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## Sectoral debt capacity and business cycles: Developing Asia and the world economy

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# SECTORAL DEBT CAPACITY AND BUSINESS CYCLES

DEVELOPING ASIA AND THE WORLD ECONOMY

*Bada Han, Rashad Ahmed, Yothin Jinjarak, and Joshua Aizenman*

**NO. 681**

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## ABSTRACT

This paper reviews the patterns of sectoral debts and growth and the mechanisms explaining the adverse effects of debt burdens on growth rates. The empirical analysis covers a sample of 55 emerging and frontier market economies. Future economic growth is more sensitive to rising household debt than corporate debt. However, these effects are highly heterogenous across economies and depend on relative income. For the developing economies with a gross domestic product per capita in 2010 below \$10,000 (purchasing power parity-adjusted in 2017 international dollar), the coefficients of all types of sectoral debts are negative and significant at least at the 5% level. For developing economies at higher income levels, household debts matter more than other sectoral debts for subsequent economic growth.

**Keywords:** household debts, corporate debts, public debts, financial stability, credit cycles

**JEL codes:** E44, F34, G51, H63

## 1. Introduction

Understanding the real-time dynamics of debt capacity is a due diligence required for policymakers in developing Asia. The policy challenge applies to total debt and to sectoral debts, i.e., disaggregated debts of the household, nonfinancial corporate, public, and financial sectors. For developing Asia, debt levels increased through the pandemic as households had limited access to social safety nets, firms encountered illiquidity, and authorities ramped up pandemic-related spending. Debt buildup has been broad-based across sectors. Borrowings by nonfinancial corporations and governments accounted for more than half of the increase in debt, suggesting both private and public debt vulnerabilities.

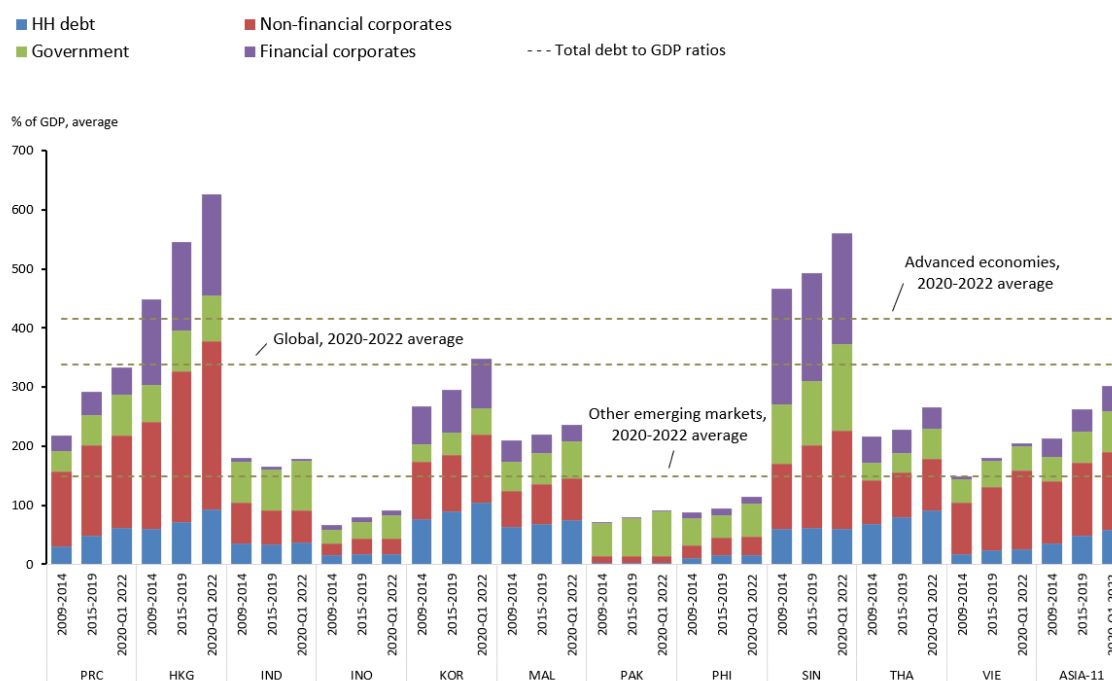
This project seeks to analyze and provide information for Asian Development Bank (ADB) developing member economies with available data and empirical methodologies to assess an economy's capacity to service debts, total and sectoral, and the impact of this capacity on growth. It aims to clarify the data, methodological, and statistical requirements for accounting the private and public resources for debt repayment of selected developing members, to stimulate informed discussion with economists and government officials about the benefits, pitfalls, and alternative options for macroeconomic policy formulation for assessing a country's debt capacity. The outputs should allow policymakers to identify resource gaps on debt capacity assessment, enabling them to monitor an economy's debt dynamics and make more informed medium- to long-term policy decisions.

Figure 1 shows the levels of debt to gross domestic product (GDP) for 11 economies of Developing Asia (Hong Kong, China; India; Indonesia; Malaysia; Pakistan;

the People's Republic of China [PRC]; the Philippines; the Republic of Korea; Singapore; Thailand; and Viet Nam) in the context of a global sample which includes 55 emerging markets and frontier economies (EMs). The pandemic saw debt buildup; while not alarming, it should be closely monitored as an integral part of the pandemic recovery in the region. While all sectoral debt rose through the pandemic, the accumulation of debt in developing Asia has been driven by nonfinancial corporate debt. Much of the regional increase is due to the PRC and financially developed economies.

**Figure 1: Debt to GDP in Developing Asia**

*Asia's debt is on the rise.*



GDP = gross domestic product, HH = household.

Note: Sample includes 11 economies of developing Asia, including Hong Kong, China (HKG); India (IND); Indonesia (INO); Malaysia (MAL); Pakistan (PAK); the People's Republic of China (PRC); the Philippines (PHI); the Republic of Korea (KOR); Singapore (SIN); Thailand (THA); and Viet Nam (VIE). The global sample includes 55 economies.

Source: Institute of International Finance. Global Debt Monitor Online Database.

<https://www.iif.com/Research/Capital-Flows-and-Debt/Global-Debt-Monitor> (accessed 14 July 2022).

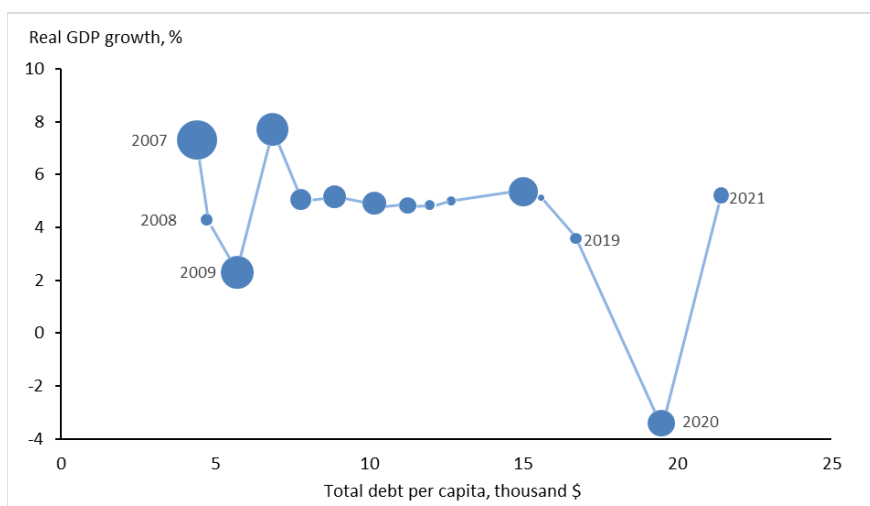
Debt levels increased more in developing Asia than elsewhere. For 11 developing Asian economies (Figure 1) with comprehensive data spanning 2 decades, aggregate debt (household, nonfinancial corporate, public sector, and financial institutions) rose during the coronavirus disease (COVID-19) crisis from an average of 263% of GDP in 2015–2019 to 302% of GDP in 2020–2022 first quarter (Q1), a 40-percentage point increase. By comparison, debt increased from an average of 212% of GDP in 2009–2014 to 263% of GDP in 2015–2019, a 50-percentage point increase. Elsewhere, from 2007–2019 and 2020–2022, total debt increased from 321% to 338% of GDP globally and from 136% to 150% of GDP in other developing economies.

Debt buildup has been broad-based across sectors. Borrowings by nonfinancial corporations and governments accounted for more than half of the increase in debt. Debt build-up was across the sectors during the pandemic: household debt rose from 48% of GDP in 2015–2019 to 59% of GDP in 2020–2022 Q1; nonfinancial corporation debt rose from 124% of GDP to 132% of GDP; government debt went up from 52% of GDP to 68% of GDP; and financial sector debt increased from 39% of GDP to 44% of GDP.



## Figure 2: Debt Deleveraging and Growth in Asia

*Growth may slow down with debt deleveraging.*



GDP =gross domestic product.

Notes: Based on the Developing Asia (11 economies) sample of Figure 1. Bubble sizes correspond to the annual percentage change in total debt per capita.

Sources: *Asian Development Outlook* database; Institute of International Finance. Global Debt Monitor online database. <https://www.iif.com/Research/Capital-Flows-and-Debt/Global-Debt-Monitor> (accessed 14 July 2022); Haver Analytics.

Authorities must monitor and navigate the debt outlook prudently, balancing competing tradeoffs. Improved spending policy and fiscal consolidation, if well-paced, may help loosen the fiscal space and avoid additional headwinds in the recovery process. Mobilizing domestic resources through taxes and savings is a sustainable way to fund development without over-burdening the economy with debt repayment and its side effects. For instance, growth tended to decelerate during the deleveraging process (Figure 2). The effects of debt deleveraging propagated through the financial system, hitting households, firms, and government, and inducing a negative association between growth and change in debt. The post-pandemic period may not be an exception. Balance

sheets of households and small and medium-sized firms deteriorated. Constrained fiscal space also implies governments cannot readily spend their way out of the recession, and the global demand weakened by inflation and geopolitics are hindering countries from exporting their way out of debt burdens.

Section 2 discusses conceptual issues relating sectoral debts to macroeconomic stability, business cycles, and growth in the regional and global context. We explain the detrimental growth effects of growing sectoral and aggregate debt overhang using the sectoral balance sheet adverse Feedback Loops Paradigm. This framework asserts that the negative growth impact of debt in one sector depends, in part, on the level of indebtedness in the other sectors, as well as on aggregate debt overhang, and other key macroeconomic factors. The section also reviews empirical research validating these predictions. Notably, the available empirical studies focused mostly on the Organisation for Economic Co-operation and Development (OECD) countries. Thereby, these studies may have limited validity for EMs and developing economies in the absence of controlling for the much greater heterogeneity of financial depth and fiscal capabilities, institutional capacities, and the policies of EMs and developing countries. We thereby outline an empirical agenda dealing with the association between sectoral and aggregated debt overhangs and economic growth in emerging markets and developing countries.

Section 3 provides empirical tests, investigating the heterogeneity of the association between sectoral debt overhang and economic growth for a sample of 55 EMs. Section 4 concludes.

## 2. Related Concepts and Previous Studies

This section provides a brief selective overview and an introduction to our empirical research of debt overhang in emerging markets and developing economies. The notion that debt overhang has detrimental effects on future growth is supported by growing theoretical and empirical literature. Previous research suggested that both the aggregate debt overhang and its sectoral composition matter. Larger private sector debt overhang implies that adverse macro shocks cause larger balance sheet stress by reducing asset valuations, increasing liabilities due, and deteriorating rollover risk. Feedback loop dynamics tend to magnify downturns, especially in cases of simultaneous deleveraging of the household, corporate, financial, and public sectors.

To illustrate, adverse macro developments cause balance sheet stress through both lower asset valuations (house or equity price declines) and increases in liabilities (rising interest rates due to higher risk premia). A higher debt overhang magnifies the resultant stress. Falling house prices reduce household wealth, decrease the value of collateral held by banks, and increase nonperforming loans.

The consequent decline in private consumption also reduces firms' profits, thereby diminishing the public sector's tax revenue. Firms in turn adjust by reducing employment and investment, magnifying the contraction of households' demand. The government's consolidation effort in the form of higher taxes and lower spending further reduces households' income, thereby worsening further households' debt-servicing capacity and firm profitability. These forces impair banks' balance sheet and deteriorate the public sector's ability to bailout systemic banks and firms, further increasing the risk premia and reducing access to credit lines by households and the corporate sector. Deleveraging

attempts by selling assets in order to serve the debt induce fire-sale externalities, further magnifying the stress.<sup>1</sup>

The textbook summary of feedback loops associated with adverse macro shocks highlights the complexity of feedback between households, banks, firms and government. Higher debt overhang of each of these sectors magnifies the recessionary impact associated with their adjustment. Bornhorst and Arranz (2014) tested the adverse balance sheet effects on growth rates building on Cecchetti, Mohanty, and Zampolli (2011) for a panel of 18 OECD countries during 1980–2009. They reported that:<sup>2</sup>

- The negative growth impact of debt in one sector depends, in part, on the level of indebtedness in the other sectors.
- When the three sectors—government, households, and corporate (banking and non-banking)—have above-average debt levels, the negative growth impact of each category of debt is highest.
- The confluence of debt in multiple sectors exacerbates the negative feedback loops that arise in times of crisis.
- The private sector debt may be more detrimental to growth than public sector debt.

Regressions identify a stronger and more statistically significant association

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<sup>1</sup> Shleifer and Vishny (1992) model fire sale externalities. In their literature overview, Shleifer and Vishny (2011) explain “a fire sale is essentially a forced sale of an asset at a dislocated price. The asset sale is forced in the sense that the seller cannot pay creditors without selling assets. The price is dislocated because the highest potential bidders are typically involved in a similar activity as the seller, and are therefore themselves indebted and cannot borrow more to buy the asset. Indeed, rather than bidding for the asset, they might be selling similar assets themselves. Assets are then bought by non-specialists who, knowing that they have less expertise with the assets in question, are only willing to buy at valuations that are much lower.”

<sup>2</sup> Cecchetti, Mohanty, and Zampolli (2011) used a dataset that includes the level of government, non-financial, corporate, and household debt in 18 OECD countries from 1980 to 2010. They found that corporate debt of more than 90% of GDP and household debt of more than 85% of GDP dragged down growth.

between private sector debt and growth than between government debt and growth.

- High corporate debt and high household debt are associated with negative growth even if each is the only sector indebted in the economy. The negative impact becomes larger the higher the number of sectors with high debt.
- High public debt is negatively associated with growth only when both the household and corporate sectors are also indebted.
- In contrast, when only the government is indebted, or only one additional sector has high debt, the relationship becomes statistically insignificant.

These results broadly validate the adverse growth effects of aggregate debt-overhang, and the importance of the sectoral distribution of the debt-overhang. There is no clear consensus about the policy implications of debt overhang. Alesina and Ardagna (2009) claimed that in a country with an overly large government, spending consolidation can actually be pro-growth. Cecchetti, Mohanty, and Zampolli (2011) argued that, because very high public debt levels appear to be associated with lower growth, governments should aim to reduce their debt–GDP ratios where possible. Philippon (2010) analyzed an economy in which debt overhang occurs simultaneously in the mortgage market and in the market for bank debt overhang in one market reinforces overhang in the other.<sup>3</sup>

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<sup>3</sup> The paper also shows that in a closed economy, it is ex post Pareto-efficient to tax households and recapitalize the banks. In an open economy, some of the gains are transferred abroad, while all the costs are borne by domestic households. Efficient recapitalization programs therefore require global coordination.

Lo and Rogoff (2015) noted that during a deep recession, it is very hard to implement policies aimed at short-term debt stabilization. However, it is more reasonable for governments to lay out a very long-term exit strategy. Reinhart and Rogoff (2014) argued for debt restructuring and other heterodox policies where public and or private debt levels are unsustainable.

The research of Cecchetti, Mohanty, and Zampolli (2011) and Bornhorst and Arranz (2014) provided insights on the association between growth rates and sectoral composition of debt overhang in 18 OECD countries. Importantly, the Lucas critique implies that the results in these two studies are sample-specific, and there is no reason to expect the various thresholds identified in the two papers and the corresponding regression coefficient to be constant across different periods, and for different countries.

Specifically, a priori there is no reason to expect that the OECD results should hold for non-OECD countries. One expects that the currency composition of sectoral debt matters much more for countries with limited access to hedging and with a history of sovereign defaults and macroeconomic instability. Limited financial depth, underdeveloped regulatory structure, and inadequate quality of supervision and prudential regulations matter for the growth effects of sectoral debt overhang.

Financial integration and sovereign risks of non-OECD countries are key determinants of the balance sheet adverse feedback loop effects. For example, an underdeveloped banking system implies low debt overhang of the private sectors, reducing the potency of some of the feedback loops induced by adverse macro shocks, but also reducing the investment and GDP growth rates. In contrast, underregulated access to borrowing in foreign currencies frequently leads to currency and maturity

mismatches, magnifying the feedback loops associated with adverse financial and macro shocks. This was vividly illustrated during the 1997–1998 East Asian financial crisis, when the corporate sectors in the Republic of Korea and Thailand increased their foreign currency debt, tempted by the lower interest rates overseas, expecting their central banks to reduce exchange rate volatility (Park 2011 and Brunnermeier et al. 2009). The resultant exposure induced a deeper crisis, and lower future growth (Cerra and Saxena 2008). A decade later, the risk of underregulating access to leverage was illustrated in several Eastern European countries, where regulations allowed local households to finance their mortgages in “hard currencies,” the Swiss Franc or the Euro. The resultant initial housing boom turned into a housing bust induced by the depreciations of Eastern European countries (Bethlendi 2011 and Financial Times 2022a).

The large heterogeneity of institutional factors, financial integration, and financial depth in EMs and developing countries motivate us to focus our empirical effort on the associations between sectoral debt overhang in non-OECD countries. The proposed research will extend Cecchetti, Mohanty, and Zampolli (2011) and Bornhorst and Arranz (2014) analyses of debt overhang and growth in 18 OECD countries to emerging markets and developing countries.

Specifically, the empirical specification of Bornhorst and Arranz (2014) was derived from the neoclassical Solow growth model in which per capita income growth depends on the initial level of physical and human capital; the saving rate; population growth rate; number of years spent in secondary education as a proxy for the level of human capital; the dependency ratio; openness to trade measured by the sum of the ratio of exports and imports to GDP; consumer price index inflation as a measure of macroeconomic stability;

the ratio of liquid liabilities to GDP as a measure of financial development; and a dummy to control for banking crises. Measures of sectoral debt overhang are added to the specification: the ratio of debt to GDP of the public or private sectors (household and corporate sectors) as well as interactions with dummy variables indicating whether the debt ratios are above threshold levels. Sectoral Debt/GDP is considered “high” if it is above the sample mean. Panel data regressions are estimated using country-specific and time-specific fixed effects.

Our proposed research agenda will focus on emerging markets and developing countries, in a sample determined by data availability. We expect this sample to be substantially larger and more heterogeneous than the 18 OECD countries. In the next section, we extend Cecchetti, Mohanty, and Zampolli (2011), illustrating the importance of accounting for emerging markets’ heterogeneity in explaining the associations between sectoral debt overhang and growth.



### **3. Sectoral Debt Overhang and Growth in Emerging and Frontier Market Economies: An Empirical Study of 55 Countries**

This section formally tests how sectoral debt levels are associated with macroeconomic outcomes. While sectoral debt levels should matter for both real economic outcomes and financial stability, through various channels, we have chosen to test the relationship between sectoral debts and economic growth. Economic growth is a relatively direct measure to test the relationship and furthermore, various effects of sectoral debt levels on macroeconomic aggregates and financial markets shall be ultimately reflected in the economic growth. The data used in this section are described in the Appendix.

#### **3.1 Estimation Strategy**

The econometric analysis builds on Cecchetti, Mohanty, and Zampolli (2011) and Bornhorst and Arranz (2014), modifying their specification to be compatible with our own analysis goal and data availability of emerging and frontier market economies. Their specification is based on neoclassical growth theory. That is, per capita GDP growth should be negatively correlated with per capita GDP level and capital stock. Thus, the dependent variable is per capita GDP growth, and included regressors are per capita GDP level, capital stock (or a proxy for the capital stock), and others. To those regressors, Cecchetti et al. (2011) added sectoral debt levels as the goal is to see the association of sectoral debt with the growth.

Our sample is composed of 55 emerging and frontier market economies. Therefore, we have substantial heterogeneity across the economies in our sample. First, we divide

the sample countries into four different groups. Moreover, we want to see how sectoral debt levels impact the growth, which should depend on the economic and financial development of a country. It is inevitable to divide the economies into subgroups for cross-economy comparison. Several more changes are explained as we proceed. The baseline regression equation is

$$\bar{g}_{i,t+1,t+k} = \theta y_{i,t} + \beta d_{i,s,t} I_{i \in k} + \gamma X_{i,t} + \mu_i + \tau_t + \varepsilon_{i,t} \quad (1)$$

where  $\bar{g}_{i,t+1,t+k}$  is the  $k$ -year forward average of annual real GDP per capita growth between years  $t+1$  and  $t+k$ . Unlike Cecchetti et al. (2011) where  $k$  was set to 5, we set  $k$  to 3 to examine the impact of sectoral debt on growth over a shorter run and because the time-span in our sample is shorter.<sup>4</sup>  $y_{i,t}$  is the per capita GDP in year  $t$ .  $X_{i,t}$  is a vector of control variables, which are: gross saving as a share of GDP, openness to trade measured by the ratio of the sum of exports and imports to GDP, and consumer price index inflation as a measure of macroeconomic stability.  $d_{i,s,t}$  is the debt to GDP ratio of sector  $s$  in country  $i$  in year  $t$ .  $I_{i \in k}$  is a vector of identity functions for the subgroup analysis. Hence,  $I_{i \in k}$  refers to the groups of countries in group  $k$ . There are four different groups according to the GDP per capita. Group 1 is composed of the economies with GDP per capita below \$4,000 (purchasing power parity or PPP-adjusted in 2017 international dollars)<sup>5</sup> in 2010. Similarly, group 2 is composed of the economies with GDP per capita between \$4,000 and \$10,000, group 3 is composed of the economies with GDP per capita

<sup>4</sup> The regression in Cecchetti, Mohanty, and Zampolli (2011) covered the period 1980–2006, whereas our sample covers 2006–2021.

<sup>5</sup> We used GDP per capita (PPP-adjusted in 2017 international dollars) from the 2020 October World Economic Outlook database by the International Monetary Fund.

between \$10,000 and \$20,000, and group 4 is with GDP per capita between \$20,000 and \$40,000. We have balanced numbers of countries across the groups.  $\mu_i$  and  $\tau_t$  are country and time fixed effects, respectively. We used Driscoll-Kraay standard errors that are widely used in cross-country analysis. Driscoll-Kraay standard errors are computed considering possible cross-country dependence and autocorrelation, which will surely occur as we use multiple years' average growth as the dependent variable.

The baseline regression in equation (1) estimates the linear association of sectoral debt levels with growth but may not capture possible non-linearities in the relationship. In the modified regression of equation (2), we try to identify the threshold of each type of sectoral debt in different groups, above which the sectoral debt levels are associated with lower economic growth in the future.

The regression equation is as follows.

$$\bar{g}_{i,t+1,t+k} = \theta y_{i,t} + \beta I_{D_{s,i,t,k} > q_{s,k}} + \gamma X_{i,t} + \mu_i + \tau_t + \varepsilon_{i,t} \quad (2)$$

where  $I_{D_{s,i,t,k} > q_{s,k}}$  refers to the indicator variable for sectoral debt type  $S$  in country  $i$  in year  $t$  in group  $k$ . If sectoral debt of sector  $s$  in country  $i$  in year  $t$  in group  $k$  is above the  $q_{th}$  quantile of sectoral debt of sector  $s$  in group  $k$ , then the indicator variable is equal to one and otherwise to zero. We use second (50%, median) and third (75%) quantiles as thresholds across country groups but allow coefficients on these thresholds to vary across groups. For example, suppose the median household debt to GDP ratio in the group is 60%, and household debt to GDP ratio in the Republic of Korea, which falls within this group, is 50% in 2005 and 80% in 2015. Then, the dummy variable for the Republic of

Korea is set to zero in 2005 and set to one in 2015. The idea behind this specification is that once sectoral debt levels reach a certain threshold, the high debt level will force the sector to deleverage and thereby put a drag on future growth.<sup>6</sup> The risk of excessively high sectoral debt can dampen economic growth in different ways. For instance, foreign investors may recognize the risk of sectoral debt overhang and ask for a higher premium on both local currency and foreign currency external debt, which would make credit expansion costlier. One can understand our approach as a holistic way to capture sectoral levels, above which sectoral debts begin suppressing economic growth in different ways without taking a stance on the specific mechanism at play.

We used the sectoral debt data provided by the Institute of International Finance (IIF). The dataset by the IIF reported sectoral debt levels for 56 emerging and frontier market economies in the classification of the IIF. The dataset begins in 2005 and we rely on the full sample. All other data is from the October 2022 World Economic Outlook Database by the International Monetary Fund (IMF).

### **3.2 Results**

The results of equation (1) are reported in Table 1. Besides three types of sectoral debt, we also examine private sector debt, which is the summation of household debt and nonfinancial corporate debt. As expected, higher debt levels are typically associated with lower growth over the subsequent 3 years. However, the relationship between debt and growth varies with the type of sectoral debt and across country groups. For groups 1 and 2, the frontier and emerging economies which are poorer than other groups, the

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<sup>6</sup> The impact of leverage cycles on economic growth has been extensively studied in the aftermath of Global Financial Crisis in 2008 as seen in the excellent survey in Fostel and Geanakoplos (2014).

coefficients of all types of sectoral debts are negative and significant at least at the 5% level.

However, the results are highly heterogeneous for groups 3 and 4: relatively richer emerging market economies. The coefficients of government debt are not significant for groups 3 and 4. The coefficients of nonfinancial corporate debt are negative, but not significant even at the 15% level. Household debt seems to matter more than other types of sectoral debt for relatively more developed emerging economies, as the coefficients are significant at least at the 10% level and their estimates are larger than those on other nonfinancial corporate debt in terms of absolute value.

**Table 1: Baseline Regression**

	(1)	(2)	(3)	(4)
	Household	Nonfinancial Corporate	Government	Private Sector
Group 1 Sector "S" Debt	-0.166** (0.067)	-0.093*** (0.025)	-0.044*** (0.004)	-0.084*** (0.020)
Group 2 Sector "S" Debt	-0.068*** (0.007)	-0.075*** (0.007)	-0.048*** (0.009)	-0.056*** (0.004)
Group 3 Sector "S" Debt	-0.069*** (0.019)	-0.028 (0.027)	0.001 (0.010)	-0.036** (0.015)
Group 4 Sector "S" Debt	-0.045* (0.023)	-0.014 (0.010)	0.060*** (0.015)	-0.017* (0.009)
GDP per Capita	-0.087 (0.054)	-0.097* (0.054)	-0.180*** (0.053)	-0.090 (0.054)
Trade Openness	0.003 (0.003)	0.003 (0.005)	0.007** (0.003)	0.004 (0.004)
Gross Saving Rate	0.067*** (0.010)	0.075*** (0.009)	0.066*** (0.013)	0.072*** (0.010)
Inflation	-0.000 (0.010)	0.001 (0.008)	0.009 (0.010)	0.001 (0.008)
Observations	824	824	735	824
R-squared	0.070	0.102	0.167	0.102
Country Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

## Notes:

1. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1
2. Driscoll-Kraay standard errors in parentheses
3. Sector "S" refers to each sector in columns (1) to (4). Thus, in column (1), the 3 years' average growth rate is regressed on household debt to GDP ratios in each subgroup, and similarly in columns (2) to (4).

Source: Authors' calculations.

The results that household debt seems to matter most for richer groups are the most impressive among different results in Table 1.7. Although it might be hasty to conclude that household debt matters most for the median-income emerging economies, the results may suggest that the median-income economies are facing a new risk. While more investigation is required to fully explain the empirical results, one plausible interpretation is as follows.

First, much of the household debt in the frontier and emerging economies are likely composed of mortgages. Perhaps demand for mortgages arises in economies that passed a certain level of development. And this desire to raise mortgages would arise for households who can satisfy necessities. Furthermore, households in more developed markets have greater access to bank loans as financial markets in a more developed economy are deeper and liberalized. In this context, the risk from household debt arises in median-income economies as those countries build more developed financial systems. Second, mortgages are intimately linked to housing market conditions and swings in house prices can impact households with mortgages. Real estate markets in many emerging economies have experienced large ups and downs similar to advanced economies. If the real estate assets in those economies are exposed to various macroeconomic shocks to a greater extent than corporate earnings are exposed, we would naturally see tighter connections between household debt and growth than corporate debt and growth.

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<sup>7</sup> The results that sectoral debts matter less for relatively richer frontier and emerging economies probably reflect that financial markets in those economies are already developed and thus, the simple GDP ratios might not capture the effects of sectoral debts on growth. Perhaps, we need more information such as nonperforming loan ratios or ratios of collateralized debt to more accurately assess the consequences of rising sectoral debt in these economies.

We now present the results from the threshold regressions in Tables 2 and 3. As explained, we only tested 50% quantile and 75% quantile for both household and nonfinancial corporate debt variables. While higher debt levels are associated with lower growth across these different specifications, the difference between the impact of household debt and corporate debts on growth becomes subtler. Nonetheless, one can see that nonfinancial corporate debt in less developed countries (groups 1 and 2) becomes highly associated with lower growth when it is above the 50% quantile and the 75% quantile of the group. Meanwhile, household debt levels that are above the quantiles dampen future growth significantly in more developed groups (groups 3 and 4). These threshold-based results are consistent with the baseline linear regressions.

Another important observation is that the group 4 indicator for a 50% threshold is statistically insignificant, but the same group 4 indicator is significant at the 75% threshold. The direction of changes is opposite to group 3 where statistical significance is lost to some extent in the 75% threshold regression, compared to the 50% threshold regression. Although one should be careful in drawing too strong of a conclusion from the results, this may suggest that higher-income emerging economies can withstand higher household debt levels for various reasons. For example, household debt in higher-income economies may be collateralized to a greater extent or titled toward safer debt holders due to prudential policies in those countries.



**Table 2: Threshold Regression (50th Percentile)**

	Household Debt (1)	Nonfinancial Corporate Debt (2)
Group 1 Sector "S" Debt	-0.286 (0.576)	-0.928*** (0.298)
Group 2 Sector "S" Debt	0.019 (0.163)	-1.120*** (0.348)
Group 3 Sector "S" Debt	-1.283*** (0.382)	-0.393 (0.608)
Group 4 Sector "S" Debt	-0.357 (0.352)	0.839* (0.473)
GDP per Capita	-0.099* (0.054)	-0.106* (0.055)
Trade Openness	0.003 (0.003)	0.003 (0.003)
Gross Saving Rate	0.069*** (0.010)	0.073*** (0.009)
Inflation	0.005 (0.010)	-0.000 (0.009)
Observations	824	824
R-squared	0.060	0.069
Country Fixed Effects	YES	YES
Year Fixed Effects	YES	YES

Notes:

1. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10
2. Driscoll-Kraay standard errors in parentheses
3. Sector "S" refers to each sector in columns (1) to (2). Thus, in column (1), the 3 years' average growth rate is regressed on household debt to GDP ratios in each subgroup, and same in column (2).

Source: Authors' calculations.

**Table 3: Threshold Regression (75th Percentile)**

	Household Debt (1)	Nonfinancial Corporate Debt (2)
Group 1 Sector "S" Debt	-0.627*** (0.163)	-0.534** (0.183)
Group 2 Sector "S" Debt	-0.189 (0.262)	-2.641*** (0.306)
Group 3 Sector "S" Debt	-0.825* (0.418)	-0.718 (0.408)
Group 4 Sector "S" Debt	-0.681** (0.257)	-0.707*** (0.229)
GDP per Capita	-0.097* (0.053)	-0.094* (0.050)
Trade Openness	0.003 (0.003)	0.005 (0.004)
Gross Saving Rate	0.073*** (0.009)	0.069*** (0.009)
Inflation	0.001 (0.009)	0.001 (0.009)
Observations	824	824
R-squared	0.057	0.082
Country Fixed Effects	YES	YES
Year Fixed Effects	YES	YES

Notes:

1. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10
2. Driscoll-Kraay standard errors in parentheses
3. Sector "S" refers to each sector in columns (1) to (2). Thus, in column (1), the 3 years' average growth rate is regressed on household debt to GDP ratios in each subgroup, and same in column (2).

Source: Authors' calculations.

#### 4. Concluding Remarks

We examined the global rise in debt across sectors for emerging markets and frontier economics, with a particular focus on Asian economies. We observed a common pattern that sectoral debt levels have risen in the last decade and accelerated further due to the onset of the COVID-19 pandemic.

To quantify the relationship between sectoral debt overhang and economic growth, we extended previous econometric studies to the setting of emerging markets and developing economies, within which we found significant, non-causal evidence of sectoral debt overhang across these countries. A country's economic sensitivity to rising sectoral debt depends both on the country's level of development relative to its peers and the level of debt itself. Future economic growth does appear to be more sensitive to rising household debt relative to corporate debt, however, these effects are highly heterogeneous across countries. Sectoral debts matter less for relatively richer frontier and emerging economies. The relationship between debt and growth is negative, though it varies with the type of sectoral debt and across country groups. For the frontier and emerging economies which are poorer than other groups (i.e., in the bottom quartile), the coefficients of all types of sectoral debts are negative and significant at least at the 5% level. However, the results are highly heterogeneous for the relatively richer emerging market economies. The coefficients of government debt are not significant for them. The coefficients on nonfinancial corporate debt are negative, but not significant even at the 15% level. Household debt matters more than other types of sectoral debt for relatively more developed emerging economies. While the debt tolerance to household debt in the highest-income emerging economies might be relatively high, there is no reason for these

countries to sit on their laurels, as several of these countries reached above the 75% quantile of the peer group and their own historical 75% quantile.

The prevalence of household debt overhang risk in emerging economies that we document is a pattern similarly found in advanced economies which have also experienced rapid debt growth following the global pandemic.<sup>8</sup> In the US, for example, household credit issued by commercial banks continues to expand rapidly despite aggressive monetary tightening by the Federal Reserve (Financial Times 2022b). As a result, rising household debt that limits fiscal space may interact with the banking sector in ways that present notable tail risks to the economy—both in advanced and emerging economies.<sup>9</sup>

With more detailed data and a longer sample, we hope to gain more detailed insights accounting for the observed heterogeneity. Among the issues to be explored are the following:

- Adding controls for global factors, like VIX, US policy interest rates, global growth rates, quality of institution, and the like.
- Controlling the currency composition of debt overhang, international reserves and GDP ratios, share of floating interest loans, etc.

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<sup>8</sup> This commonality may reflect political economy factors subsidizing residential mortgages, and the high transactions and fiscal costs of bailing out household debt. [IMF's WEO \(2021-1, Chapter 3\)](#) and Mbaye, Badia, and Chae (2018).

<sup>9</sup> As highlighted in the United States (US) context currently underway, the deteriorating capital ratios of large US banks can be explained by continued growth in aggregate loan issuance by large US banks. Large bank asset composition is indeed becoming riskier in 2022 as loans are growing faster than asset holdings like treasuries and mortgage-backed securities (MBS) which are decreasing. A large proportion of increased bank loan issuance is to households. Consumer loans held by US banks are at record levels and so are residential real estate loans. Meanwhile, MBS assets have decreased in 2022 but because of their low risk weight in regulatory capital calculations, the decrease in MBS assets cannot meaningfully offset the rise of risky loan assets in regulatory capital buffer calculations.

- Controlling for the public debt and aggregate private sectors debt. A lower ratio, other things being equal, increases the fiscal space, and may increase the growth rate.
- Controlling for terms of trade shocks.
- Controlling for directly fiscal space measures [public debt or tax base; sovereign spreads and the like].
- Comparing sub samples determined by major global changes, like before and after the GFC.
- Studying and comparing regional patterns.

## Appendix: Data Description

This appendix describes the data used in the regressions. As explained in section 3 all the data except for sectoral debts are from the October 2022 World Economic Outlook database by the International Monetary Fund (IMF) and the sectoral data are from the Institute of International Finance.

All the data are annual, and the sample period is 2006–2021, but sectoral debts, in particular, government debts, of several frontier economies and emerging economies in the early years (the late 2000s) are missing in the data.

Below, we report the list of the countries in each of the groups and the summary statistics of the variables used in the regressions. The summary statistics of sectoral debts are reported by the group as the data is used in subgroups in the panel estimation. Group 1 is composed of the countries with gross domestic product (GDP) per capita in 2010 below \$4,000 (PPP-adjusted in 2017 international dollars). Group 2 is between \$4,000 and \$10,000 in the GDP per capita, Group 3 is between \$10,000 and \$20,000, and Group 4 is between \$20,000 and \$40,000.

Summary statistics of the variables are reported in Table A2. Three years' average growth of GDP per capita is calculated using the real GDP per capita in domestic currency. Trade openness refers to the ratios of the volume of trade, as the summation of exports and imports, to GDP. Gross saving rate is the total saving to GDP ratio. Inflation is the yearly average growth of the consumer price index.

**Table A1: Countries in Each Group**

<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>	<b>Group 4</b>
Bangladesh	Angola	Brazil	Argentina
Benin	PRC	Colombia	Chile
Cameroon	El Salvador	Costa Rica	Croatia
Congo	India	Dominica	Czech Republic
Côte d'Ivoire	Indonesia	Ecuador	Hungary
Ethiopia	Jamaica	Grenada	Israel
Ghana	Kenya	Jordan	Kazakhstan
Mozambique	Lao PDR	Maldives	Republic of Korea
Papua New Guinea	Mongolia	Mexico	Malaysia
Rwanda	Morocco	Serbia	Oman
Senegal	Nigeria	South Africa	Poland
Tajikistan	Pakistan	Türkiye	Romania
Zambia	Sri Lanka	Thailand	Russian Federation
		Tunisia	Trinidad and Tobago
		Ukraine	

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Source: Authors.

**Table A2: Summary Statistics of the Variables**

	<b>Observations</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Minimum</b>	<b>Maximum</b>
3 years' average growth of GDP per capita (%)	844	2.208	2.890	-8.964	13.707
GDP per capita (\$1,000)	1035	17.086	16.049	0.761	106.032
Trade Openness (%)	943	85.278	65.283	20.723	442.62
Gross Saving Rate (%)	989	23.112	11.032	-15.532	64.717
Inflation (%)	1024	5.650	5.986	-2.324	53.548
Group 1					
Household Debt / GDP (%)	221	5.4	2.37	0.37	12.01
Nonfinancial Corporate Debt / GDP (%)	221	13.26	7.94	0.04	36.88
Government Debt /GDP (%)	221	43.59	24.18	8.37	140.21
Group 2					
Household Debt /GDP (%)	221	16.98	12.39	1.42	61.61
Nonfinancial Corporate Debt / GDP (%)	221	32.25	34.36	0.33	160.28
Government /GDP (%)	208	59.37	28.79	7.28	146.68
Group 3					
Household Debt /GDP (%)	252	24.34	16.34	4.66	90.98
Nonfinancial Corporate Debt / GDP (%)	252	32.68	19.16	0	88.62
Government /GDP (%)	224	52.44	21.35	18.06	154.39
Group 4					
Household Debt /GDP (%)	237	30.71	20.94	3.11	105.79
Nonfinancial Corporate Debt / GDP (%)	237	57.74	25.95	4.87	113.69
Government /GDP (%)	201	40.94	23.14	3.2	98.64

GDP = gross domestic product.

Source: Authors' calculations.



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## **Sectoral Debt Capacity and Business Cycles**

*Developing Asia and the World Economy*

This paper reviews the patterns of sectoral debts and growth and the mechanisms explaining the adverse effects of debt burdens on growth rates. The empirical analysis covers a sample of 55 emerging and frontier market economies. Future economic growth is more sensitive to rising household debt than corporate debt. However, these effects are highly heterogenous across economies and depend on relative income.

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