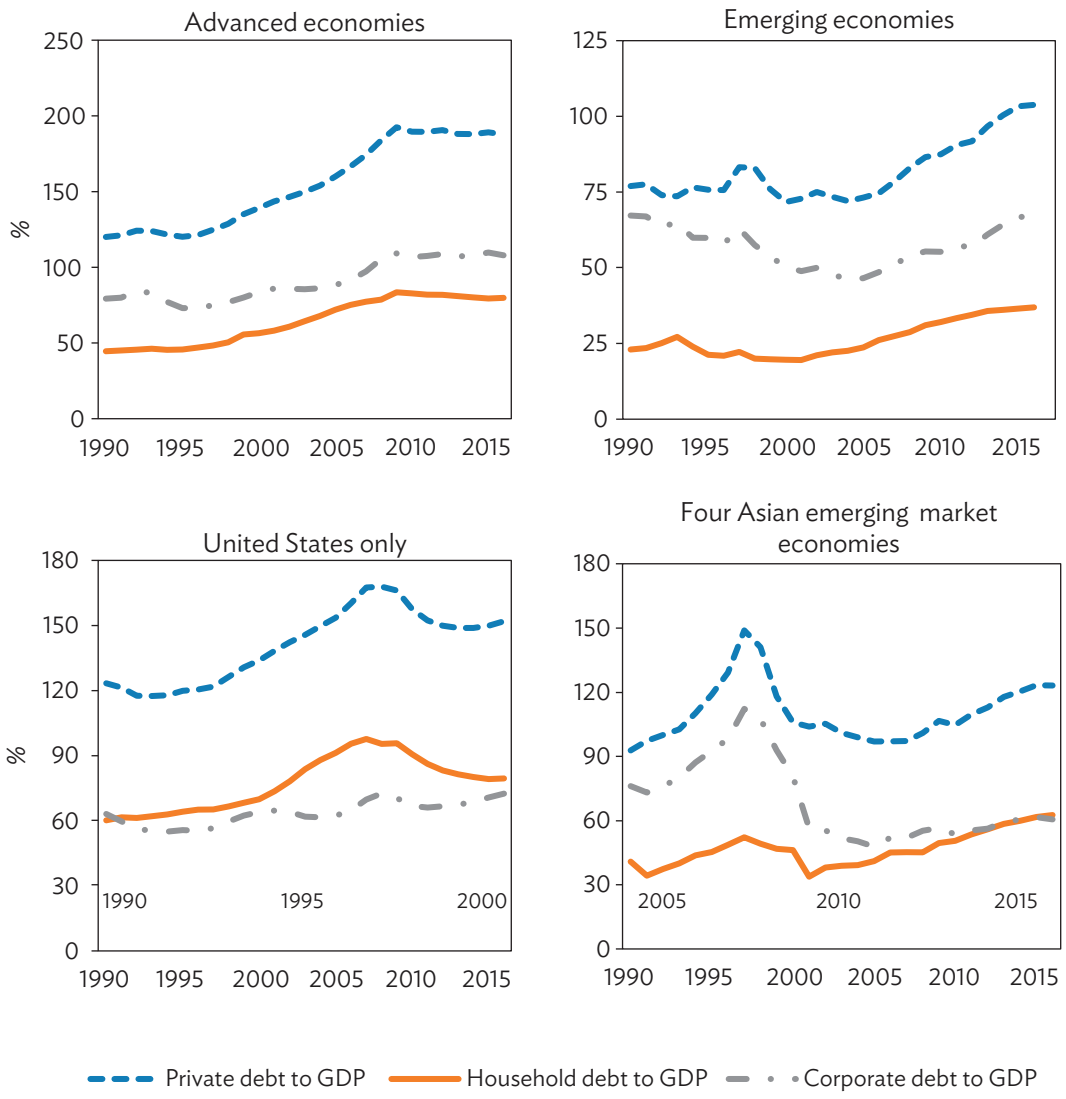
[10] We follow the approach pioneered by Mian, Sufi, and Verner (2017). However, while Mian, Sufi, and Verner (2017) also report some differences in experiences between advanced and EMEs, the comparison was not a main objective of their paper.

[11] We follow the approach by Jordà, Schularick, and Taylor (2013) in defining financial peaks solely based on actual financial crisis dates and compare these results with ours.

[12] Crises dates follow banking crisis years in Reinhart and Rogoff (2009) data set, and financial crisis years in Laeven and Valencia (2013).

[13] This different timing of the effects of household and corporate debts is also highlighted by Mian, Sufi, and Verner (2017).

Figure 1: Dynamics of Private Debt, Household Debt, and Corporate Debt in Advanced Economies and Emerging Market Economies (Debt as shares of GDP)



GDP = gross domestic product.
Notes: Debt are measured as shares of GDP. The list of advanced economies and emerging market economies is in Appendix Table A.1. Four Asian emerging market economies include Indonesia, Malaysia, the Republic of Korea, and Thailand.
Source: Authors' calculations based on the Bank for International Settlements Debt Securities database.

II. LITERATURE REVIEW

The nonlinear nexus between public debt and economic growth is well established in the literature. Relevant studies include Baum, Checherita, and Rother (2013); Checherita and Rother (2012); Égert (2015); Kumar and Woo (2010); and Reinhart and Rogoff (2010). However, less is known about the impact of private debt accumulation on growth. Before the GFC, most advanced economies experienced rapid accumulation of private debt, particularly household debt, which contributed to the

severe economic downturn during the Great Recession.[14] EMEs also experienced similar increases in private debt. However, the dynamics of private debt growth has diverged since then. While the GFC set in motion a deleveraging process in advanced economies that reduced the levels of private debt, EMEs continue to amass significant amounts of private debt, which has become a source of concern to policy makers.[15] Theoretically, private debt buildups do not necessarily lead to subsequent economic downturns. Mian, Sufi, and Verner (2017) survey the recent body of theoretical research that explores the links between private debt buildups and subsequent output growth. They show that, depending on the structure of models and the nature of shocks, either positive or negative relationship is possible. Mian, Sufi, and Verner (2017) argue that rational expectation models with credit demand shocks imply a positive relationship between private debt buildups and subsequent output growth, since rational agents borrow against the expectation that future productivity or permanent income will increase.[16]

On the other hand, models based on credit supply shocks predict a negative relationship between private debt buildup during a boom and subsequent economic growth.[17] As argued by Mian, Sufi, and Verner (2017), if credit supply shocks are driven by irrationally exuberant expectations of lenders ignoring downside risks, accumulation of debt in high-risk sectors eventually brings about a reversal in investment sentiment and subsequent decline in growth. Cecchetti, Mohanty, and Zampolli (2011) also suggest that excess private debt not only constrains financing capacity to smooth economic cycles, but also causes large swings in asset prices, which tend to trigger recessions when the economy slows down. Empirically, however, there are only a few studies that examine the impact of private debt on economic growth and stability, and these are largely confined to advanced economies. Mian, Sufi, and Verner (2017) investigate the impacts of both household and corporate debts in EMEs as well as in advanced economies, but their analyses are mostly confined to household debts in advanced economies. Sutherland and Hoeller (2012) examined the impact of debt of different sectors, i.e., government, financial private sector, nonfinancial private sector, and households, on economic stability in the Organisation for Economic Co-operation and Development (OECD) economies. They find that private sector debt is not consistently related to gross domestic product (GDP) volatility, but household debt is positively associated with consumption volatility and short-term private sector debt to investment volatility. Cecchetti, Mohanty, and Zampolli (2011) examine the separate impact of public, corporate, and household debts on economic growth in the OECD economies. They show that both corporate and household debts have a significant negatively correlation with per capita GDP growth rate, but only corporate debt is significantly positively related to per capita GDP growth rate volatility.

While the above studies focus on the level of private debt, it is worthwhile to examine how the speed of private debt accumulation affects economic growth and the occurrence of recessions. Jordà, Schularick, and Taylor (2013) show that financial crisis recessions are costlier, and expansions with more rapid credit buildups lead to deeper recession. Claessens, Kose, and Terrones (2012) find that

[14] Household debt has received more attention than corporate debt. For example, Glick and Lansing (2010) show that many advanced economies experienced rapid increases in household leverage and countries with the largest increase in household leverage experience the fastest rise in house prices and the largest decline in subsequent household consumption. Based on US county data, Mian and Sufi (2014) also find that the increase in household debt before the GFC predicts the severity of the downturn during the Great Recession.

[15] See Bernardini and Forni (2017) and Figure 1 therein. See also section II.

[16] Mian, Sufi, and Verner (2017) also show that, if the underlying credit shock is demand driven, even models of agents with flawed expectations are not consistent with empirical facts because these models imply increases in the interest rate, which is counterfactual.

[17] See Mian, Sufi, and Verner (2017) for the references that explain sources of credit supply shocks. For example, as argued by Justiniano, Primiceri, and Tambalotti (2015) and Schmitt-Grohé and Uribe (2016), credit supply expansion may originate from foreign capital inflows as well.

recessions associated with financial disruptions tend to be longer and deeper. Bernardini and Forni (2017) find that the exacerbation of private debt buildups on the duration and intensity of recessions is even more pronounced in EMEs.

Many existing studies look at the effect of aggregate private debt, however, a sectoral breakdown of private debt sheds new light on the heterogeneous effects of different types of private debt on recessions. One example is Mian, Sufi, and Verner (2017) which decompose private debt into household and nonfinancial corporation debt, and show that household debt is more closely related to the boom and bust cycle than corporate debt. However, their analyses lack a differentiation between advanced economies and EMEs. This study therefore extends Mian, Sufi, and Verner (2017) by separately and directly examining the relationship between corporate and household debt buildup and subsequent recessions in advanced and EMEs. In doing so, this study provides comprehensive evidence on the debt–growth nexus in emerging economies.

III. DATA

In this section, we describe the data used for our empirical analysis. We collect private debt of nonfinancial sector as share of GDP from the Bank for International Settlements Debt Securities database. Private debt of nonfinancial sector is then divided into household debt and nonfinancial corporate debt for 21 advanced economies and 17 EMEs.[18] Appendix Table A.1 lists all advanced economies and EMEs for which data are available. Per capita real GDP data are collected from the Penn World Table 9.0, and calculated by dividing real GDP at constant 2011 national prices by population. We also collect per capita real consumption and investment from the same source. These are calculated by multiplying share of consumption and investment in output-side real GDP at chained public–private partnerships (PPPs) in 2011 US dollar, and divided by population.[19] Housing price index is collected from two sources: the Bank for International Settlements property price database and the Jordá–Schularick–Taylor Macrohistory database. Stock price index is also collected from the Jordá–Schularick–Taylor Macrohistory database. The definition and sources of these variables and other control variables are listed in Appendix Table A.2.

Figure 1 illustrates the dynamics of private debt, household debt, and corporate debt as shares of GDP (in percent) for advanced economies and EMEs from 1990 to 2016. The figure in the upper left panel shows that advanced economies' private debt increased quite rapidly before the GFC in 2008 and then stabilized. While both household and corporate debts increased before the GFC in advanced economies, the dynamics of household debt is more dramatic. Household debt increased more rapidly than corporate debt before the GFC. In the postcrisis period, while corporate debt has stabilized, household debt has decreased. The dynamics of private debt in the US, presented in the lower left panel, shows even more dramatic changes in private debt. Private debt increased rapidly before the GFC, and then decreased afterward. Such dynamics were mostly driven by household debt, which is consistent with the widely held view that rapid increase in household debt was one of the key causes of the GFC. Figure 1 presents the dynamics of private debt in EMEs in the upper right panel. Unlike advanced economies, EMEs continue to accumulate private debt even after the GFC. While corporate

[18] Following Mian, Sufi, and Verner (2017), we exclude India, the People's Republic of China, and South Africa, for which the data for private debt start from 2006 or 2007, as well as Luxembourg, for which the private debt data are too volatile. For most countries, the amount of private debt of the nonfinancial sector is exactly the same as the sum of household debt and nonfinancial corporate debt, but there are small discrepancies in some cases.

[19] We calculate real consumption by multiplying consumption share to output-side real GDP at chained PPPs because consumption share is reported using current PPPs. However, our findings in this study seldom change, if we use GDP at constant national prices instead.

debt increased, household debt grew even more rapidly since the GFC. Looking only at Asian EMEs in the lower right panel, the increase in private debt is most pronounced before the Asian financial crisis in 1997, largely driven by corporate debt.[20] Since 2000, private debt has been increasing, primarily due to household debt. However, unlike other EMEs, private debt as a share of GDP in the region did not peak in the post-GFC period. Instead, it peaked in the pre-Asian financial crisis period. Figure 1 suggests that the dynamics of household and corporate debts are quite different.

Table 1 presents dynamic correlations between increases in household and corporate debts as shares of GDP. We report mean correlations across the full sample as well as for advanced economies and EMEs. The standard deviations are in parentheses. The contemporaneous correlation for the full sample is 0.276, and the correlation generally decreases as time lags or leads increase. We observe the same pattern in advanced economies and EMEs, but correlations are higher in advanced economies. Interestingly, in all cases, correlations between increases in household debt and lead increases in corporate debt are higher than correlations between increases in household debt and lagged increases in corporate debt. This suggests that increases in household debt lead to increases in corporate debt, but not the other way around. This feature is more pronounced in EMEs.

Table 1: Dynamic Correlations between Increases in Household and Corporate Debts

	Correlation with Δhhd_t						
	$\Delta corp_{t-3}$	$\Delta corp_{t-2}$	$\Delta corp_{t-1}$	$\Delta corp_t$	$\Delta corp_{t+1}$	$\Delta corp_{t+2}$	$\Delta corp_{t+3}$
Whole economies	−0.007	0.036	0.105	0.276	0.210	0.228	0.189
	(0.23)	(0.27)	(0.29)	(0.29)	(0.30)	(0.25)	(0.23)
Advanced economies	0.047	0.143	0.213	0.305	0.235	0.264	0.237
	(0.19)	(0.19)	(0.24)	(0.26)	(0.25)	(0.24)	(0.20)
Emerging market economies	−0.074	−0.095	−0.028	0.240	0.179	0.183	0.130
	(0.25)	(0.30)	(0.31)	(0.33)	(0.36)	(0.26)	(0.25)

Notes: Mean correlations across whole, advanced, and emerging market economies are reported. Household and corporate debts are measures as shares of gross domestic product. Δ denotes 1-year change and numbers in parentheses are standard deviations.

Source: Authors' calculation.

Table 2 presents summary statistics of the variables considered in this study for advanced economies (Table 2.1) and EMEs (Table 2.2). The dataset has an unbalanced panel structure with a sample period of 1952–2014. The means of private debt, household debt, and corporate debt as shares of GDP are higher in advanced economies (123.1, 55.5, and 83.7, respectively) than in EMEs (76.7, 26.0, and 55.3, respectively). In both groups, the level of household debt is smaller than corporate debt, but the former increases slightly faster than the latter. However, the standard deviation of percentage points per year increases in corporate debt is much higher than that in household debt (2.8 versus 5.4 in advanced economies and 2.1 versus 5.3 in EMEs). Serial correlation is higher for household debt, and this feature is more pronounced in advanced economies.

[20] Asian EMEs refer to the four countries hit hardest during the Asian financial crisis, namely India, Malaysia, the Republic of Korea, and Thailand.

Table 2: Summary Statistics

Table 2.1: Advanced economies

	N	Mean	SD	Min	Max	Serial Correlation
y_{na}	1364	10.02	0.57	8.04	11.34	
Δy_{na}	1343	2.43	2.82	−9.36	14.72	0.43
y_{output}	1364	9.84	0.63	7.83	11.34	
Δy_{output}	1343	2.87	3.49	−18.07	21.12	0.24
C	1364	9.28	0.58	7.20	10.53	
ΔC	1343	2.59	3.32	−15.21	23.51	0.29
I	1364	8.52	0.68	5.88	10.00	
ΔI	1343	2.95	10.04	−59.77	44.31	0.05
d_{priv}	1135	123.05	51.68	25.60	322.70	
Δd_{priv}	1114	2.17	5.79	−28.80	56.60	0.46
d_{hhd}	794	55.52	26.96	5.50	139.50	
Δd_{hhd}	773	1.23	2.80	−24.60	11.40	0.60
d_{corp}	776	83.73	31.38	24.80	264.90	
Δd_{corp}	755	1.17	5.39	−25.20	46.50	0.30
Δhp	1144	6.81	9.41	−37.47	98.06	0.57
$\Delta stock$	1269	6.52	24.28	−149.47	102.77	−0.01
Tropen	127	0.65	0.34	0.10	2.10	
$Finopen$	110	2.81	3.39	0.20	26.05	
WorldGR	130	2.47	1.56	−1.74	6.18	

SD = standard deviation.

Notes: The sample includes 21 advanced economies listed in Appendix Table A.1. The variables y_{na}, y_{output}, C, I, d_{priv}, d_{hhd}, d_{corp}, hp, stock, Tropen, $Finopen$, WorldGR, $Peak_{norm}$, $Peak_{fin}$, $Peak_{HHD\ fin}$, and $Peak_{Firm\ fin}$ denote per capita log real gross domestic product (GDP) at constant 2011 national prices, per capita output-side log real GDP at chained public–private partnerships, per capita log real consumption, per capita log real investment, the debt-to-GDP ratio of private nonfinancial sector, the debt-to-GDP ratio of households, the debt-to-GDP ratio of nonfinancial corporations, housing price index, stock price index, trade openness, financial openness, world real GDP growth, a normal peak dummy, a financial peak dummy, a household debt-driven financial peak dummy and a corporate debt-driven financial peak dummy, respectively. Δ denotes 1-year change (for ratios) or log difference (for levels). We multiply 100 to log differences and ratios to report changes in percentage or percentage points. Trade openness, financial openness, and world real GDP growth are calculated only at peaks.

Source: Authors' calculation based on various data sources.

Table 2.2: Emerging market economies

	N	Mean	SD	Min	Max	Serial Correlation
y_{na}	927	9.25	0.86	6.79	11.46	
Δy_{na}	910	2.84	4.82	−29.56	29.40	0.34
y_{output}	927	9.06	0.90	6.74	11.10	
Δy_{output}	910	3.34	6.60	−32.90	35.25	0.25
C	927	8.49	0.79	6.38	10.47	
ΔC	910	3.14	5.98	−27.02	33.13	0.23
I	927	7.60	1.14	4.06	10.19	
ΔI	910	3.71	15.16	−70.33	71.54	0.07
d_{priv}	575	76.69	49.93	10.90	301.50	
Δd_{priv}	558	1.83	7.50	−67.60	49.80	0.15
d_{hhd}	415	25.99	20.71	0.10	92.80	
Δd_{hhd}	398	0.93	2.05	−6.10	9.80	0.46
d_{corp}	415	55.31	34.34	11.40	233.90	
Δd_{corp}	398	0.86	5.34	−20.40	28.00	0.32
Δhp	168	7.68	10.32	−33.17	39.87	0.52
$\Delta stock$	262	10.57	41.07	−237.02	222.37	−0.27
Tropen	72	1.14	1.04	0.15	4.22	
$Finopen$	64	3.19	5.38	0.35	24.28	
WorldGR	72	2.42	1.38	−1.74	4.65	

SD = standard deviation.
Notes: The sample includes 17 emerging market economies listed in Appendix Table A.1. For others, see notes for Table 2.1.
Source: Authors' calculation based on various data sources.

IV. HOUSEHOLD AND CORPORATE DEBTS, ASSET PRICES, AND ECONOMIC GROWTH

As noted in section I, private debt buildups are associated with lower output growth. In particular, Mian, Sufi, and Verner (2017) emphasize that household debt is much more closely related to booms and busts of the economy than corporate debt. They estimate the following equation

$$\Delta_3 y_{it+k} = \beta_0 + \beta_H \Delta_3 d_{it-1}^{HH} + \beta_C \Delta_3 d_{it-1}^{Corp} + u_{it+k} \quad (1)$$

where the 3-year change in logarithm of per capita GDP of country *i* from $t + k$ to $t + k - 3$ is denoted by $\Delta_3 y_{it+k}$ where Δ_3 is the 3-year difference operator.[21] The change of household and corporate debts as shares of GDP from $t + k$ to $t + k - 3$ are similarly defined as $\Delta_3 d_{it-1}^{HH}$ and $\Delta_3 d_{it-1}^{Corp}$. Following the method in Mian, Sufi, and Verner (2017), k is set to be an integral ranging from −1 to +5. The upper

[21] Mian, Sufi, and Verner (2017) consider 30 countries in their sample, mostly advanced economies.

panel of Table 3.1, which reports the results, confirms Mian, Sufi, and Verner's (2017) results for advanced economies. While the coefficients of contemporaneous and 1-year lead variable are positive and statistically significant, those of 3-year and above leads are negative and statistically significant. These results suggest that, while buildups of household debt boost output growth in the very short run, they predict lower output growth after 3 years. In contrast, buildups of corporate debt never increase output growth even in the short run, and predict lower output growth in 1–3 years. While the estimated coefficients of corporate debt are smaller, their negative impact is comparable to household debt. For example, when the impact is largest, one standard deviation percentage points per year increase in household (5-year lead) and corporate debt (3-year lead) lowers future output growth by 1.34 % (=−0.481×2.80) and 1.06 % (=−1.97×5.39), respectively.

The middle panel of Table 3.1 reports the same regression results for EMEs. While the coefficients of increase in household debt similarly predict lower medium-run output growth, for the positive short term, coefficients are never statistically significant. The coefficients of corporate debt also show a similar pattern—the harmful impact of corporate debt is more immediate. The largest impact of one standard deviation percentage points per year increase in household and corporate debts on future output growth is −0.72 % (=−0.352×2.05) and −1.06 % (=−1.97×5.34), respectively, suggesting that the negative impact is larger for corporate debt, mainly due to a much larger standard deviation.

In the lower panel of Table 3.1, we also report the regression results for the whole economies for the following modified equation:

$$\Delta_3 y_{it+k} = \beta_0 + \beta_{H1}\Delta_3 d_{it-1}^{HH} + \beta_{C1}\Delta_3 d_{it-1}^{Corp} + \beta_{H2}\Delta_3 d_{it-1}^{HH} * d_{it-1}^{HH} \quad (2)$$

$$+\beta_{C2}\Delta_3 d_{it-1}^{Corp} * d_{it-1}^{Corp} + \beta_{H3} d_{it-1}^{HH} + \beta_{C3} d_{it-1}^{Corp} + u_{it+k}$$

In equation (2), we include the level of each debt and its interaction with the change. The idea is that the impact of the change can differ across economies at different financial development stages that can be captured by the different levels of the debt. In the lower panel of Table 3.1, we find that the sign of the coefficient of the interaction terms, when statistically significant, is the opposite to that for the change, indicating that booms and busts of business cycles driven by the change in debts are mitigated as the economy is financially more developed, i.e., the level is higher.

In Table 3.2, we report the regression results for per capita real consumption growth. For advanced economies, it is shown that an increase in household debt is positively related to contemporaneous consumption growth, but it predicts lower future consumption growth in the medium run. Increase in corporate debt predicts lower consumption growth even immediately. Its maximum impact, −1.19% (=−0.222×5.39), is comparable with that of household debt, −1.27% (=−0.457×2.80). In contrast, for EMEs, increases in household and corporate debts do not show any significantly negative impact on subsequent income growth and consumption growth. Here, the coefficient of the interaction term is generally not statistically significant.

Table 3: Household and Corporate Debt Expansion and Future 3-Year Growth Rates of Various Variables

Table 3.1: Three-year gross domestic product growth

Advanced economies							
Variables	$\Delta_3 y_{it-1}$	$\Delta_3 y_{it}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.20**	0.17**	0.03	−0.19*	−0.39**	−0.48**	−0.46**
	[0.06]	[0.06]	[0.07]	[0.08]	[0.10]	[0.11]	[0.12]
$\Delta_3 d_{it-1}^{Corp}$	−0.10+	−0.19**	−0.20**	−0.13**	−0.05	0.03	0.09*
	[0.06]	[0.06]	[0.05]	[0.04]	[0.04]	[0.04]	[0.04]
Observations	671	650	629	608	587	566	545
R^2	0.05	0.11	0.12	0.13	0.18	0.19	0.17
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.00	0.00	0.01	0.58	0.01	0.00	0.00
Emerging Market Economies							
$\Delta_3 d_{it-1}^{HHD}$	0.26	0.08	−0.11	−0.26**	−0.35**	−0.35**	−0.30+
	[0.23]	[0.20]	[0.13]	[0.06]	[0.07]	[0.11]	[0.16]
$\Delta_3 d_{it-1}^{Corp}$	−0.04	−0.12+	−0.15*	−0.12*	−0.08	−0.04	−0.01
	[0.08]	[0.07]	[0.06]	[0.06]	[0.06]	[0.07]	[0.07]
Observations	330	313	296	279	262	244	228
R^2	0.03	0.03	0.07	0.09	0.09	0.07	0.05
Countries	17	17	17	17	17	16	16
p-value (HHD vs. Corp)	0.32	0.43	0.84	0.06	0.01	0.04	0.17
Whole economies							
$\Delta_3 d_{it-1}^{HHD}$	0.64**	0.49**	0.23+	−0.11	−0.35**	−0.49**	−0.49**
	[0.17]	[0.15]	[0.14]	[0.12]	[0.11]	[0.10]	[0.12]
$\Delta_3 d_{it-1}^{Corp}$	−0.06	−0.20**	−0.28**	−0.26**	−0.19**	−0.04	0.08
	[0.10]	[0.06]	[0.04]	[0.06]	[0.07]	[0.07]	[0.08]
$d_{i\,t-1}^{HHD} * \Delta_3 d_{it-1}^{HHD}$	−0.0058**	−0.0043**	−0.0019	0.0014	0.0032+	0.0048**	0.0056**
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
$d_{i\,t-1}^{Corp} * \Delta_3 d_{it-1}^{Corp}$	0.0004	0.0008	0.0014**	0.0017**	0.0015*	0.0006	−0.0002
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
d_{it-1}^{HHD}	−0.12**	−0.12**	−0.14**	−0.16**	−0.18**	−0.20**	−0.21**
	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]
d_{it-1}^{Corp}	−0.05+	−0.05+	−0.04	−0.02	0.00	0.01	0.02
	[0.03]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]
Observations	1,001	963	925	887	849	810	773
R^2	0.25	0.28	0.29	0.28	0.28	0.27	0.25
Countries	38	38	38	38	38	37	37
p-value (HHD vs. Corp)	0.24	0.18	0.07	0.01	0.00	0.00	0.00

HHD = household.

Notes: We report panel regression results with fixed effects. Δ_3 denotes 3-year change (for ratios) or log difference (for levels). The first row in each panel presents the dependent variable, which is the 3-year log difference of per capita real gross domestic product (GDP) for country *i* at $t-1, t, \ldots, t+5$. The explanatory variables are 3-year changes of the debt-to-GDP ratio of households ($\Delta_3 d_{it-1}^{HHD}$) and the debt-to-GDP ratio of nonfinancial corporations ($\Delta_3 d_{it-1}^{Corp}$) for country *i* at time t-1. Reported R^2 values are based on within-country variation. The reported p-value is for the test for equality of coefficients of $\Delta_3 d_{it-1}^{HHD}$ and $\Delta_3 d_{it-1}^{Corp}$. Numbers in parentheses are standard errors dually clustered on country and year, and **, *, and + denote the significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

Table 3.2: Three-year consumption growth

Advanced Economies							
Variables	$\Delta_3 c_{it-1}$	$\Delta_3 c_{it}$	$\Delta_3 c_{it+1}$	$\Delta_3 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_3 c_{it+4}$	$\Delta_3 c_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.22**	0.22**	0.11	−0.09	−0.31**	−0.44**	−0.46**
	[0.08]	[0.08]	[0.07]	[0.06]	[0.08]	[0.11]	[0.12]
$\Delta_3 d_{it-1}^{Corp}$	−0.03	−0.17*	−0.22**	−0.17**	−0.07	0.04	0.13*
	[0.06]	[0.07]	[0.07]	[0.06]	[0.06]	[0.05]	[0.05]
Observations	671	650	629	608	587	566	545
R^2	0.04	0.06	0.10	0.09	0.10	0.12	0.13
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.05	0.00	0.00	0.29	0.01	0.00	0.00
Emerging Market Economies							
$\Delta_3 d_{it-1}^{HHD}$	0.09	−0.08	−0.22	−0.31+	−0.25	−0.18	−0.10
	[0.26]	[0.23]	[0.18]	[0.16]	[0.17]	[0.15]	[0.13]
$\Delta_3 d_{it-1}^{Corp}$	0.03	−0.06	−0.07	−0.04	−0.02	−0.01	−0.02
	[0.12]	[0.13]	[0.12]	[0.11]	[0.10]	[0.09]	[0.07]
Observations	330	313	296	279	262	244	228
R^2	0.00	0.01	0.02	0.03	0.02	0.01	0.00
Countries	17	17	17	17	17	16	16
p-value (HHD vs. Corp)	0.86	0.97	0.54	0.09	0.10	0.25	0.63
Whole Economies							
$\Delta_3 d_{it-1}^{HHD}$	0.55*	0.42+	0.22	−0.03	−0.08	−0.11	−0.07
	[0.25]	[0.22]	[0.20]	[0.19]	[0.17]	[0.17]	[0.17]
$\Delta_3 d_{it-1}^{Corp}$	−0.06	−0.20	−0.23+	−0.20	−0.22+	−0.17	−0.12
	[0.14]	[0.14]	[0.13]	[0.12]	[0.11]	[0.11]	[0.11]
$d_{i\,t-1}^{HHD} * \Delta_3 d_{it-1}^{HHD}$	−0.0052+	−0.0037	−0.0020	0.0001	−0.0009	−0.0013	−0.0015
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
$\Delta^{Corp} * \Delta \Delta^{Corp}$	0.0009	0.0011	0.0009	0.0009	0.0017*	0.0019*	0.0020+
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
d_{it-1}^{HHD}	−0.05	−0.06	−0.08+	−0.11*	−0.13**	−0.14**	−0.15**
	[0.05]	[0.05]	[0.05]	[0.04]	[0.05]	[0.05]	[0.05]
d_{it-1}^{Corp}	−0.05	−0.05	−0.03	−0.00	0.01	0.02	0.02
	[0.05]	[0.05]	[0.04]	[0.03]	[0.03]	[0.03]	[0.04]
Observations	1,001	963	925	887	849	810	773
R^2	0.07	0.08	0.10	0.10	0.11	0.12	0.13
Countries	38	38	38	38	38	37	37
p-value (HHD vs. Corp)	0.98	0.91	0.55	0.12	0.03	0.02	0.02

HHD = household.

Notes: We report panel regression results with fixed effects. The first row in each panel presents the dependent variable, which is the 3-year log difference of per-capita real consumption for country *i* at $t-1, t, \ldots, t+5$. The explanatory variables are 3-year changes of the debt-to-gross domestic product (GDP) ratio of households ($\Delta_3 d_{it-1}^{HHD}$) and the debt-to-GDP ratio of nonfinancial corporations ($\Delta_3 d_{it-1}^{Corp}$) for country *i* at time *t*-1. Reported R^2 values are based on within-country variation. The reported p-value is for the test for equality of coefficients of $\Delta_3 d_{it-1}^{HHD}$ and $\Delta_3 d_{it-1}^{Corp}$. Numbers in parentheses are standard errors dually clustered on country and year, and **, *, and + denote the significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

Table 3.3 presents the same regression results for per capita real investment growth. In advanced economies, the impact of household and corporate debts are opposite of each other. Household debt boosts investment immediately, and then predicts lower investment growth in the medium term. In contrast, corporate debt has a negative effect on investment immediately and in the short term, but boosts investment in the medium run. The maximum negative impact of one standard deviation percentage points per year increases in household debt and corporate debt occur respectively at 5-year lead— −3.38 % (=−1.208×2.80)—and at 1-year lead— −3.77 % (=−0.700×5.39). The results for EMEs are presented in the lower panel. The positive immediate impact of household debt and medium-run impact of corporate debt disappear, and only their negative impact remain. In EMEs, the maximum negative impact of corporate debt— −3.60% (= −0.667×5.39)—is larger than that of household debt −2.43% (=−0.868×2.80). Our results suggest that corporate debt has a more negative impact on investment growth than household debt, and this feature is more pronounced in EMEs. The sign of the coefficient of the interaction terms, when statistically significant, is again the opposite of that for the change, especially in the case of corporate debt.

Tables 3.4 and 3.5 show the regression results when the dependent variable is replaced by housing and stock price growth rates, respectively. In advanced economies, household debt predicts boom-and-bust housing price cycles, but corporate debt has only a negative effect on housing prices. In EMEs, household debt has a negative impact on housing prices in the medium run and corporate debt has almost no impact. The regression results for stock prices are somewhat different. In advanced economies, household debt has only a negative impact in the medium run, but corporate debt has a more immediate negative impact and the effect turns positive in the more distant future. In EMEs, both household and corporate debts have a negative effect on stock prices, with corporate debt having more immediate effect.

The results in Tables 3.4 and 3.5 show that private debt buildups are related to changes in asset prices, suggesting that asset prices may be one channel through which private debt have impacts on the real economy. In Table 3.6, we investigate this possibility by modifying equation (1) as follows:

$$\Delta_3 y_{it+k} = \beta_0 + \beta_H \Delta_3 d_{it-1}^{HH} + \beta_C \Delta_3 d_{it-1}^{Corp} + \beta_{hp} \Delta_3 hp_{it+k} + \beta_{st} \Delta_3 st_{it+k} + u_{it+k} \qquad (3)$$

In the above equation, we add changes in asset prices, i.e., housing prices (hp) and stock prices (st), as additional regressors. The timing of differencing housing and stock prices is in line with that of output growth so that we control the impacts of changes in housing and stock prices over the same time horizon. If output changes are mainly due to simultaneous changes in housing or stock prices, we expect only β_hp and β_st to be statistically significant. Indeed, the estimates of β_hp and β_st are highly significant with the expected sign. However, while the estimated coefficients of household and corporate debts are lowered approximately by one-half, they are still statistically significant and show the same pattern as in Table 1. This suggests that their effects are not solely due to changes in asset prices. Interestingly, however, in the lower panel presenting the results for EMEs, all coefficients of household and corporate debts except for one are statistically insignificant, suggesting that, in EMEs, the impacts of private debt are more associated with asset price changes in EMEs.

Table 3.3: Three-year investment growth

Advanced Economies							
Variables	$\Delta_3 i_{it-1}$	$\Delta_3 i_{it}$	$\Delta_3 i_{it+1}$	$\Delta_3 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_3 i_{it+4}$	$\Delta_3 i_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.84**	0.82**	0.31	−0.44+	−1.08**	−1.21**	−0.94**
	[0.23]	[0.21]	[0.22]	[0.26]	[0.28]	[0.27]	[0.27]
$\Delta_3 d_{it-1}^{Corp}$	−0.38*	−0.70**	−0.61**	−0.26+	0.10	0.32**	0.40**
	[0.18]	[0.15]	[0.15]	[0.14]	[0.12]	[0.11]	[0.13]
Observations	671	650	629	608	587	566	545
R^2	0.08	0.16	0.12	0.06	0.11	0.13	0.10
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.00	0.00	0.00	0.58	0.00	0.00	0.00
Emerging Market Economies							
$\Delta_3 d_{it-1}^{HHD}$	1.08+	0.34	−0.43	−0.78**	−0.87*	−0.85**	−0.82**
	[0.57]	[0.50]	[0.40]	[0.30]	[0.38]	[0.26]	[0.14]
$\Delta_3 d_{it-1}^{Corp}$	−0.12	−0.50*	−0.67**	−0.60**	−0.44*	−0.22	−0.01
	[0.25]	[0.24]	[0.22]	[0.20]	[0.18]	[0.17]	[0.21]
Observations	330	313	296	279	262	244	228
R^2	0.03	0.04	0.11	0.11	0.08	0.05	0.03
Countries	17	17	17	17	17	16	16
p-value (HHD vs. Corp)	0.07	0.19	0.65	0.60	0.21	0.01	0.01
Whole Economies							
$\Delta_3 d_{it-1}^{HHD}$	2.15**	1.55**	0.45	−0.43	−0.75+	−0.76*	−0.72+
	[0.54]	[0.44]	[0.46]	[0.40]	[0.40]	[0.36]	[0.37]
$\Delta_3 d_{it-1}^{Corp}$	−0.29	−0.77**	−0.94**	−0.90**	−0.68**	−0.31	0.07
	[0.35]	[0.23]	[0.17]	[0.19]	[0.22]	[0.21]	[0.26]
$d_{i\,t-1}^{HHD} * \Delta_3 d_{it-1}^{HHD}$	−0.019**	−0.012*	−0.002	0.004	0.002	0.001	0.005
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.00]	[0.01]
$d_{i\,t-1}^{Corp} * \Delta_3 d_{it-1}^{Corp}$	0.0013	0.0025	0.0039*	0.0055**	0.0058**	0.0041*	0.0015
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
d_{it-1}^{HHD}	−0.10	−0.14	−0.21*	−0.28**	−0.30**	−0.33**	−0.38**
	[0.10]	[0.10]	[0.10]	[0.11]	[0.12]	[0.12]	[0.11]
d_{it-1}^{Corp}	−0.14	−0.14	−0.09	−0.01	0.07	0.10	0.12+
	[0.09]	[0.10]	[0.09]	[0.08]	[0.08]	[0.07]	[0.06]
Observations	1,001	963	925	887	849	810	773
R^2	0.12	0.15	0.15	0.13	0.12	0.11	0.09
Countries	38	38	38	38	38	37	37
p-value (HHD vs. Corp)	0.77	0.98	0.48	0.10	0.03	0.01	0.00

HHD = household.

Notes: We report panel regression results with fixed effects. The first row in each panel presents the dependent variable, which is the 3-year log difference of per-capita real investment for country *i* at $t-1, t, \ldots, t+5$. The explanatory variables are 3-year changes of the debt-to-gross domestic product (GDP) ratio of households ($\Delta_3 d_{it-1}^{HHD}$) and the debt-to-GDP ratio of nonfinancial corporations ($\Delta_3 d_{it-1}^{Corp}$) for country *i* at time *t*-1. Reported R^2 values are based on within-country variation. The reported p-value is for the test for equality of coefficients of $\Delta_3 d_{it-1}^{HHD}$ and $\Delta_3 d_{it-1}^{Corp}$. Numbers in parentheses are standard errors dually clustered on country and year, and **, *, and + denote the significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

Table 3.4: Three-year housing price growth

Advanced Economies							
Variables	$\Delta_3 hp_{it-1}$	$\Delta_3 hp_{it}$	$\Delta_3 hp_{it+1}$	$\Delta_3 hp_{it+2}$	$\Delta_3 hp_{it+3}$	$\Delta_3 hp_{it+4}$	$\Delta_3 hp_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	1.12**	0.98**	0.52*	−0.07	−0.77**	−1.28**	−1.57**
	[0.24]	[0.21]	[0.21]	[0.26]	[0.29]	[0.28]	[0.27]
$\Delta_3 d_{it-1}^{Corp}$	−0.11	−0.34	−0.43*	−0.40*	−0.26*	−0.10	0.09
	[0.21]	[0.23]	[0.21]	[0.16]	[0.13]	[0.13]	[0.13]
Observations	627	610	593	576	558	540	521
R^2	0.12	0.08	0.05	0.05	0.09	0.14	0.18
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.00	0.00	0.00	0.27	0.13	0.00	0.00
Emerging Market Economies							
$\Delta_3 d_{it-1}^{HHD}$	0.02	−0.34	−0.87	−1.31	−1.57*	−1.61**	−1.34**
	[0.41]	[0.61]	[0.79]	[0.80]	[0.68]	[0.52]	[0.33]
$\Delta_3 d_{it-1}^{Corp}$	0.55*	0.41	0.24	0.05	−0.05	−0.00	0.07
	[0.22]	[0.38]	[0.45]	[0.34]	[0.15]	[0.08]	[0.06]
Observations	115	111	107	103	99	94	91
R^2	0.13	0.07	0.06	0.11	0.16	0.17	0.11
Countries	8	8	8	8	8	7	7
p-value (HHD vs. Corp)	0.36	0.45	0.35	0.18	0.03	0.00	0.00
Whole economies							
$\Delta_3 d_{it-1}^{HHD}$	0.66	1.00+	0.94	0.48	−0.36	−1.04*	−1.33**
	[0.67]	[0.56]	[0.62]	[0.61]	[0.47]	[0.45]	[0.49]
$\Delta_3 d_{it-1}^{Corp}$	0.46	0.09	−0.33	−0.61*	−0.65**	−0.45*	−0.25
	[0.30]	[0.36]	[0.37]	[0.26]	[0.16]	[0.20]	[0.30]
$d_{i\,t-1}^{HHD} * \Delta_3 d_{it-1}^{HHD}$	0.0070	0.0011	−0.0026	−0.0025	0.0020	0.0054	0.0067
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
$d_{i\,t-1}^{Corp} * \Delta_3 d_{it-1}^{Corp}$	−0.0031	−0.0014	0.0017	0.0042+	0.0055**	0.0047*	0.0040
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
d_{it-1}^{HHD}	−0.60**	−0.60**	−0.59**	−0.56**	−0.53**	−0.50**	−0.46*
	[0.15]	[0.14]	[0.13]	[0.14]	[0.17]	[0.19]	[0.21]
d_{it-1}^{Corp}	0.07	0.03	−0.01	−0.03	−0.04	−0.04	−0.04
	[0.10]	[0.10]	[0.11]	[0.12]	[0.13]	[0.13]	[0.15]
Observations	742	721	700	679	657	634	612
R^2	0.30	0.27	0.24	0.24	0.25	0.26	0.25
Countries	29	29	29	29	29	28	28
p-value (HHD vs. Corp)	0.00	0.00	0.01	0.02	0.06	0.11	0.18

HHD = household.

Notes: We report panel regression results with fixed effects. The first row in each panel presents the dependent variable, which is the 3-year log difference of housing price for country i at $t-1, t, \ldots, t+5$. The explanatory variables are 3-year changes of the debt-to-gross domestic product (GDP) ratio of households ($\Delta_3 d_{it-1}^{HHD}$) and the debt-to-GDP ratio of nonfinancial corporations ($\Delta_3 d_{it-1}^{Corp}$) for country i at time t-1. Reported R^2 values are based on within-country variation. The reported p-value is for the test for equality of coefficients of $\Delta_3 d_{it-1}^{HHD}$ and $\Delta_3 d_{it-1}^{Corp}$. Numbers in parentheses are standard errors dually clustered on country and year, and **, *, and + denote the significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

Table 3.5: Three-year stock price growth

Advanced Economies							
Variables	$\Delta_3 st_{it-1}$	$\Delta_3 st_{it}$	$\Delta_3 st_{it+1}$	$\Delta_3 st_{it+2}$	$\Delta_3 st_{it+3}$	$\Delta_3 st_{it+4}$	$\Delta_3 st_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.70	0.11	−0.97	−2.24**	−2.60**	−2.27**	−1.37*
	[0.53]	[0.56]	[0.76]	[0.87]	[0.79]	[0.66]	[0.57]
$\Delta_3 d_{it-1}^{Corp}$	−1.35**	−1.41**	−1.06**	−0.35	0.27	0.89**	1.03**
	[0.42]	[0.36]	[0.39]	[0.41]	[0.37]	[0.29]	[0.37]
Observations	658	638	618	598	578	558	538
R^2	0.08	0.10	0.10	0.10	0.09	0.08	0.06
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.01	0.05	0.93	0.11	0.01	0.00	0.00
Emerging Market Economies							
$\Delta_3 d_{it-1}^{HHD}$	0.62	−0.63	−1.97*	−2.73+	−2.68	−2.13*	−1.52
	[1.40]	[0.84]	[0.84]	[1.45]	[1.66]	[1.05]	[0.99]
$\Delta_3 d_{it-1}^{Corp}$	−1.33*	−1.01+	−0.47	−0.34	−0.34	−0.53+	−0.08
	[0.61]	[0.57]	[0.49]	[0.29]	[0.28]	[0.31]	[0.45]
Observations	166	160	153	146	139	131	125
R^2	0.08	0.06	0.05	0.07	0.07	0.06	0.02
Countries	9	9	9	9	9	8	8
p-value (HHD vs. Corp)	0.27	0.75	0.04	0.07	0.18	0.17	0.24
Whole Economies							
$\Delta_3 d_{it-1}^{HHD}$	1.73	0.20	−2.50+	−4.39**	−4.85**	−3.83**	−2.56*
	[1.18]	[1.23]	[1.39]	[1.41]	[1.48]	[1.26]	[1.22]
$\Delta_3 d_{it-1}^{Corp}$	−1.35*	−2.06**	−2.11**	−1.75**	−0.41	0.49	1.02+
	[0.67]	[0.53]	[0.49]	[0.66]	[0.69]	[0.52]	[0.62]
$d_{i\,t-1}^{HHD} * \Delta_3 d_{it-1}^{HHD}$	−0.016	−0.002	0.025	0.043*	0.047*	0.038*	0.031+
	[0.01]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]
$d_{i\,t-1}^{Corp} * \Delta_3 d_{it-1}^{Corp}$	0.0039	0.0101*	0.0135**	0.0153**	0.0072	0.0025	−0.0009
	[0.01]	[0.00]	[0.00]	[0.01]	[0.01]	[0.00]	[0.01]
d_{it-1}^{HHD}	−0.33	−0.40+	−0.54*	−0.59*	−0.56*	−0.51*	−0.50*
	[0.24]	[0.23]	[0.26]	[0.25]	[0.25]	[0.22]	[0.20]
d_{it-1}^{Corp}	−0.49*	−0.40*	−0.26	−0.22	−0.22+	−0.28**	−0.29*
	[0.20]	[0.18]	[0.19]	[0.17]	[0.12]	[0.10]	[0.11]
Observations	824	798	771	744	717	689	663
R^2	0.15	0.15	0.14	0.15	0.11	0.08	0.06
Countries	30	30	30	30	30	29	29
p-value (HHD vs. Corp)	0.67	0.98	0.44	0.25	0.18	0.25	0.14

HHD = household.

Notes: We report panel regression results with fixed effects. The first row in each panel presents the dependent variable, which is the 3-year log difference of stock price index for country *i* at $t-1, t, \ldots, t+5$. The explanatory variables are 3-year changes of the debt-to-gross domestic product (GDP) ratio of households ($\Delta_3 d_{it-1}^{HHD}$) and the debt-to-GDP ratio of nonfinancial corporations ($\Delta_3 d_{it-1}^{Corp}$) for country *i* at time t-1. Reported R^2 values are based on within-country variation. The reported p-value is for the test for equality of coefficients of $\Delta_3 d_{it-1}^{HHD}$ and $\Delta_3 d_{it-1}^{Corp}$. Numbers in parentheses are standard errors dually clustered on country and year, and **, *, and + denote the significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

Table 3.6: Three-year GDP growth with housing and stock prices as additional explanatory variables

Advanced Economies							
Variables	$\Delta_3 y_{it-1}$	$\Delta_3 y_{it}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	−0.02	0.01	−0.03	−0.09	−0.19*	−0.22*	−0.22**
	[0.05]	[0.05]	[0.05]	[0.06]	[0.08]	[0.09]	[0.08]
$\Delta_3 d_{it-1}^{Corp}$	−0.02	−0.09*	−0.10**	−0.07*	−0.03	0.00	0.04
	[0.04]	[0.04]	[0.03]	[0.03]	[0.04]	[0.03]	[0.03]
$\Delta_3 hp_{it-k}$	0.16**	0.15**	0.15**	0.14**	0.13**	0.13**	0.12**
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.02]	[0.02]
$\Delta_3 st_{it-k}$	0.04**	0.03**	0.03**	0.03**	0.04**	0.04**	0.04**
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Observations	623	606	589	572	554	536	517
R^2	0.44	0.46	0.48	0.48	0.48	0.48	0.46
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.92	0.19	0.25	0.78	0.12	0.04	0.01
Emerging Market Economies							
$\Delta_3 d_{it-1}^{HHD}$	−0.06	−0.10	−0.12	−0.07	0.00	0.11	0.15
	[0.23]	[0.18]	[0.10]	[0.06]	[0.15]	[0.17]	[0.16]
$\Delta_3 d_{it-1}^{Corp}$	0.03	−0.08*	−0.11	−0.10	−0.07	−0.04	−0.02
	[0.07]	[0.04]	[0.07]	[0.09]	[0.09]	[0.07]	[0.05]
$\Delta_3 hp_{it+k}$	0.13*	0.17**	0.16**	0.14**	0.13**	0.15**	0.14**
	[0.05]	[0.04]	[0.03]	[0.02]	[0.03]	[0.02]	[0.02]
$\Delta_3 st_{it+k}$	0.03*	0.03**	0.02**	0.02*	0.03*	0.02**	0.02**
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Observations	108	105	101	97	93	88	85
R^2	0.26	0.30	0.30	0.28	0.25	0.23	0.23
Countries	8	8	8	8	8	7	7
p-value (HHD vs. Corp)	0.73	0.92	0.95	0.86	0.67	0.40	0.40

HHD = household.

Notes: We report panel regression results with fixed effects. The first row in each panel presents the dependent variable, which is the 3-year log difference of per capita real gross domestic product (GDP) for country *i* at $t-1, t, \ldots, t+5$. The explanatory variables are 3-year changes of the debt-to-GDP ratio of households ($\Delta_3 d_{it-1}^{HHD}$), the debt-to-GDP ratio of nonfinancial corporations ($\Delta_3 d_{it-1}^{Corp}$)for country *i* at time $t-1$ and housing price and stock price index for country *i* at time $t+k$, where k corresponds to the time at which the growth rate of GDP is measured for the dependent variable. Reported R^2 values are based on within-country variation. The reported p-value is for the test for equality of coefficients of $\Delta_3 d_{it-1}^{HHD}$ and $\Delta_3 d_{it-1}^{Corp}$. Numbers in parentheses are standard errors dually clustered on country and year, and **, *, and + denote the significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

V. NORMAL PEAKS VERSUS FINANCIAL PEAKS

While the results in previous sections suggest that debt buildups of both household and corporates debt are related to lowered future output growth, studies in the literature zoom in on their roles in recessions. In particular, Jordà, Schularick, and Taylor (2013); Claessens, Kose, and Terrones (2012); and Bernardini and Forni (2017) point out that recessions associated with financial expansions and disruptions tend to be more damaging to the real economy than normal business cycle recessions. In

this section, we will empirically investigate if there are differences between financial recessions associated with household debt and corporate debt.

In Jordà, Schularick, and Taylor (2013) and most other previous studies, business cycle upswings and downswings are dated by using the Bry and Boschan (1971) algorithm, which defines downswings as negative GDP growth. Since the average GDP growth rate is higher in EMEs than in advanced economies, the Bry–Boschan algorithm tends to detect fewer downswings in EMEs. To avoid this bias, we use the Hodrick–Prescott filter to identify business cycles. As a robustness check, we also repeat the analysis using the Bry–Boschan algorithm which generates qualitatively similar results.[22] We identify peaks and troughs of business cycles by calculating local maxima and minima of cyclical parts derived from the Hodrick–Prescott filter. We find a total of 195 peaks in advanced economies and 140 peaks in EMEs.

The next step is to distinguish financial peaks from normal peaks. Jordà, Schularick, and Taylor (2011) defines financial peaks, more precisely financial crisis peaks (FCPs), as those that precede financial crises. We follow their methodology and collect crisis dates from two sources: banking crisis from Reinhart and Rogoff (2009) and financial crisis from Laeven and Valencia (2013). Alternatively, we define financial peaks solely based on buildup speed of private debt. We calculate the annual change in private debt in the preceding boom, and if it exceeds the sample median, the corresponding peak is defined as a financial peak and otherwise as a normal peak. Then we classify FCPs (or financial peaks) into household debt-driven and corporate debt-driven peaks by comparing annual changes in household debt and corporate debt in the preceding boom. More precisely, if the annual change in household debt is greater than that for corporate debt, we define it as a household debt-driven FCP (or financial peak) and otherwise as a corporate debt-driven FCP (or financial peak). In Table 4.1, we report dates of FCPs, household debt-driven FCPs (household FCPs, hereafter) and corporate debt-driven FCPs (corporate FCPs). Note that classification of FCPs into household and corporate FCPs is possible only when both household and corporate debts data are available. Table 4.2 also reports dates of financial peaks, household financial peaks and corporate financial peaks. Most years of FCPs are also identified as financial peaks, but there were some cases where FCPs in Table 4.1 are classified as normal peaks in Table 4.2, which are marked by * in Table 4.1. FCPs marked with ** in Table 4.1 are not classified as financial peaks in Table 4.2 due to lack of private debt data.

Table 5 presents summary statistics during expansions and recessions in advanced economies and EMEs. In Table 5.1, as explained, FCPs are distinguished from normal peaks by utilizing crisis dates. Since crisis dates are available only after 1970, we also restrict our sample to normal peaks which occur after 1970. Out of 26 FCPs, we identify 10 household FCPs and 12 corporate FCPs. That is, financial crises are more associated with rapid increase in corporate debt than in household debt. This is a bit surprising since recent studies emphasize recessions associated with household debt buildups. In Table 5.2, we classify peaks using the second methodology based on debt buildup speed during booms. Due to the methodology that separates normal peaks and financial peaks by the median, there is approximately the same number of normal peaks (59) and financial peaks (65). Out of 65 financial peaks, we have both household and corporate debt data in 46 cases, and they are divided into 20 household financial peaks and 24 corporate financial peaks. Again, there are more financial peaks driven by corporate debt than household debt.

[22] Results are not reported for brevity purpose but are available upon request.

Table 4: Normal Peaks and Financial Peaks for Individual Economies

Table 4.1: Financial-crisis peaks based on crisis dates

Advanced Economies			Italy	Financial	1989 2007	Hungary	Financial	
Australia	Financial	1989		HHD Fin.	1989		HHD Fin.	
	HHD Fin.			Corp Fin.	2007		Corp Fin.	
	Corp Fin.	1989	Japan	Financial	1991 1997*	Indonesia	Financial	1997
Austria	Financial	2008		HHD Fin.	1997		HHD Fin.	
	HHD Fin.			Corp Fin.	1991		Corp Fin.	
	Corp Fin.	2008	Netherlands	Financial	2008*	Israel	Financial	
Belgium	Normal	2007		HHD Fin.	2008		HHD Fin.	
	HHD Fin.			Corp Fin.			Corp Fin.	
	Corp Fin.	2007	Norway	Financial	1986	Republic of Korea	Financial	1996 2000*
Canada	Financial			HHD Fin.	1986		HHD Fin.	2000
	HHD Fin.			Corp Fin.			Corp Fin.	1996
	Corp Fin.		New Zealand	Financial	1986	Mexico	Financial	1981** 1994
Switzerland	Financial	2008 2010		HHD Fin.			HHD Fin.	
	HHD Fin.	2010		Corp Fin.			Corp Fin.	
	Corp Fin.	2008	Portugal	Financial	2008 2010	Malaysia	Financial	1984 1997 2000*
Germany	Financial	2008		HHD Fin.			HHD Fin.	
	HHD Fin.			Corp Fin.	2008 2010		Corp Fin.	
	Corp Fin.	2008	Sweden	Financial	2007	Poland	Financial	
Denmark	Financial	1986 2007		HHD Fin.			HHD Fin.	
	HHD Fin.			Corp Fin.	2007		Corp Fin.	
	Corp Fin.	2007	United States	Financial	1989 2007	Russian Federation	Financial	2008
Spain	Financial	2007		HHD Fin.	1989 2007		HHD Fin.	
	HHD Fin.			Corp Fin.			Corp Fin.	2008
	Corp Fin.	2007	**Emerging Economies**			Saudi Arabia	Financial	
Finland	Financial		Argentina	Financial	1980**		HHD Fin.	
	HHD Fin.			HHD Fin.			Corp Fin.	
	Corp Fin.			Corp Fin.		Singapore	Normal	
France	Financial	2007	Brazil	Financial	1997**		Financial	
	HHD Fin.	2007		HHD Fin.			Corp Fin.	
	Corp Fin.			Corp Fin.		Thailand	Financial	1996
United Kingdom	Financial	1973 2007	Colombia	Financial	1997**		HHD Fin.	
	HHD Fin.	2007		HHD Fin.			Corp Fin.	
	Corp Fin.	1973		Corp Fin.		Turkey	Financial	1990* 1993* 2000*
Greece	Financial	1991* 2008	Czech Republic	Financial	1996*		HHD Fin.	1993 2000
	HHD Fin.	2008		HHD Fin.			Corp Fin.	1990
	Corp Fin.			Corp Fin.				
Ireland	Financial	2007	Hong Kong, China	Financial				
	HHD Fin.			HHD Fin.				
	Corp Fin.			Corp Fin.				

Notes: We report years of financial crisis peaks (FCPs) for individual economies. Peaks and troughs are defined as local maxima and minima of cyclical parts of per capita log real gross domestic product calculated by using the Hodrick–Prescott filter. We define FCPs by using Reinhart and Rogoff (2009) and Laeven and Valencia (2013) definitions of financial crisis. That is, if the next year after a peak is defined either as a banking crisis a là Reinhart and Rogoff or a financial crisis a là Laeven and Valencia, then the peak is considered as an FCP and otherwise as a normal peak. We also divide financial peaks into household (HHD) debt-driven FCP and corporate (Corp.) debt-driven FCP depending by comparing annual changes in household debts and corporate debts in the preceding boom. FCPs marked with * are classified as normal peaks in Table 4.2. FCPs marked with ** are not classified as financial peaks in Table 4.2 as private credit data are not available. All other FCPs are also identified as financial peaks in Table 4.2.
Source: Authors' calculation.

Table 4.2: Financial peaks based on buildup speed of private debts

Advanced Economies								
Australia	Normal	1964 1969 1976 1999	Italy	Normal	1976 1980 2001 2011	Hungary	Normal	2014
	Financial	1981 1985 1989 2007		Financial	1970 1989 2007		Financial	2006
	HHD Fin.	2007		HHD Fin.	1989		HHD Fin.	
	Corp Fin.	1981 1985 1989		Corp Fin.	1870 2007		Corp Fin.	2006
Austria	Normal	1983 2011	Japan	Normal	1997 2007 2013	Indonesia	Normal	1981 1984 2012
	Financial	1964 1973 1977 1979 1991 2000 2008		Financial	1973 1991		Financial	1997
	HHD Fin.			HHD Fin.	1973		HHD Fin.	
	Corp Fin.	2000 2008		Corp Fin.	1991		Corp Fin.	
Belgium	Normal	1980 1990 2011	Netherlands	Normal	1964 2008 2011	Israel	Normal	2011
	Financial	1976 2000 2007		Financial	1973 1979 1990 2000		Financial	2000 2007
	HHD Fin.			HHD Fin.	2000		HHD Fin.	
	Corp Fin.	2000 2007		Corp Fin.			Corp Fin.	2000 2007
Canada	Normal	1966 1988 2000	Norway	Normal	1967 1980 1997	Republic of Korea	Normal	1973 1978 1988 2000 2004 2011
	Financial	1973 1981 2014		Financial	1986 2007 2014		Financial	1969 1996 2002 2007
	HHD Fin.	1973		HHD Fin.	1986 2014		HHD Fin.	2002
	Corp Fin.	1981 2014		Corp Fin.	2007		Corp Fin.	1969 1996 2007
Switzerland	Normal	1964 1973 1985 2000 2008 2010	New Zealand	Normal	1969 2014	Mexico	Normal	2000 2007 2012
	Financial	1981 1990		Financial	1974 1986 1996 1999 2007		Financial	1985 1994
	HHD Fin.			HHD Fin.	1999 2007		HHD Fin.	
	Corp Fin.			Corp Fin.	1996		Corp Fin.	
Germany	Normal	1965 1979 1991 2008 2011	Portugal	Normal	1968 1980 1991 2010	Malaysia	Normal	1966 2000 2008
	Financial	1973 2001		Financial	1973 2000 2008		Financial	1973 1984 1997 2014
	HHD Fin.			HHD Fin.	2000		HHD Fin.	2014
	Corp Fin.	2001		Corp Fin.	2008		Corp Fin.	
Denmark	Normal	1979	Sweden	Normal	1970 1975 2000 2011	Poland	Normal	
	Financial	1969 1986 2000 2007		Financial	1989 2007		Financial	2007
	HHD Fin.			HHD Fin.			HHD Fin.	2007
	Corp Fin.	2007		Corp Fin.	2007		Corp Fin.	
Spain	Normal	1990	United States	Normal	1979 2014	Russian Federation	Normal	
	Financial	1974 2007		Financial	1955 1966 1973 1989 2000 2007		Financial	2008
	HHD Fin.			HHD Fin.	1955 1966 1989 2007		HHD Fin.	
	Corp Fin.	2007		Corp Fin.	1973 2000		Corp Fin.	2008
Finland	Normal	1973 1980 2000	**Emerging Economies**			Saudi Arabia	Normal Peaks	2000 2008 2012
	Financial	1989 2007 2011	Argentina	Normal	2007 2011		Financial	2005
	HHD Fin.	1989 2007 2011		Financial	1987 1998		HHD Fin.	
	Corp Fin.			HHD Fin.			Corp Fin.	2005
France	Normal	1979 1982	Brazil	Corp Fin.		Singapore	Normal	1990 2000 2007
	Financial	1990 2000 2007 2011		Normal	2000 2008		Financial	1984 1997 2011
	HHD Fin.	2007		Financial	2011		HHD Fin.	2011
	Corp Fin.	1990 2000 2011		HHD Fin.	2011		Corp Fin.	1997
United Kingdom	Normal	1968 1979 2014	Colombia	Corp Fin.		Thailand	Normal Peaks	2007 2010
	Financial	1973 1988 2007		Normal	2007 2011		Financial	1978 1996 2012
	HHD Fin.	1988 2007		Financial			HHD Fin.	2012
	Corp Fin.	1973		HHD Fin.			Corp Fin.	
Greece	Normal	1976 1979 1991	Czech Republic	Corp Fin.		Turkey	Normal	1990 1993 2000
	Financial	2008		Normal	1996 2007		Financial	1997 2007 2011
	HHD Fin.	2008		Financial	2011		HHD Fin.	2007
	Corp Fin.			HHD Fin.			Corp Fin.	1997 2011
Ireland	Normal	1979 1990 2014	Hong Kong, China	Corp Fin.	2011			
	Financial	2007		Normal	1984 1994			
	HHD Fin.			Financial	1981 1988 2007 2011			
	Corp Fin.			HHD Fin.				
				Corp Fin.	2007 2011			

Notes: We report years of financial peaks for individual economies. Peaks and troughs are defined as local maxima and minima of cyclical parts of per capita log real gross domestic product (GDP) calculated by using the Hodrick–Prescott filter. We calculate average annual change of the debt to GDP ratio of private nonfinancial sector during expansion and, if it is less than the median of the sample, the corresponding peak is defined as a normal peak and otherwise as a financial peak. Financial peaks are also divided into household (HHD) financial and corporate (Corp.) financial peaks, depending on whether average annual change of the debt to GDP ratio of households is greater than that of the debt-to-GDP ratio of the nonfinancial corporate sector.
Source: Authors' calculation.

In advanced economies, average growth rates of output, consumption, and investment are higher during expansions before normal peaks than before FCPs.[23] However, during recessions, the growth rates are much lower after FCPs than after normal peaks. Comparing household FCPs with corporate FCPs, we find that the average output growth rate related to corporate FCP is slightly lower during expansions and substantially lower during recessions. This further suggests that corporate debt buildups can be at least as damaging as household debt buildups. The same pattern emerges in Table 5.2 where we use financial peaks instead of FCPs.

In both Tables 5.1 and 5.2, the speed of buildups of private debt, household debt, and corporate debt does not slow down after normal peaks, FCPs, and household and corporate FCPs, indicating that debt deleveraging during recessions is a difficult process. However, there is strong evidence that price increases of assets, such as housing and equities decline substantially after FCPs or financial peaks, but not normal peaks, irrespective of whether FCPs or financial peaks are driven by household or corporate debt.

In EMEs, the growth rates of output, consumption, and investment during expansions are comparable across normal peaks and FCPs, but those for FCPs are much lower during recessions in both Tables 5.1 and 5.2. Again, there is no evidence of debt deleveraging during recessions. In Table 5.1, out of 17 FCPs, there are only six cases where both household and corporate debt data are available, and they are divided into equal number of household and corporate FCPs. In Table 5.2, we observe relatively more financial peaks and they are divided into 7 household financial peaks and 14 corporate financial peaks. Even in EMEs, there are more financial peaks where corporate debt increased more rapidly than household debt. The growth rate of output related to corporate financial peaks is slightly lower both during expansions and recessions. The growth rates of consumption and investment are also lower during corporate financial peak recessions than household financial peak recession. Again, our evidence suggests that corporate debt buildups are at least as damaging as household debt buildups in EMEs.

From now on, we will focus on financial peaks rather than FCPs.[24] In Table 6, we compare normal peak recessions with financial peak recessions more systematically by regressing future growth rates at various lead intervals on normal peak and financial peak dummies. The same methodology was used by Jordà, Schularick, and Taylor (2013) to compare normal peaks with FCPs for 14 advanced economies for a much longer period, from 1870 to 2008.[25] Note that we cover more economies, including a substantial number of EMEs, and define financial peaks based on the speed of debt buildups rather than crisis dates. Most importantly, we distinguish between household and corporate financial peaks, unlike Jordà, Schularick, and Taylor (2013).

Jordà, Schularick, and Taylor (2013) estimate the following unconditional path of the cumulative response of the variable y to a treatment x at time t(r):

$$\mathrm{CR}\left(\Delta_h y_{it(r)+h}, \delta\right) = E_{it(r)}\left(\Delta_h y_{it(r)+h} \middle| x_{it(r)} = \bar{x} + \delta\right) \tag{4}$$

$$-E_{it(r)}\left(\Delta_h y_{it(r)+h} \middle| x_{it(r)} = \bar{x}\right), \mathrm{h} = 1, .., \mathrm{H}$$

[23] In fact, the average duration of expansions before FCPs is much longer than that before normal peaks. Hence the amplitude of the variables of the FCPs is higher than that of normal peaks. However, as reported in Table 5.1, the annual growth rate, the amplitude divided by duration, is actually lower during expansions before FCPS than before normal peaks.

[24] The results, based on FCPs, are quite similar and are available upon request.

[25] We gratefully appreciate Jordà, Schularick, and Taylor (2013) for sharing their Stata program for generating the regression results. Stata is a general purpose statistical software package created in 1985 by StataCorp.

where $\mathrm{CR}(\Delta_h y_{it(r)+h}, \delta)$ denotes the average cumulated response of *y* across economies and recessions, *h* periods in the future, with the treatment variable *x* of a given size δ change. Following Jordà, Schularick, and Taylor (2013), *x* could be a discrete treatment for normal recessions, i.e., recessions following normal peaks, and financial recessions, i.e., recessions following financial peaks. At various times, we introduce controls for recessions following peaks (normal peak [NP], financial peak [FP]) into x as a discrete treatment, and also "excess credit" variable in a continuous form.

Table 5: Summary Statistics of Booms and Recessions

Table 5.1: Financial crisis peaks based on crisis dates

Advanced Economies																
	Normal Peaks				Financial Crisis Peaks				HHD Financial Peaks				Corp. Financial Peaks			
	Boom		Recession		Boom		Recession		Boom		Recession		Boom		Recession	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Δy_{na}	3.53	95	−0.05	88	2.58	26	−2.10	26	2.59	10	−1.61	10	2.36	12	−2.85	12
	(1.63)		(1.72)		(1.11)		(2.15)		(0.89)		(2.63)		(0.91)		(1.55)	
ΔC	3.72	95	0.87	88	3.07	26	−0.25	26	2.95	10	−0.95	10	3.24	12	0.01	12
	(1.77)		(2.12)		(1.08)		(3.01)		(1.01)		(3.76)		(1.03)		(2.55)	
ΔI	6.86	95	−4.63	88	5.74	26	−8.11	26	4.07	10	−8.49	10	6.87	12	−8.79	12
	(4.58)		(6.65)		(3.58)		(7.02)		(4.90)		(7.91)		(1.60)		(6.51)	
ΔNX	−0.50	95	0.55	88	−0.46	26	0.95	26	−0.52	10	0.86	10	−0.63	12	0.88	12
	(1.27)		(1.29)		(0.63)		(1.56)		(0.48)		(1.06)		(0.70)		(1.94)	
Δd_{priv}	1.26	91	2.10	88	4.27	26	5.96	26	3.14	10	3.17	10	4.94	12	7.52	12
	(3.38)		(3.14)		(4.31)		(8.20)		(3.00)		(5.68)		(5.11)		(7.03)	
Δd_{hhd}	0.73	59	1.08	62	1.99	22	2.36	23	2.39	10	1.82	10	1.66	12	2.58	12
	(2.19)		(1.61)		(2.16)		(2.52)		(1.46)		(2.49)		(2.63)		(2.58)	
Δd_{corp}	0.28	56	1.11	60	2.04	22	4.26	23	0.60	10	1.22	10	3.25	12	4.94	12
	(2.51)		(2.95)		(2.59)		(6.87)		(1.75)		(3.63)		(2.61)		(5.42)	
Δhp	8.68	78	5.23	76	7.10	24	−1.39	25	6.43	9	−1.45	10	6.28	12	−0.89	12
	(6.61)		(6.40)		(4.95)		(5.33)		(4.07)		(4.83)		(5.50)		(4.81)	
$\Delta stock$	8.08	88	2.80	83	7.78	25	−0.16	26	7.74	10	1.77	10	5.09	12	0.96	12
	(11.28)		(13.11)		(11.52)		(18.49)		(11.37)		(16.16)		(11.06)		(21.23)	
ΔM_2	8.94	40	7.58	35	10.30	13	6.48	13	7.91	6	5.74	6	10.98	5	5.00	5
	(5.80)		(4.32)		(4.72)		(4.47)		(2.91)		(3.06)		(5.65)		(2.30)	
D_{exp}			3.19	88			2.96	26			3.10	10			2.08	12
			(1.96)				(1.87)				(1.73)				(1.38)	
D_{rcn}	4.27	95			5.85	26			6.10	10			4.75	12		
	(2.18)				(3.54)				(4.28)				(2.56)			

continued on next page

Table 5.1 *continued*

Emerging Market Economies																
	Normal Peaks				Financial Crisis Peaks				HHD Financial Peaks				Corp. Financial Peaks			
	Boom		Recession		Boom		Recession		Boom		Recession		Boom		Recession	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Δy_{na}	5.35	85	–0.77	84	5.31	17	–3.47	17	6.39	3	–3.57	3	7.27	3	–0.16	3
	(3.51)		(4.14)		(2.08)		(4.00)		(2.23)		(6.39)		(0.40)		(0.94)	
ΔC	5.69	85	0.87	84	6.55	17	–3.84	17	7.48	3	–2.65	3	11.46	3	0.70	3
	(4.69)		(5.48)		(3.47)		(5.62)		(2.11)		(6.01)		(3.04)		(4.45)	
ΔI	9.86	85	–3.76	84	10.88	17	–24.46	17	13.83	3	–30.77	3	10.13	3	–13.83	3
	(8.08)		(9.91)		(3.87)		(19.89)		(2.39)		(28.81)		(4.00)		(10.29)	
ΔNX	–0.07	85	0.03	84	–1.11	18	2.67	18	–1.97	3	1.51	3	–0.76	3	2.06	3
	(1.94)		(5.41)		(1.28)		(3.98)		(0.88)		(3.33)		(1.22)		(3.37)	
Δd_{priv}	0.69	57	2.99	58	0.89	13	–0.25	16	–3.17	3	1.10	3	2.78	3	3.63	3
	(5.45)		(4.94)		(7.11)		(7.44)		(6.49)		(1.06)		(2.18)		(3.36)	
Δd_{hhd}	0.95	43	1.59	44	1.11	6	0.33	11	1.48	3	0.80	3	0.74	3	0.07	3
	(2.13)		(2.04)		(0.67)		(2.00)		(0.56)		(4.10)		(0.64)		(0.91)	
Δd_{corp}	–0.16	43	1.80	44	–1.19	6	1.04	11	–4.32	3	0.47	3	1.94	3	3.27	3
	(4.62)		(3.38)		(5.14)		(2.91)		(5.88)		(4.03)		(1.48)		(3.39)	
Δhp	10.55	21	7.51	23	5.47	4	–0.40	6	0.25	1	3.86	1	–0.36	1	–3.37	1
	(9.52)		(9.01)		(9.98)		(5.33)		.		.		.		.	
$\Delta stock$	12.16	33	9.30	33	0.63	7	4.75	10	–32.56	2	35.15	2	–9.51	1	–7.33	1
	(14.77)		(21.27)		(31.52)		(22.20)		(38.37)		(4.71)		.		.	
ΔM_2	27.04	77	31.37	75	36.45	17	32.28	17	37.07	3	71.32	3	30.16	3	31.71	3
	(36.39)		(48.06)		(31.52)		(28.46)		(15.34)		(15.78)		(13.72)		(24.87)	
D_{exp}			2.81	84			2.12	17			1.00	3			3.00	3
			(1.74)				(1.45)				(0.00)				(2.65)	
D_{rcn}	3.94	85			5.00	17			1.67	3			4.67	3		
	(2.86)				(3.41)				(0.58)				(4.73)			

Notes: Peaks and troughs are defined as local maxima and minima of cyclical parts of per capita log real gross domestic product calculated by using the Hodrick–Prescott filter. We define financial peaks by using Reinhart and Rogoff (2009) and Laeven and Valencia (2013) definitions of financial crisis. Since crisis dates are available after 1970, we also restrict to normal peaks after 1970. If the next year after a peak is defined either as a banking a là Reinhart and Rogoff or a banking crisis a là Laeven and Valencia, then the peak is considered as a financial peak and otherwise as a normal peak. We also divide financial peaks into household (HHD) financial and corporate (Corp.) financial peaks depending by applying the same methodology as in Table 2.1. See notes for Table 2.1 for others.
Source: Authors' calculation based on various data sources.

Table 5.2: Financial peaks based on buildup speed of private debts

Advanced Economies

	Normal Peaks				Financial Peaks				HHD Financial Peaks				Corp. Financial Peaks			
	Boom		Recession		Boom		Recession		Boom		Recession		Boom		Recession	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Δy_{na}	3.52	64	0.16	59	3.39	67	−0.64	65	3.39	21	−0.65	20	2.77	25	−1.14	24
	(1.76)		(1.77)		(1.50)		(2.05)		(1.50)		(2.37)		(1.23)		(1.98)	
ΔC	3.59	64	0.79	59	3.57	67	0.64	65	3.89	21	0.27	20	3.28	25	0.64	24
	(2.25)		(2.38)		(1.35)		(2.30)		(1.30)		(2.13)		(1.33)		(2.17)	
ΔI	6.78	64	−3.61	59	6.77	67	−5.58	65	6.38	21	−5.08	20	6.06	25	−6.36	24
	(5.19)		(5.82)		(3.93)		(6.92)		(3.09)		(6.73)		(3.85)		(6.11)	
ΔNX	−0.32	64	0.39	59	−0.50	67	0.57	65	−0.98	21	0.55	20	−0.27	25	0.66	24
	(1.32)		(2.13)		(1.03)		(1.39)		(1.21)		(1.58)		(0.75)		(1.40)	
Δd_{priv}	−0.99	64	2.36	59	4.50	67	3.59	65	4.60	21	3.09	20	4.61	25	4.07	24
	(2.07)		(3.54)		(2.64)		(5.60)		(2.27)		(3.81)		(3.12)		(6.04)	
Δd_{hhd}	−0.39	38	1.36	38	2.26	46	1.40	49	3.00	21	1.39	20	1.64	25	1.31	24
	(1.93)		(1.86)		(1.65)		(2.06)		(1.49)		(1.65)		(1.55)		(2.27)	
Δd_{corp}	−1.15	36	1.28	37	2.34	44	2.77	47	1.41	21	1.61	20	3.18	23	2.95	22
	(2.16)		(2.91)		(1.75)		(5.15)		(1.04)		(3.04)		(1.86)		(4.60)	
Δhp	6.83	54	5.01	52	9.23	56	2.27	57	8.56	19	1.13	19	8.28	22	2.32	23
	(6.70)		(6.32)		(5.43)		(6.87)		(4.64)		(6.67)		(5.65)		(5.86)	
$\Delta stock$	6.27	57	4.84	54	9.53	64	−1.41	63	12.03	21	−4.25	20	9.18	25	−1.36	24
	(13.63)		(13.54)		(9.38)		(14.01)		(7.67)		(11.48)		(9.73)		(17.66)	
ΔM_2	6.79	30	7.99	26	11.65	31	7.27	31	11.68	11	7.12	11	12.44	12	6.19	12
	(3.73)		(3.81)		(5.35)		(4.49)		(5.83)		(4.67)		(4.31)		(2.70)	
D_{exp}	3.69	64			5.07	67			5.62	21			4.68	25		
	(2.21)				(2.84)				(3.38)				(1.97)			
D_{rcn}			3.05	59			3.37	65			3.65	20			2.63	24
			(1.78)				(2.02)				(1.95)				(1.47)	

continued on next page

Table 5.2 *continued*

Emerging Market Economies																
	Normal Peaks				Financial Peaks				HHD Financial Peaks				Corp. Financial Peaks			
	Boom		Recession		Boom		Recession		Boom		Recession		Boom		Recession	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Δy_{na}	5.28	38	0.09	33	5.59	34	−1.02	33	5.93	7	0.91	6	5.15	14	0.01	14
	(2.22)		(3.32)		(2.15)		(3.72)		(1.33)		(2.25)		(1.79)		(2.35)	
ΔC	6.14	38	2.09	33	6.15	34	−0.48	33	7.23	7	2.03	6	5.86	14	1.44	14
	(4.12)		(4.37)		(3.09)		(6.45)		(1.93)		(2.04)		(3.27)		(6.84)	
ΔI	11.22	38	−4.45	33	11.02	34	−10.94	33	13.51	7	−3.37	6	8.41	14	−5.41	14
	(7.44)		(13.99)		(6.92)		(17.79)		(5.25)		(10.52)		(8.24)		(13.12)	
ΔNX	0.03	38	−0.99	33	−0.85	34	2.71	33	−0.74	7	0.80	6	−0.85	14	2.99	14
	(2.16)		(3.05)		(1.83)		(7.81)		(1.55)		(0.89)		(2.47)		(11.51)	
Δd_{priv}	−2.85	38	2.97	33	4.83	34	2.26	33	3.55	7	4.04	6	5.50	14	3.63	14
	(4.47)		(4.10)		(3.82)		(7.10)		(2.33)		(4.71)		(5.25)		(4.76)	
Δd_{hhd}	0.31	29	1.84	27	1.88	21	0.94	23	3.74	7	1.44	6	0.94	14	0.81	14
	(1.42)		(2.47)		(2.30)		(1.14)		(2.85)		(1.61)		(1.27)		(0.92)	
Δd_{corp}	−2.57	29	1.25	27	3.02	21	2.53	23	0.02	7	2.60	6	4.52	14	2.66	14
	(2.91)		(2.85)		(4.62)		(3.78)		(1.43)		(3.38)		(4.96)		(4.32)	
Δhp	6.67	14	4.84	14	11.83	9	4.24	12	12.24	4	8.80	3	10.06	4	6.05	5
	(9.59)		(5.79)		(8.17)		(9.66)		(9.35)		(3.84)		(8.75)		(6.61)	
$\Delta stock$	9.99	21	15.02	19	9.74	17	2.52	19	5.99	6	6.63	5	3.16	6	9.65	7
	(21.66)		(19.37)		(16.10)		(23.71)		(17.05)		(11.41)		(12.28)		(32.45)	
ΔM_2	16.90	36	18.75	32	21.45	32	22.67	31	12.87	7	8.53	6	19.70	14	16.61	14
	(11.18)		(21.02)		(17.89)		(43.44)		(4.30)		(5.18)		(17.68)		(16.18)	
D_{exp}	3.32	38			4.74	34			2.71	7			4.79	14		
	(2.63)				(3.18)				(1.98)				(3.36)			
D_{rcn}			2.36	33			2.79	33			3.00	6			2.79	14
			(1.64)				(1.67)				(2.10)				(1.48)	

Notes: Peaks and troughs are defined as local maxima and minima of cyclical parts of per capita log real gross domestic product (GDP) calculated by using the Hodrick–Prescott filter. We divide peaks into approximately the same number of normal peaks and financial peaks. We calculate average annual change of the debt-to-GDP ratio of private nonfinancial sector during expansion and, if it is less than the median of the sample, the corresponding peak is defined as a normal peak and otherwise as a financial peak. Financial peaks are also divided into household (HHD) financial and corporate (Corp.) financial peaks, depending on whether average annual change of the debt-to-GDP ratio of households is greater than that of the debt-to-GDP ratio of the nonfinancial corporate sector. ΔNX and ΔM_2 are annual growth of net exports and M_2, respectively. For other variables, see notes for Table 2.1. We report average annual change (for ratios) or log difference (for levels) during booms (before the peak) and recession (after the peak). Standard deviation is in parentheses.
Source: Authors' calculation based on various data sources.

Table 6 compares the recession paths of cumulative changes in output, consumption, and investment at different horizons, of 1–5 years, by treating *x* as a binary indicator for normal or financial recession. By normalizing the peak year reference level of log real per capita GDP set equal to zero, we report log deviations of cumulative changes in output (upper panel), consumption (middle panel), and investment (lower panel) from the reference multiplied by 100 in Table 6.1 for advanced economies and Table 6.2 for all economies.[26] The reported p-value of the F-test is for the test for equality of cumulative changes in normal and financial recessions at different horizons.

[26] The number of FCPs and household and corporate FCPs is small for EMEs. So, instead of reporting the estimates separately, we combine advanced economies and EMEs together to generate estimates for the full sample.

Table 6: Recession Paths of Gross Domestic Product, Consumption, and Investment after Normal and Financial Peaks

Table 6.1: Advanced economies

Variables	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$
Normal peak	0.48+	1.4**	3.0**	5.3**	7.8**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.26]	[0.51]	[0.68]	[0.87]	[1.02]
Financial peak	−0.18	−0.85+	0.32	1.8*	2.9**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.23]	[0.46]	[0.61]	[0.78]	[0.92]
R^2	0.04	0.09	0.15	0.27	0.38
p-value (normal vs. financial)	0.06	0.00	0.00	0.00	0.00
N normal peaks	51	51	51	51	51
N financial peaks	63	63	63	63	63
Variables	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$
Normal peak	0.83+	1.6*	2.8**	5.0**	7.5**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.43]	[0.62]	[0.89]	[1.09]	[1.21]
Financial peak	1.7**	1.7**	2.6**	4.5**	6.8**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.39]	[0.56]	[0.80]	[0.98]	[1.08]
R^2	0.17	0.12	0.16	0.27	0.41
p-value (normal vs. financial)	0.13	0.93	0.89	0.75	0.67
Observations, normal peaks	51	51	51	51	51
Observations, financial peaks	63	63	63	63	63
Variables	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$
Normal peak	−3.1**	−5.1**	−4.3*	−1.5	2.1
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[1.15]	[1.88]	[2.16]	[2.66]	[2.89]
Financial peak	−4.2**	−11.1**	−8.5**	−5.3*	−3.4
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[1.04]	[1.69]	[1.94]	[2.39]	[2.60]
R^2	0.17	0.31	0.17	0.04	0.02
p-value (normal vs. financial)	0.46	0.02	0.15	0.29	0.16
Observations, normal peaks	51	51	51	51	51
Observations, financial peaks	63	63	63	63	63

Notes: The sample includes 21 advanced economies listed in Appendix Table A.1. The dependent variables y_{it}, c_{it}, i_{it} denote per capita real gross domestic product (GDP), real consumption, and investment for country *i*, and Δ_τ denotes τ-year log difference. For example, $\Delta_\tau y_{it+\tau}$, $\tau = 1,2, \ldots ,5$ is *i*-year growth rate of per capita GDP from the peak. The explanatory variables are dummy variables that take one if the year corresponds to normal and financial peaks, respectively. Financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The three panels show unconditional paths of per capita GDP, real consumption, and investment, respectively, after normal and financial peaks. The reported p-value is for the test for equality of coefficients of normal and financial peaks. Numbers in brackets are standard errors, and **, *, and + denote the significance levels of 1%, 5%, and 10%, respectively.

Table 6.2: Whole economies

Variables	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$
Normal peak	0.35	1.7**	4.5**	7.2**	10.3**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.33]	[0.51]	[0.69]	[0.88]	[1.01]
Financial peak	−0.56+	−1.1*	0.80	2.6**	4.5**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.31]	[0.48]	[0.65]	[0.83]	[0.96]
R^2	0.03	0.09	0.21	0.32	0.43
p-value (normal vs. financial)	0.05	0.00	0.00	0.00	0.00
Observations, normal peaks	80	80	80	80	80
Observations, financial peaks	90	90	90	90	90
Variables	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$
Normal peak	1.7**	2.9**	5.5**	8.0**	11.3**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.52]	[0.78]	[1.02]	[1.29]	[1.45]
Financial peak	1.1*	1.1	3.4**	6.3**	9.4**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.49]	[0.73]	[0.96]	[1.21]	[1.37]
R^2	0.09	0.09	0.20	0.28	0.39
p-value (normal vs. financial)	0.38	0.09	0.14	0.32	0.34
Observations, normal peaks	80	80	80	80	80
Observations, financial peaks	90	90	90	90	90
Variables	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$
Normal peak	−2.1	−3.3	−0.5	3.6	7.5**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[1.53]	[2.01]	[2.29]	[2.67]	[2.89]
Financial peak	−6.6**	−13.8**	−10.0**	−7.1**	−3.8
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[1.45]	[1.90]	[2.16]	[2.52]	[2.72]
R^2	0.12	0.25	0.11	0.05	0.05
p-value (normal vs. financial)	0.03	0.00	0.00	0.00	0.00
Observations, normal peaks	80	80	80	80	80
Observations, financial peaks	90	90	90	90	90

Notes: The sample includes 17 emerging market economies listed in Appendix Table A.1. The dependent variables y_{it}, c_{it}, i_{it} denote per capita real gross domestic product, real consumption, and investment for country *i*, and Δ_τ denotes τ-year log difference. The explanatory variables are dummy variables that take one if the year corresponds to normal and financial peaks, respectively. For other, see notes for Table 5.1.
Source: Authors' calculation.

In advanced economies, in the upper panel, we observe a clear difference in cumulative output changes between normal and financial recessions. At every horizon, the p-value is close to 0, except for $h = 1$, at which it is 0.06. Hence, we conclude that cumulative changes in output are lower after financial peaks than after normal peaks at high levels of statistical significance.[27] However, in the middle and lower panels, while cumulative changes in consumption and investment are lower in financial recessions, the difference is mostly insignificant. When we extend the sample to include EMEs in Table 6.2, the p-value for the test for equality of cumulative output changes in normal and financial recessions suggests more statistical significance. While the p-value for

[27] This finding is also emphasized by Jordà, Schularick, and Taylor (2013).

cumulative changes in consumption is still not low, the p-value for cumulative changes in investment is even lower than that for cumulative changes in output. This implies that financial recessions are especially damaging for investment.

Table 7 reports cumulative changes in output, consumption, and investment in normal, household financial, and corporate financial recessions when we extend the discrete treatment to distinguish between household and corporate financial peaks. We report the results for advanced economies in Table 7.1 and for all economies in Table 7.2. In Table 7.1, the number of normal peaks, household financial peaks, and corporate financial peaks is 51, 19, and 23, respectively. We observe that cumulative changes in output are substantially lower in both household and corporate financial recessions than in normal recessions. However, there is no statistically significant difference between cumulative output changes of household and corporate financial recessions at any horizon. Hence, our results reconfirm that the impact of corporate financial recessions on output is as damaging as that of household financial recessions. However, in the middle panel for cumulative changes in consumption, the p-value is generally high. For both household and corporate financial recessions, cumulative consumption changes are not statistically different from those in normal recessions. In the lower panel, only cumulative investment changes in household, but not corporate. Financial recessions are statistically different from those in normal recession. In Table 7.2, which reports the results of extending the sample to include EMEs, the number of normal peaks, household financial peaks, and corporate financial peaks increases to 80, 22, and 34, respectively. Note that, when EMEs are included, the number of corporate financial peaks increases more than the household financial peaks. Hence, the likelihood of corporate financial peaks, rather than household financial peaks, is even higher in EMEs. Further, all the results are preserved except that the cumulative investment changes in both household and corporate financial recessions are statistically different from those in normal recession. Hence, including EMEs in the sample further reinforces our conclusion that corporate financial recessions are equally damaging as household financial recessions. In Figure 2, we present cumulative changes graphically before as well as after peaks. Figure 2.1 shows the cumulative changes in output, consumption, and investment for advanced economies. In the left panel, which shows cumulative changes in output, the expansion path looks similar, but cumulative changes in both household and corporate financial recessions are substantially lower than those in normal recessions. In the middle panel, which shows cumulative changes in consumption, the recession path after household financial peaks is lowest but, as reported in Table 7.1, the difference is not statistically significant. In the right panel, the recession paths of investment after household and corporate financial peaks are close at earlier horizons, but only those in household recessions are statistically different from those in normal recession at longer horizons. In Figure 2.2, we present the same graphs for EMEs. Note that, since Table 7.2 is for all economies, Figure 2.2 and Table 7.2 do not contain the same information. Figure 2.2 can help us understand why the results in Table 7.2 differ from those in Table 7.1. Figure 2.2 shows that, in EMEs, corporate recessions inflict bigger damage on output and investment than household recession. In the left panel, which shows cumulative changes in output, the recession path after corporate financial peaks is substantially lower than those after either normal peaks or household financial peaks. In the right panel, which shows cumulative changes in investment, we observe that the recession path after corporate financial peaks is much lower at longer horizons than after either normal peaks or household financial peaks. Figure 2.2 shows more directly that corporate financial recessions can have even more adverse impact on the economy than household financial recessions in EMEs.

Table 7: Recession Paths of Gross Domestic Product, Consumption, and Investment after Household Debt-Driven and Corporate Debt-Driven Financial Peaks

Table 7.1: Advanced economies

Variables	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$
Normal peak	0.48+	1.4**	3.0**	5.3**	7.8**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.25]	[0.50]	[0.66]	[0.86]	[1.03]
Household financial peak	0.15	−1.2	−1.0	−0.0	1.4
$(\Delta d_{corp} < \Delta d_{hhd})$	[0.41]	[0.82]	[1.08]	[1.41]	[1.68]
Corporation financial peak	−0.83*	−1.4+	0.5	2.1	2.9+
$(\Delta d_{hhd} < \Delta d_{corp})$	[0.37]	[0.75]	[0.99]	[1.28]	[1.53]
R^2	0.09	0.13	0.19	0.31	0.41
p-value (normal vs. household)	0.50	0.01	0.00	0.00	0.00
p-value (normal vs. corporate)	0.00	0.00	0.04	0.04	0.01
p-value (household vs. corporate)	0.08	0.88	0.31	0.27	0.52
Observations, normal peaks	51	51	51	51	51
Observations, household financial peaks	19	19	19	19	19
Observations, corporate financial peaks	23	23	23	23	23
Variables	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$
Normal peak	0.83+	1.6**	2.8**	5.0**	7.5**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.43]	[0.58]	[0.85]	[1.06]	[1.19]
Household financial peak	1.6*	0.88	0.75	2.2	5.5**
$(\Delta d_{corp} < \Delta d_{hhd})$	[0.71]	[0.95]	[1.39]	[1.73]	[1.94]
Corporation financial peak	1.7**	1.8*	3.8**	5.7**	8.7**
$(\Delta d_{hhd} < \Delta d_{corp})$	[0.65]	[0.86]	[1.26]	[1.57]	[1.76]
R^2	0.15	0.12	0.18	0.29	0.45
p-value (normal vs. household)	0.37	0.51	0.21	0.17	0.40
p-value (Normal vs. corporate)	0.27	0.88	0.53	0.71	0.56
p-value (Household vs. corporate)	0.90	0.49	0.11	0.14	0.23
Observations, normal peaks	51	51	51	51	51
Observations, household financial peaks	19	19	19	19	19
Observations, corporate financial peaks	23	23	23	23	23
Variables	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$
Normal peak	−3.1**	−5.1**	−4.3*	−1.5	2.1
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[1.12]	[1.72]	[2.06]	[2.58]	[2.98]
Household financial peak	−3.6+	−12.8**	−12.8**	−11.0*	−7.5
$(\Delta d_{corp} < \Delta d_{hhd})$	[1.84]	[2.82]	[3.38]	[4.23]	[4.89]
Corporation financial peak	−4.9**	−11.1**	−5.7+	−1.1	−0.2
$(\Delta d_{hhd} < \Delta d_{corp})$	[1.67]	[2.57]	[3.07]	[3.84]	[4.44]
R^2	0.18	0.35	0.20	0.07	0.03
p-value (normal vs. household)	0.79	0.02	0.03	0.06	0.10
p-value (normal vs. corporate)	0.36	0.06	0.71	0.94	0.67
p-value (household vs. corporate)	0.61	0.65	0.12	0.09	0.27
Observations, normal peaks	51	51	51	51	51
Observations, household financial peaks	19	19	19	19	19
Observations, corporate financial peaks	23	23	23	23	23

Notes: The sample includes 21 advanced economies listed in Appendix Table A.1. The dependent variables y_{it}, c_{it}, i_{it} denote per capita real gross domestic product, real consumption, and investment for country i, and Δ_τ denotes $\tau-$ year log difference. Household and corporate financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported three p-values are for the test for equality of coefficients of normal versus household financial peaks, normal versus corporate financial peaks, and household versus corporate financial peaks, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

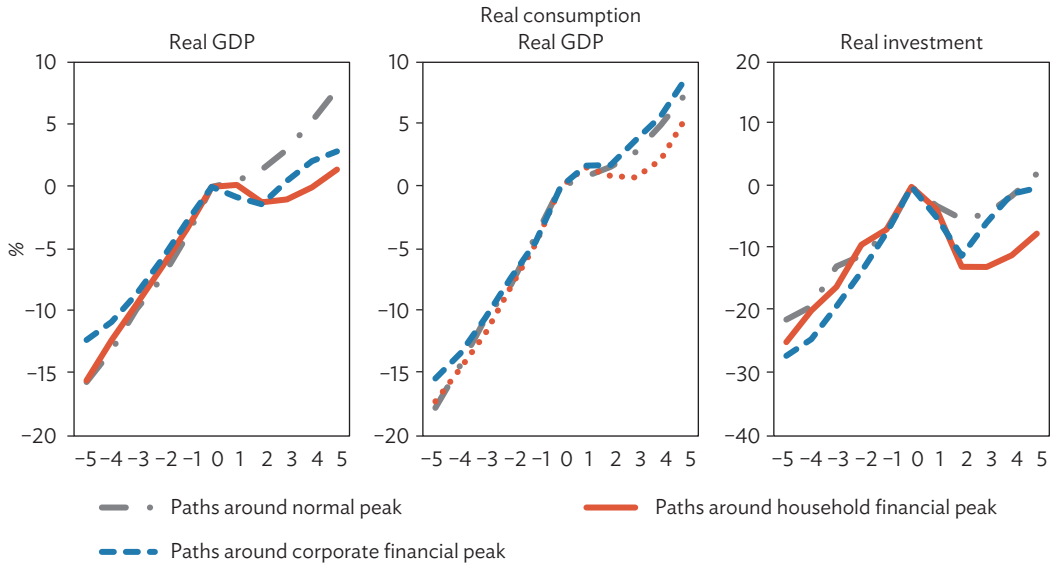
Table 7.2: Whole economies

Variables	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$
Normal peak	0.35	1.7**	4.5**	7.2**	10.3**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.28]	[0.48]	[0.65]	[0.85]	[1.01]
Household financial peak	0.38	−0.79	0.05	1.6	3.1
$(\Delta d_{corp} < \Delta d_{hhd})$	[0.53]	[0.91]	[1.23]	[1.62]	[1.92]
Corporation financial peak	−0.47	−0.89	1.6	3.3*	4.7**
$(\Delta d_{hhd} < \Delta d_{corp})$	[0.43]	[0.74]	[0.99]	[1.30]	[1.55]
R^2	0.02	0.10	0.28	0.38	0.46
p-value (normal vs. household)	0.95	0.02	0.00	0.00	0.00
p-value (normal vs. corporate)	0.11	0.00	0.02	0.01	0.00
p-value (household vs. corporate)	0.22	0.94	0.33	0.42	0.54
Observations, normal peaks	80	80	80	80	80
Observations, household financial peaks	22	22	22	22	22
Observations, corporate financial peaks	34	34	34	34	34
Variables	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$
Normal peak	1.7**	2.9**	5.5**	8.0**	11.3**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.48]	[0.74]	[1.01]	[1.27]	[1.45]
Household financial peak	2.0*	1.5	2.3	4.5+	7.9**
$(\Delta d_{corp} < \Delta d_{hhd})$	[0.91]	[1.40]	[1.92]	[2.42]	[2.76]
Corporation financial peak	2.0**	2.8*	6.5**	9.8**	13.4**
$(\Delta d_{hhd} < \Delta d_{corp})$	[0.73]	[1.13]	[1.54]	[1.95]	[2.22]
R^2	0.16	0.15	0.27	0.34	0.44
p-value (normal vs. household)	0.78	0.36	0.15	0.19	0.27
p-value (normal vs. corporate)	0.78	0.89	0.59	0.46	0.44
p-value (household vs. corporate)	0.97	0.48	0.10	0.09	0.12
Observations, normal peaks	80	80	80	80	80
Observations, household financial peaks	22	22	22	22	22
Observations, corporate financial peaks	34	34	34	34	34
Variables	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$
Normal peak	−2.1	−3.3+	−0.52	3.6	7.5**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[1.37]	[1.72]	[2.08]	[2.41]	[2.77]
Household financial peak	−2.6	−12.9**	−10.1*	−6.9	−4.1
$(\Delta d_{corp} < \Delta d_{hhd})$	[2.60]	[3.28]	[3.97]	[4.59]	[5.28]
Corporation financial peak	−5.5**	−10.0**	−3.9	−1.1	0.98
$(\Delta d_{hhd} < \Delta d_{corp})$	[2.09]	[2.64]	[3.19]	[3.69]	[4.25]
R^2	0.07	0.20	0.06	0.03	0.06
p-value (normal vs. household)	0.86	0.01	0.03	0.04	0.05
p-value (normal vs. corporate)	0.17	0.04	0.37	0.29	0.20
p-value (household vs. corporate)	0.39	0.50	0.22	0.32	0.45
Observations, normal peaks	80	80	80	80	80
Observations, household financial peaks	22	22	22	22	22
Observations, corporate financial peaks	34	34	34	34	34

Notes: The sample includes both advanced and emerging economies listed in Appendix Table A.1. The dependent variables y_{it}, c_{it}, i_{it} denote per capita real gross domestic product, real consumption, and investment for country i, and Δ_τ denotes $\tau-$ year log difference. Household and corporation financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported three p-values are for the test for equality of coefficients of normal versus household financial peaks, normal versus corporate financial peaks, and household versus corporate financial peaks, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

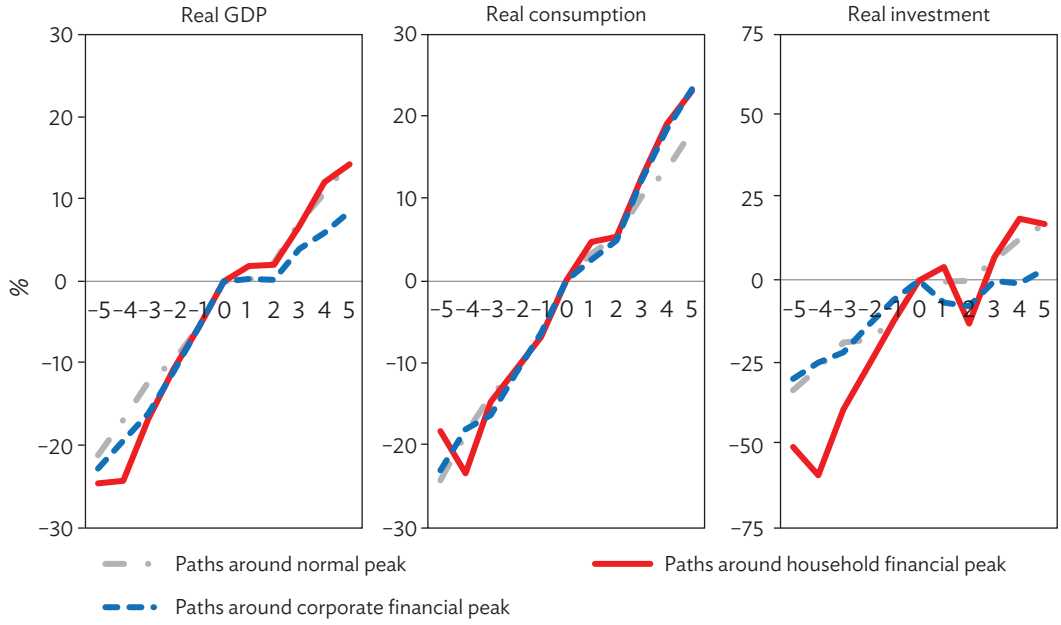
Figure 2: Unconditional Paths of Expansions and Recessions around Normal Peaks and Household and Corporate Financial Peaks

(a) Advanced economies



GDP = gross domestic product.
Notes: Solid, dashed, and dotted lines show expansion and recession paths of real output, consumption, and investment around normal peaks, and household and corporate financial peaks in advanced economies. The recession paths (t=1,...,5) are taken from estimates in Table 7.1.
Source: Authors' calculations.

(b) Emerging economies



GDP = gross domestic product.
Notes: Solid, dashed, and dotted lines show expansion and recession paths of real output, consumption and investment around normal peaks, and household and corporate financial peaks in emerging market economies. The recession paths (t=1,...,5) are taken from estimates in Table 7.2.
Source: Authors' calculations.

While the results in Table 7 are suggestive, we do not distinguish financial peaks by the extent of private debt buildup. However, as noted, the treatment can be continuous in equation (4). Therefore, we can test if more rapid buildups of private debt during expansions can be more damaging among financial recessions. Following Jordà, Schularick, and Taylor (2013), in addition to discrete treatments for normal peak and financial peak to capture average treatment response at each horizon, we include interaction terms to capture marginal treatment responses due to deviations of excess credit from its specific recession-type mean ($\xi - \bar{\xi}$) and report the results in Table 8. We define excess credit in two ways: as deviations from the mean increase in household and corporate debts, respectively. For example, the interaction terms with excess credits to households and corporations in the expansion before normal peaks are defined as $(\mathrm{NP} \times (\xi^H - \overline{\xi^H_{NP}}))$ and $(\mathrm{NP} \times (\xi^C - \overline{\xi^C_{NP}}))$, respectively, where $\xi^H - \overline{\xi^H_{NP}}$ and $\xi^C - \overline{\xi^C_{NP}}$ measure excess credit to households and corporations. Likewise, we can define the interaction terms with excess credit before financial peaks as $(\mathrm{FP} \times (\xi^H - \overline{\xi^H_{FP}}))$ and $(\mathrm{FP} \times (\xi^C - \overline{\xi^C_{FP}}))$.

In Table 8, we report estimates of the marginal treatments associated with excess credit in advanced economies (Table 8.1) and in all economies (Table 8.2). In each table, panels A, B, and C report the results for output, consumption, and investment, respectively. In Table 8.1.A, we find that the interaction terms with excess credit are not statistically significant for normal peaks. However, both excess credit to households and corporations are statistically significant for financial peaks. In addition, as underlined in Table 7, recession paths after financial peaks are lower than after normal peaks. These results suggest that financial recessions not only inflict greater damage on output, but also higher excess credit to both households and corporations from the previous expansion entails more painful recession trajectories of output after financial peaks. However, in Table 8.2.A, the results for all economies show that, while financial recessions inflict more damage on output than normal recession, the interaction terms with excess credit to households and corporation are not statistically significant.

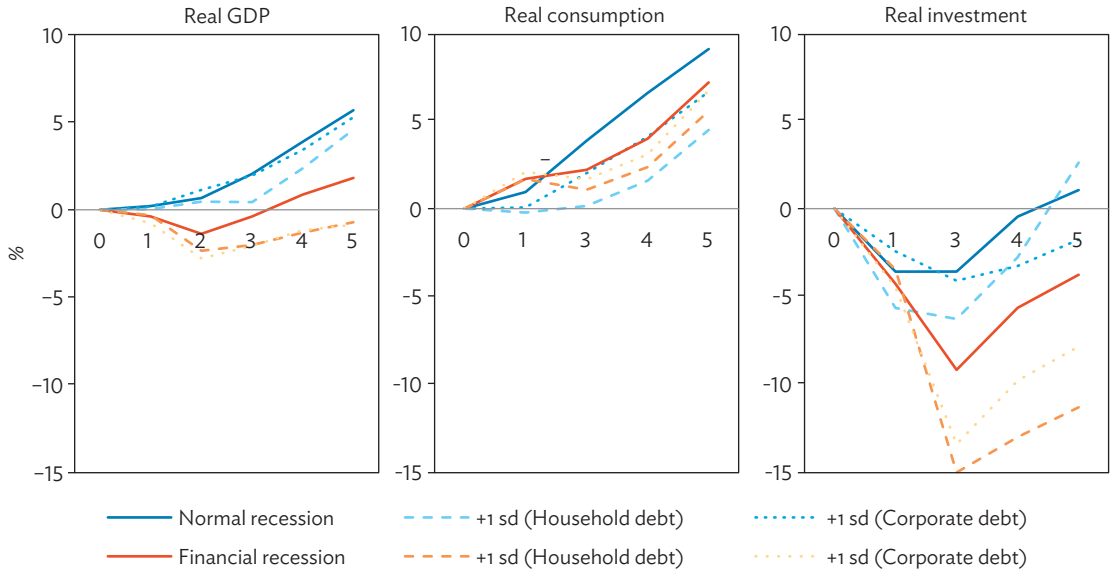
Figures 3A and 3B show the recession paths of output, consumption, and investment for advanced economies and all economies, respectively. In addition to the average paths after normal peaks and financial peaks denoted by solid lines in black and red, respectively, each figure shows the recession paths when the excess credit treatment is perturbed by one standard deviation percentage points per year increases in household and corporation debt, respectively. The left panel in Figure 3.A shows clearly that the recession path after financial peaks is lower than that after normal peaks. While the perturbation of excess credit to either households or corporations does not significantly affect the recession trajectory after normal peaks, it creates significant changes in the recession trajectory after financial peaks. In particular, one standard deviation perturbation of corporate debt moves the trajectory even lower than the same shock of household debt. In the left panel of Figure 3B, one standard deviation perturbation of corporate debt, while not statistically significant, creates a more painful trajectory in EMEs as well.

Tables 8.1.B and 8.1.C present estimates of the marginal treatments associated with excess credit for consumption and investment trajectories, respectively, in advanced economies. Interestingly, for the consumption trajectory, the interaction terms with excess credit are statistically significant only after normal peaks but not after financial peaks. However, for the investment trajectory, the interaction terms with excess credit to both households and corporations are statistically significant only after financial peaks.[28] Tables 8.2.B and 8.2.C present the same regression results for consumption and investment trajectories, respectively, in all economies. For the consumption trajectory, the interaction terms with excess credit are generally not statistically significant for both normal peaks and financial peaks. However, for the investment trajectory, the interaction terms with excess credit are statistically significant at the 10% level for corporate debt only after financial peaks.

[28] The interaction terms with household excess credit are generally more statistically significant.

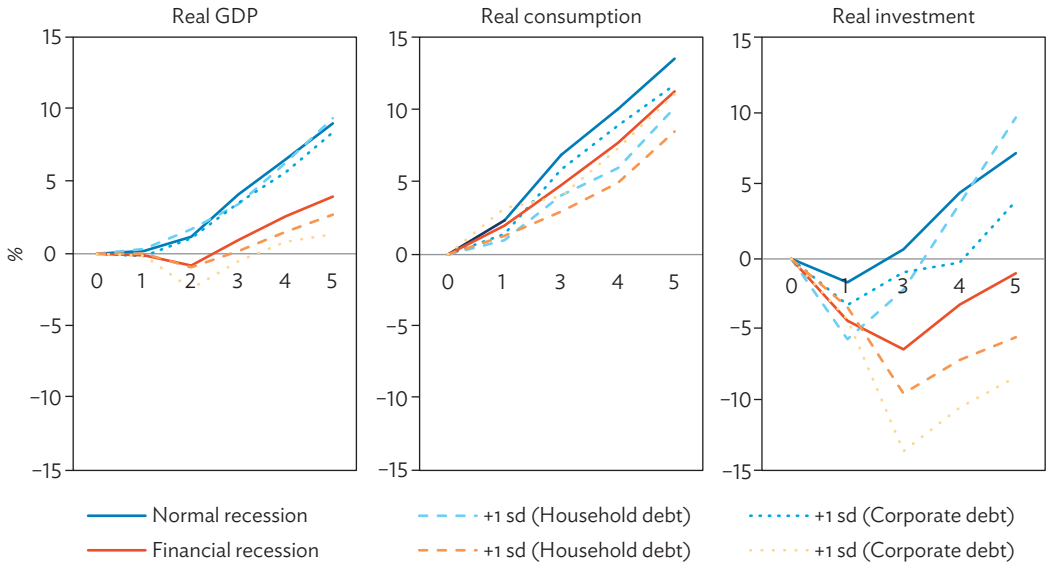
Figure 3: Recession Paths under Continuous Excess Credit Treatment

(a) Advanced economies



GDP = gross domestic product, sd = standard deviation.
Notes: Both solid lines show unconditional recession paths in advanced economies after normal peaks and financial peaks, respectively. Dashed and dotted lines are recession paths, taken from Table 8.1, with 1 standard deviation percentage points per year perturbation in excess credits to households and corporations, respectively.
Source: Authors' calculations.

(b) Whole economies



GDP = gross domestic product.
Notes: Both solid lines show unconditional recession paths in advanced economies after normal peaks and financial peaks, respectively. Dashed and dash-dotted lines are recession paths, taken from Table 8.2, with 1 standard deviation percentage points per year perturbation in excess credits to households and corporations, respectively.
Source: Authors' calculations.

Table 8: Recession Paths of Gross Domestic Product, Consumption, and Investment after Financial Peaks with Excess Credit as a Continuous Treatment

Table 8.1.A: Advanced economies, output

Variables	$\Delta_1 y_{it+1}$	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$	$\Delta_5 y_{it+5}$
Normal peak	0.04	0.22	0.69	0.67	1.8*	2.0*	3.6**	3.9**	5.7**	5.7**
	[0.40]	[0.44]	[0.71]	[0.77]	[0.87]	[1.02]	[1.13]	[1.33]	[1.28]	[1.48]
Financial peak	−0.39	−0.38	−1.2*	−1.4*	−0.0	−0.4	1.4	0.9	2.5*	1.8+
	[0.31]	[0.31]	[0.54]	[0.55]	[0.67]	[0.72]	[0.87]	[0.94]	[0.99]	[1.05]
Household excess credit × normal peak	0.00		−0.14		−0.8		−0.8		−0.7	
	[0.27]		[0.46]		[0.58]		[0.74]		[0.84]	
Household excess credit × financial peak	0.05		−0.68*		−1.2**		−1.6**		−1.9**	
	[0.19]		[0.33]		[0.41]		[0.52]		[0.59]	
Corporate excess credit × normal peak		−0.02		0.27		−0.05		−0.26		−0.23
		[0.19]		[0.33]		[0.43]		[0.56]		[0.62]
Corporate excess credit × financial peak		−0.22		−0.80*		−0.96*		−1.2*		−1.5*
		[0.18]		[0.31]		[0.41]		[0.53]		[0.59]
R^2	0.03	0.05	0.15	0.20	0.20	0.15	0.27	0.20	0.37	0.31
p-value (normal vs. financial)	0.40	0.28	0.04	0.04	0.11	0.06	0.11	0.07	0.05	0.04
p-value (credit at normal vs. financial)	0.88	0.45	0.35	0.02	0.58	0.13	0.36	0.25	0.22	0.14
Observations, normal peaks	25	23	25	23	25	23	25	23	25	23
Observations, financial peaks	42	40	42	40	42	40	42	40	42	40

Notes: The sample includes 21 advanced economies listed in Appendix Table A.1. The dependent variables y_{it} denotes per capital real gross domestic product for country i, and Δ_τ denotes τ -year log difference. Normal and financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported p-values are for the test for equality of coefficients of normal versus household financial peaks and interaction terms of household versus corporate financial excess credits, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

Table 8.1.B: Advanced economies, consumption

Variables	$\Delta_1 c_{it+1}$	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$	$\Delta_5 c_{it+5}$
Normal peak	0.45	0.95	1.5+	2.2*	2.7*	3.9**	5.2**	6.6**	7.8**	9.1**
	[0.65]	[0.72]	[0.79]	[0.89]	[1.15]	[1.32]	[1.41]	[1.64]	[1.49]	[1.73]
Financial peak	1.64**	1.70**	1.5*	1.3*	2.5**	2.2*	4.3**	4.0**	7.5**	7.2**
	[0.50]	[0.51]	[0.60]	[0.63]	[0.88]	[0.93]	[1.08]	[1.16]	[1.15]	[1.23]
Household excess credit × normal peak	−0.41		−0.69		−1.5*		−2.2*		−2.0*	
	[0.43]		[0.52]		[0.76]		[0.93]		[0.98]	
Household excess credit × financial peak	0.02		−0.68+		−0.9		−1.1+		−1.2	
	[0.30]		[0.36]		[0.53]		[0.65]		[0.69]	
Corporate excess credit × normal peak		−0.50		−0.69+		−1.1+		−1.4*		−1.4+
		[0.30]		[0.37]		[0.55]		[0.69]		[0.73]
Corporate excess credit × financial peak		0.23		−0.30		−0.31		−0.51		−0.27
		[0.29]		[0.36]		[0.53]		[0.66]		[0.69]
R^2	0.16	0.20	0.19	0.17	0.25	0.21	0.38	0.33	0.55	0.51
p-value (normal vs. financial)	0.15	0.40	1.00	0.40	0.92	0.31	0.61	0.20	0.86	0.37
p-value (credit at normal vs. financial)	0.42	0.09	0.99	0.45	0.48	0.33	0.37	0.34	0.48	0.27
Observations, normal peaks	25	23	25	23	25	23	25	23	25	23
Observations, financial peaks	42	40	42	40	42	40	42	40	42	40

Notes: The sample includes 21 advanced economies listed in Appendix Table A.1. The dependent variables c_{it} denotes per capita real consumption for country i, and Δ_τ denotes τ -year log difference. Normal and financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported p-values are for the test for equality of coefficients of normal versus household financial peaks and interaction terms of household versus corporate financial excess credits, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

Table 8.1.C: Advanced economies, investment

Variables	$\Delta_1 i_{it+1}$	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$	$\Delta_5 i_{it+5}$
Normal peak	−3.6*	−3.6+	−6.3**	−6.7**	−4.3	−3.6	−2.1	−0.45	0.46	1.1
	[1.69]	[1.91]	[2.18]	[2.36]	[2.67]	[3.21]	[3.31]	[3.99]	[3.60]	[4.33]
Financial peak	−4.4**	−4.3**	−11.6**	−11.7**	−8.3**	−9.2**	−4.8+	−5.7+	−2.7	−3.8
	[1.30]	[1.36]	[1.68]	[1.67]	[2.06]	[2.28]	[2.55]	[2.83]	[2.77]	[3.07]
Household excess credit × normal peak	−1.3		−0.9		−1.2		−0.39		1.3	
	[1.11]		[1.44]		[1.76]		[2.18]		[2.37]	
Household excess credit × financial peak	0.57		−2.1*		−4.1**		−5.0**		−5.2**	
	[0.78]		[1.01]		[1.24]		[1.54]		[1.67]	
Corporate excess credit × normal peak		0.66		1.2		−0.30		−1.6		−1.6
		[0.80]		[0.99]		[1.35]		[1.68]		[1.82]
Corporate excess credit × financial peak		−0.12		−2.3*		−2.4+		−2.4		−2.3
		[0.77]		[0.94]		[1.29]		[1.60]		[1.74]
R^2	0.21	0.19	0.50	0.51	0.34	0.26	0.20	0.11	0.16	0.06
p-value (normal vs. financial)	0.70	0.77	0.06	0.09	0.24	0.16	0.52	0.29	0.49	0.37
p-value (Credit at normal vs. financial)	0.18	0.48	0.49	0.01	0.18	0.26	0.09	0.74	0.03	0.77
Observations, normal peaks	25	23	25	23	25	23	25	23	25	23
Observations, financial peaks	42	40	42	40	42	40	42	40	42	40

Notes: The sample includes 21 advanced economies listed in Appendix Table A.1. The dependent variables i_{it} denotes per capita real investment for country i, Δ_τ denotes τ-year log difference. Normal and financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported p- values are for the test for equality of coefficients of normal versus household financial peaks and interaction terms of household versus corporate financial excess credits, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

Table 8.2.A: Whole economies, output

Variables	$\Delta_1 y_{it+1}$	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$	$\Delta_5 y_{it+5}$
Normal peak	0.11	0.20	1.1	1.2+	4.0**	4.1**	6.5**	6.5**	9.0**	9.0**
	[0.41]	[0.43]	[0.66]	[0.68]	[0.87]	[0.90]	[1.15]	[1.19]	[1.33]	[1.38]
Financial peak	−0.13	−0.11	−0.85	−0.82	0.99	0.95	2.6*	2.6*	4.1**	4.0**
	[0.37]	[0.38]	[0.60]	[0.61]	[0.79]	[0.81]	[1.04]	[1.07]	[1.20]	[1.24]
Household excess credit × normal peak	0.12		0.33		−0.30		−0.09		0.19	
	[0.28]		[0.45]		[0.60]		[0.78]		[0.91]	
Household excess credit × financial peak	0.08		−0.05		−0.43		−0.60		−0.73	
	[0.19]		[0.31]		[0.40]		[0.53]		[0.61]	
Corporate excess credit × normal peak		−0.12		−0.03		−0.20		−0.30		−0.21
		[0.15]		[0.24]		[0.31]		[0.42]		[0.48]
Corporate excess credit × financial peak		−0.01		−0.54		−0.49		−0.60		−0.88
		[0.21]		[0.33]		[0.44]		[0.58]		[0.67]
R^2	0.01	0.01	0.05	0.07	0.20	0.20	0.29	0.29	0.38	0.37
p-value (normal vs. financial)	0.66	0.59	0.03	0.03	0.01	0.01	0.01	0.02	0.01	0.01
p-value (credit at normal vs. financial)	0.91	0.67	0.49	0.22	0.86	0.59	0.59	0.68	0.41	0.42
Observations, normal peaks	46	44	46	44	46	44	46	44	46	44
Observations, financial peaks	56	54	56	54	56	54	56	54	56	54

Notes: The sample includes both advanced and emerging economies listed in Appendix Table A.1. The dependent variables y_{it} denotes per capita real gross domestic product for country i, and Δ_τ denotes τ -year log difference. Normal and financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported p-values are for the test for equality of coefficients of normal versus household financial peaks and interaction terms of household versus corporate financial excess credits, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

Table 8.2.B: Whole economies, consumption

Variables	$\Delta_1 c_{it+1}$	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$	$\Delta_5 c_{it+5}$
Normal peak	2.3**	2.4**	3.9**	4.0**	6.8**	6.9**	10.0**	10.1**	13.5**	13.6**
	[0.68]	[0.71]	[1.03]	[1.08]	[1.39]	[1.47]	[1.74]	[1.87]	[1.98]	[2.10]
Financial peak	2.0**	2.0**	2.3*	2.3*	4.9**	4.8**	7.7**	7.8**	11.3**	11.4**
	[0.61]	[0.64]	[0.94]	[0.98]	[1.26]	[1.33]	[1.58]	[1.69]	[1.79]	[1.89]
Household excess credit × normal peak	−0.69		−0.53		−1.4		−2.1+		−1.8	
	[0.46]		[0.71]		[0.95]		[1.19]		[1.35]	
Household excess credit × financial peak	−0.36		−0.69		−1.0		−1.4+		−1.4	
	[0.31]		[0.48]		[0.64]		[0.80]		[0.91]	
Corporate excess credit × normal peak		−0.32		−0.27		−0.34		−0.38		−0.61
		[0.25]		[0.38]		[0.51]		[0.65]		[0.73]
Corporate excess credit × financial peak		0.41		−0.36		−0.26		−0.13		−0.06
		[0.34]		[0.53]		[0.72]		[0.91]		[1.02]
R^2	0.21	0.21	0.19	0.18	0.31	0.28	0.39	0.35	0.48	0.46
p-value (normal vs. financial)	0.74	0.71	0.24	0.22	0.32	0.29	0.33	0.35	0.40	0.42
p-value (credit at normal vs. financial)	0.56	0.09	0.85	0.88	0.72	0.93	0.63	0.82	0.84	0.66
Observations, normal peaks	46	44	46	44	46	44	46	44	46	44
Observations, financial peaks	56	54	56	54	56	54	56	54	56	54

Notes: The sample includes both advanced and emerging economies listed in Appendix Table A.1. The dependent variables c_{it} denotes per capita real consumption for country i, and Δ_τ denotes τ -year log difference. Normal and financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported p-values are for the test for equality of coefficients of normal versus household financial peaks and interaction terms of household versus corporate financial excess credits, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

Table 8.2.C: Whole economies, investment

Variables	$\Delta_1 i_{it+1}$	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$	$\Delta_5 i_{it+5}$
Normal peak	−1.9	−1.6	−4.1+	−3.7	0.34	0.67	4.2	4.6	7.3*	7.4+
	[1.97]	[2.06]	[2.33]	[2.37]	[2.82]	[2.92]	[3.19]	[3.27]	[3.59]	[3.74]
Financial peak	−4.3*	−4.3*	−11.1**	−10.8**	−6.4*	−6.3*	−3.4	−3.2	−1.0	−1.0
	[1.78]	[1.86]	[2.12]	[2.14]	[2.56]	[2.64]	[2.89]	[2.96]	[3.25]	[3.37]
Household excess credit × normal peak	−2.0		−0.9		−1.3		−0.2		1.4	
	[1.35]		[1.60]		[1.93]		[2.18]		[2.45]	
Household excess credit × financial peak	0.52		−0.55		−1.6		−2.0		−2.4	
	[0.91]		[1.08]		[1.30]		[1.47]		[1.65]	
Corporate excess credit × normal peak		−0.53		0.23		−0.54		−1.6		−1.1
		[0.72]		[0.83]		[1.02]		[1.15]		[1.31]
Corporate excess credit × financial peak		0.03		−2.2+		−2.4+		−2.4		−2.4
		[1.01]		[1.15]		[1.43]		[1.60]		[1.82]
R^2	0.09	0.06	0.24	0.25	0.08	0.09	0.05	0.07	0.06	0.06
p-value (normal vs. financial)	0.36	0.34	0.03	0.03	0.08	0.08	0.08	0.08	0.09	0.10
p-value (credit at normal vs. financial)	0.12	0.65	0.87	0.09	0.90	0.29	0.50	0.69	0.21	0.56
Observations, normal peaks	46	44	46	44	46	44	46	44	46	44
Observations, financial peaks	56	54	56	54	56	54	56	54	56	54

Notes: The sample includes both advanced and emerging economies listed in Appendix Table A.1. The dependent variables i_{it} denotes per capita real investment for country i, and Δ_τ denotes τ-year log difference. Normal and financial peaks are listed in Table 4.1. We do not include a constant term in the regression. The reported p-values are for the test for equality of coefficients of normal vs. household financial peaks and interaction terms of household vs. corporate financial excess credits, respectively. For others, see notes for Table 4.1.
Source: Authors' calculation.

We also illustrate the recession paths of consumption and investment in advanced economies and in all economies in the middle and right panels of Figures 3.A and 3.B, respectively. As noted above, in both advanced economies and all economies, we do not see significant difference between recession trajectories of consumption after normal peaks and financial peaks. However, for investment, we observe clear differences between trajectories after normal peaks and financial peaks. Further, estimates of the marginal treatments associated with excess credit further weaken the recession recovery, particularly after financial peaks. While the investment trajectory perturbed by one standard deviation percentage points per year increase in household debt is lower than that perturbed by the same shock of corporate debt in advanced economies (right panel in Figure 3A), the opposite is true for all economies (right panel in Figure 3.B). This finding reconfirms that corporate debt is especially harmful for investment recovery after financial peaks in EMEs.

VI. CONCLUDING OBSERVATIONS

In this paper, we try to systematically and comprehensively explore the impact of both household and corporate debts buildups on the real economy in both advanced economies and EMEs. This extensive empirical analysis adds to the literature with a better understanding of the economic effects of private debt accumulation. We find that, in both advanced economies and EMEs, the level of household debt is smaller than that of corporate debt, but the former increases slightly faster than the latter. However, the standard deviation of percentage point per year increase in corporate debt is much higher than that in household debt. We confirm Mian, Sufi, and Verner's (2017) results that, while buildups of household debt boost output growth in the very short run, they predict lower output growth after 3 years. In contrast, buildups of corporate debt never increase output growth even in the short run, and predict lower output growth in 1–3 years. However, we find that, while the size of the estimated coefficients of corporate debt is smaller, its negative impact on output growth, as measured by one standard deviation shock, is comparable with that of household debt buildups. Our results also suggest that corporate debt has a larger negative effect on investment growth than household debt, and this feature is more pronounced in EMEs.

We also investigate the impact of household and corporate debts buildups on housing and stock price growth rates. In advanced economies, household debt leads to comparable booms and busts of housing prices, but corporate debt only has a negative impact. In EMEs, household debt has only a negative effect on housing prices in the medium run, and corporate debt has almost no effect. On the other hand, in advanced economies household debt has only a negative effect on stock prices in the medium run, but corporate debt has more immediate negative effect, which turns to positive over a longer horizon. In EMEs, both household and corporate debts predict lower stock prices, with corporate debt having a more immediate impact. We find that, in advanced economies, approximately half of the impact of private debt buildup on the real economy is explained by changes in asset prices in advanced economies. However, in EMEs, the asset–price channel plays a much larger role.

Finally, we take a closer look at recessions and investigate if there are differences between financial recessions associated with household debt versus corporate debt. After identifying the peaks and troughs of business cycles, we define financial peaks based solely on the buildup speed of private debt. Then, we divide financial peaks into household debt-driven and corporate debt-driven financial peaks. We find that more financial peaks are driven by corporate, rather than household, debt buildups in both advanced economies and EMEs. We compare the recession paths of cumulative changes in output, consumption, and investment at different horizons, and find that cumulative changes in output and investment are lower after financial peaks than after normal peaks. Those results are statistically highly significant in both advanced economies and EMEs. If we differentiate between household

financial peaks and corporate financial peaks, in advanced economies we find that corporate financial recessions are as damaging to output as household financial recessions. This result becomes even stronger if we include EMEs in the sample. We also find that higher excess credit to either households or corporations from the previous expansion entails more painful recession trajectories of output after financial peaks. In advanced economies, the effect of excess credit is slightly larger for corporations and, in EMEs, corporate debt is particularly damaging to investment recovery after financial peaks. Overall, our findings suggest that corporate debt buildups are at least as damaging as household debt buildups, and this is especially true in EMEs.

APPENDIX

Table A.1: Sample of Economies

Advanced Economies	Emerging Market Economies
Austria	Argentina
Australia	Brazil
Belgium	Colombia
Canada	Czech Republic
Switzerland	Hong Kong, China
Germany	Hungary
Denmark	Indonesia
Spain	Israel
Finland	Mexico
France	Malaysia
United Kingdom	Poland
Greece	Russian Federation
Ireland	Saudi Arabia
Italy	Singapore
Japan	Thailand
Netherlands	Turkey
Norway	Korea, Republic of
New Zealand	
Portugal	
Sweden	
United States	

Note: Following Mian, Sufi, and Verner (2017), we exclude India, the People's Republic of China, and South Africa as the data for private debts start from 2006 or 2007, and Luxembourg as the private debts data are too volatile.
Source: Authors' listing.

Table A.2: Definitions of Variables and Data Sources

Variables	Description and Construction	Data Source
Per capita real output, 1950–2014	Per capita real GDP at constant 2011 national prices divided by population (2011 US dollar)	Penn World Table 9.0
Per capita real consumption, 1950–2014	Share of household consumption at current PPPs times output-side real GDP at chained PPPs divided by population (2011 US dollar)	Penn World Table 9.0
Per capita real investment, 1950–2014	Share of gross capital formation at current PPPs times output-side real GDP at chained PPPs divided by population (2011 US dollar)	Penn World Table 9.0
Net export, 1950–2014	Share of net export at current PPPs times output-side real GDP at chained PPPs divided by population (2011 US dollar)	Penn World Table 9.0
Private debt-to-GDP ratio, 1952–2016	Total credit of private nonfinancial sector divided by GDP, in market value, adjusted for breaks (percentage of GDP)	BIS Debt Securities Statistics
Household debt-to-GDP ratio, 1952–2016	Total credit of households and nonprofit institutions serving households divided by GDP, in market value, adjusted for breaks (percentage of GDP)	BIS Debt Securities Statistics
Corporate debt-to-GDP ratio, 1952–2016	Total credit of nonfinancial corporations divided by GDP, in market value, adjusted for breaks (percentage of GDP)	
Housing price, 1950–2013	Index of housing prices (Jordà, Schularick, and Taylor: 1990 = 100 and BIS: baseline year varies)	BIS property price database and Jordá–Schularick–Taylor Macrohistory database
Stock price, 1950–2014	Index of stock prices (1990 = 100)	Jordá–Schularick–Taylor Macrohistory database
Financial crisis	Banking crisis (1977–2011) following Reinhart and Rogoff, and financial crisis (1970–2011) following Laeven and Valencia	Reinhart and Rogoff (2009) dataset; Laeven and Valencia (2013), IMF Working paper
Trade openness, 2010 and 2007	Sum of exports and imports of goods and services measured as a share of gross domestic product (percentage of GDP)	World Bank *World Development Indicators*
Financial openness, 1970–2011	Total foreign assets plus total foreign liabilities (percentage of GDP)	Lane and Milesi-Ferretti, External Wealth of Nations dataset
World growth, 1962–2016	Percentage growth rate of world aggregate GDP (2010 constant US dollar). Without deductions for depreciation of assets or for degradation of natural resources	World Bank, *World Development Indicators*
Broad money (M2), 1960–2016	Sum of currency outside banks; demand deposits, the time, savings, and foreign currency deposits of resident sectors other than the central government; and other securities such as certificate of deposits, commercial papers, and checks	World Bank, *World Development Indicators*

BIS = Bank for International Settlements, GDP = gross domestic product, PPP = public–private partnership, US = United States.
Source: Authors' compilation.

REFERENCES

Asian Development Bank. 2017. *Asian Economic Integration Report 2017. The Era of Financial Interconnectedness: How can Asia Strengthen Financial Resilience?* Manila.

Baum, Anja, Cristina Checherita, and Philipp Rother. 2013. "Debt and Growth: New Evidence for the Euro Area." *Journal of International Money and Finance* 32: 809–21.

Bernardini, Marco, and Lorenzo Forni. 2017. "Private and Public Debt: Are Emerging Markets at Risk?" IMF Working Paper No. WP/17/61.

Bank for International Settlements (BIS). Debt Securities Statistics. https://www.bis.org/statistics/secstats.htm.

Bry, Gerhard, and Charlotte Boschan. 1971. *Cyclical Analysis of Time Series: Selected Procedures and Computer Programs*. New York: National Bureau of Economic Research.

Cecchetti, Stephen, Madhusudan Mohanty, and Fabrizio Zampolli. 2011. "The Real Effects of Debt." BIS Working Paper No. 352.

Checherita, Cristina, and Philipp Rother. 2012. "The Impact of High and Growing Government Debt on Economic Growth: an Empirical Investigation for the Euro Area." *European Economic Review* 56 (7): 1392–405.

Claessens, Stijn, M. Ayhan Kose, and Marco E. Terrones. 2012. "How Do Business and Financial Cycles Interact?" Journal of International Economics 87: 178–90.

Égert, Balázs. 2015. "Public Debt, Economic Growth and Nonlinear Effects: Myth or Reality?" *Journal of Macroeconomics* 43: 226–38.

Eichengreen, Barry, and Ricardo Hausmann. 1999. "Exchange Rates and Financial Fragility." Proceedings of the Economic Policy Symposium, Jackson Hole, Federal Reserve Bank of Kansas City. 329–68.

Glick, Reuven, and Kevin J. Lansing. 2010. "Global Household Leverage, House Prices, and Consumption." FRBSF Economic Letter.

Jordà–Schularick–Taylor Macrohistory Database. http://www.macrohistory.net/data/.

Jordà, Òscar, Moritz Schularick, and Alan M. Taylor. 2011. "Financial Crises, Credit Booms and External Imbalances: 140 Years of Lessons." *IMF Economic Review* 59: 340–78.

———. 2013. "When Credit Bites Back." *Journal of Money, Credit and Banking* 45 (2): 3–28.

Justiniano, Alejandro, Giorgio E. Primiceri, and Andrea Tambalotti. 2015. "Credit Supply and the Housing Boom." NBER Working Paper No. 20874.

Kumar, Manmohan, and Jaejoon Woo. 2010. "Public Debt and Growth." IMF Working Paper No. 10/174.

Laeven, Luc, and Fabian Valencia. 2013. "Systemic Banking Crises Database." *IMF Economic Review* 61 (2): 225–70.

Lane, Philip R., and Gian Maria Milesi-Ferretti. 2007. "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004." *Journal of International Economics* 73: 223–50.

Lee, Jong-Wha. 2017. "Twenty Years after the Financial Crisis in the Republic of Korea." ADBI Working Paper Series No. 790.

Levine, Ross. 2005. "Finance and Growth: Theory and Evidence." In Handbook of Economic Growth, edited by Philippe Aghion and Steven Durlauf, edition 1, volume 1, chapter 12, 865–934. Elsevier.

Mian, Atif, and Amir Sufi. 2014. *House of Debt: How They (and You) Caused the Great Recession and How We Can Prevent It From Happening Again*. Chicago: University of Chicago Press.

Mian, Atif, Amir Sufi, and Emil Verner. 2017. "Household Debt and Business Cycles Worldwide." *The Quarterly Journal of Economics* 132 (4): 1755-817. doi:10.1093/qje/qjx017.

Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.

———. 2010. "Growth in a Time of Debt." *American Economic Review* 100 (2): 573–78.

Schmitt-Grohé, Stephanie, and Martín Uribe. 2016. "Downward Nominal Wage Rigidity, Currency Pegs, and Involuntary Unemployment." *Journal of Political Economy* 123: 1466–514.

Schularick, Moritz, and Alan Taylor. 2012. "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008." *American Economic Review* 102: 1029–61.

Sutherland, Douglas, and Peter Hoeller. 2012. "Debt and Macroeconomic Stability: An Overview of the Literature and Some Empirics." OECD Economics Department Working Paper No. 1006.

Household Debt, Corporate Debt, and the Real Economy: Some Empirical Evidence

This publication empirically assesses the effect of private debt buildup—household and corporate debt—on the real economy in advanced and emerging market economies. The research indicates that the buildup of corporate debt causes more financial peaks than the buildup of household debt in both groups of countries. But in emerging market economies, findings suggest that recessions induced by corporate debt inflict more damage on output than those induced by household debt.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 67 members—48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

ADB

ASIAN DEVELOPMENT BANK
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org