7. Asia's corporate debt: assessing its role in financial vulnerability

Hernán D. Seoane¹

1. INTRODUCTION

This chapter studies the interaction between nonfinancial corporate debt, output dynamics, and the degree of financial fragility of Asian economies. Corporate debt may be a source of financial instability as, in principle, it weakens the balance sheets of firms and exposes them to several types of risk. But it is also a way to finance investment and, hence, future growth in firms and in the country. Thus, the dynamics of corporate debt is of primary importance in a modern economy's macroeconomic health.

Corporate debt was a destabilizing factor during the Asian financial crisis, as part of the accumulated debt was used to finance low-productivity projects. Since then, most Asian economies have achieved lower and stable corporate debt-to-output ratios. On the other hand, since the end of the global financial crisis (GFC) that started in the United States (US) in 2008, and partly because of the search for yield behavior, international capital boosted sovereign and private debt ratios (together with stock and housing prices) worldwide, particularly in emerging economies. Hence, as international capital markets evolved, we ask what will be the impact of the current accumulation of corporate debt. To answer this question, we design a vector autoregression (VAR) model to study the interaction of private debt with macroeconomic and financial data. We estimate the model for nine large Asian economies since the mid-1990s until the first quarter of 2020.

The main result is that corporate debt tends to increase the degree of financial stress. Moreover, nonfinancial corporate debt contributes to the increase in financial stress in most of the countries we consider during the 1997 crisis, but not during 2008. This result is consistent with an ample body of literature that finds that balance sheets of corporations and intermediaries were stronger in 2008 and that the regulatory frameworks improved as a result of the 1997 crisis. After 2017, corporate debt-to-output ratio seems to have contributed more to the variability of the financial stress index, suggesting that in many countries (of which the People's Republic of China (PRC) is a particularly important case), corporate debt may start playing a destabilizing role.

After studying the fit of the model and its implications for the importance of different shocks across time, we use it to evaluate the potential impact of the current crisis. We use the exogenous variables, that is, the stock market volatility index (VIX) and the US Treasury bill rate (T-bill), to simulate an environment that resembles the one after the coronavirus disease (COVID-19) shock. We also use the model to measure the impact of the crisis on

the future dynamics of debt and financial fragility. Focusing on the case of the PRC, we find that the crisis may lead to an increase in the corporate debt-to-output ratios, a slowdown of output growth, or even a recession, and a deterioration of financial stability due to the larger debt-to-output ratios, current account deterioration, and a loss of international reserves. Moreover, we can show that the larger the increase in the debt ratios, the stronger would be the impact on output growth and financial fragility. Our analysis suggests that even though debt would be an instrument to smooth the costs of the crisis to the firms, governments should pay attention to its evolution and avoid the possibility of nonfinancial corporations overborrowing, which may slow down recovery after COVID-19.

The predictions of the model allow us to speculate about the consequences of the current crisis in relation to corporate debt. As the crisis will increase the level of corporate debt, which may be a significant outcome, in the context of high uncertainty and low domestic and international demand is the emergence of the so-called zombie firms, that is, enterprises that can only operate by continuing to issue debt. The banks that lend to these firms may not have the right incentives to recognize the firms' bankruptcy and may refinance their debts to avoid a deterioration of the banks' own balance sheets. The emergence of such a situation will affect recovery from the crisis, as has been observed in Japan since the 1990s.

The package of fiscal measures implemented during the crisis could also increase the levels of sovereign debt, raising the risk of debt overhang at the sovereign level. When public debt increases to destabilizing (or unwanted) levels, governments need to consolidate fiscal policies—increase taxes, reduce spending, or in the case of nominal debt, generate inflation to reduce its real value. In the context of low demand and underutilization of production factors, it is unlikely that inflation would erode these debts in the near future, which implies that households and firms should expect a reduction in spending or tax increases, measures that are likely to slow down recovery. Consequently, without fiscal and monetary space to boost the economy, sluggish recovery may lead to regional stagnation in Asia, a situation again resembling the experience of the Japanese economy over the last decades.

It is important to highlight that even though this chapter focuses on nonfinancial corporate debt, the asset position of households and sovereigns are also key factors for macro stability and recovery after the COVID-19 crisis. Other chapters in this volume complement the analysis of this chapter, such as Chapter 8 on the current situation regarding households' debt in Asia, Chapter 10 and Chapter 9 on the analysis of sovereign debt and more generally the role of fiscal policy, and Chapter 2 which focuses on Japan.

In the remainder of this chapter, we review the main drivers of the 1997 Asian financial crisis and the ensuing policy responses in section 2. Section 3 describes the Asian experience during the GFC that started in 2008. Section 4 presents the model we estimate to study the relationship between nonfinancial corporate debt and the macroeconomic performance of Asian economies. Section 5 uses the findings of the VAR model to forecast the plausible dynamics during the COVID-19 pandemic and highlights the challenges Asian economies are likely to experience once the crisis is over. Finally, section 6 presents a few concluding remarks.

2. THE ASIAN FINANCIAL CRISIS

This section reviews the main features of the economic environment in Southeast Asia before the Asian financial crisis, followed by a discussion of the recovery from the crisis and the

policy lessons to be drawn. It then describes the economic environment of sample economies before the GFC.

2.1 Asian Economies Before the Financial Crisis

Before 1997, Southeast Asian economies had successfully attained output growth, macroeconomic stability, high investment and savings rates, in addition to the development of private sector businesses. Their economic performance was usually classified as “miraculous”. Page (1994) describes the main features of the East Asian miracle: (1) East Asian economies experienced rapid and sustained growth for over 30 years since the 1960s; (2) total factor productivity and physical and human capital grew faster than in other economies with similar degree of development; and (3) good economic policies in these economies led to a stable macroeconomic performance and incentivized export-led growth. The consensus in the profession at that time was that the 1997 crisis was unexpected. It was, however, associated with the evolution of private sector financial choices during the boom.

2.2 The 1997 Asian Financial Crisis

Ex post, several authors identified the risks that had been growing in Asian economies but were hidden during the expansive part of the cycle. Many of these risks were associated with the behavior of corporations and the regulatory frameworks; see for instance Carson and Clark (2013). Multilateral institutions such as the International Monetary Fund (IMF) found that the crisis was due to a combination of macroeconomic imbalances, external dynamics, and weak financial and corporate sectors (IMF 1998; 2000).

Corsetti et al. (1998) identified the macro- and microeconomic drivers of the crisis. During the expansion, governments in the region contributed to boosting growth by providing public guarantees to private investment projects, which, combined with poor regulatory frameworks (and being unable to control the moral hazard), ended in overinvestment that was largely financed by the issuance of external debt in foreign currency at short maturities. The combination of these factors increased the vulnerability of economies.

Firms' indebtedness caused a deterioration in macroeconomic performance in two ways. First, it led to external fragility through the accumulation of persistent current account deficits and excessive international bank borrowing in foreign currency (inappropriately hedged short-term debt). Second, the profitability of investment eventually started to decrease: for instance, Corsetti et al. (1998) found low return on invested capital in 1996 (particularly of important chaebols in the Republic of Korea). By the mid-1990s, East Asian economies were exposed to expectation reversals due to the factors described earlier: inefficient investment financed with short-term debt in foreign currency. In this context, the dollar appreciated against the Japanese yen in 1995, and considering that several Asian economies had their currency pegged against the dollar, this represented a major competitive loss for Southeast Asian economies.

By mid-1997, there was a strong perception that the currency pegs were unsustainable due to current account imbalances. Thailand's devaluation of its currency initiated a crisis that spread to the Republic of Korea; Hong Kong, China; Malaysia; the Philippines; Indonesia; and Japan. According to Corsetti et al. (1998), corporate and financial firms were hit by the

subsequent stock market crash and decline in real estate prices, increasing private default rates. This sequence of events increased economic uncertainty, which ultimately fueled the sudden stop in capital flows, pushing the collapse of currencies in the region.

The economies began to stabilize during 1998, although not all at the same pace. The Republic of Korea's recovery was robust by 1999, while Indonesia in the course of social and political distress resumed growth by the end of that year.

2.3 Institutional Changes After the Crisis

According to IMF (2000) the strategies to restore confidence had to be based on (1) monetary policy measures to avoid exchange rate overshooting as this would weaken the balance sheet of financial intermediaries; (2) restructuring and recapitalization of the financial sector; (3) improving governance, transparency and accountability; and (4) designing fiscal policy reform to face the costs of recapitalizing the banks. The IMF and the international community provided financial support to implement such reform programs, which involved substantial changes in the economies' institutional and legal frameworks.

After the crisis there was a transitory tightness of monetary policy to avoid a collapse of exchange rates and further weakening of the balance sheets of corporations and banks. This was combined with fiscal austerity to cover the costs of financial reforms, which was quickly relaxed to compensate for the impact of the crisis on private demand.

As highlighted by IMF (2000), the financial reforms included the closure or recapitalization of financial institutions and improvements in regulations and monitoring activities of central banks. For instance, Thailand reformed bankruptcy and foreclosure laws and procedures, which included government intervention and rapid privatization of weak banks. The Republic of Korea's structural reforms focused on providing liquidity to the financial sector, recapitalizing banks and closing nonviable firms; improving prudential regulation; and liberalizing the capital account. Indonesia reformed its banking sector and at the same time restructured its corporate sector. The government introduced a bankruptcy system and a process of privatization. Similarly, Malaysia and the Philippines implemented policies to strengthen banks' balance sheets thereby supporting currency stability. Together with these policies, the measures slowly made progress toward restructuring the corporate debt.

3. RECENT FINANCIAL TRENDS IN ASIA: GLOBAL FINANCIAL CRISIS

The first signs of the GFC in Asia emerged in the form of reduced global financing, with net equity inflows becoming negative and bond financing reduced to about one-quarter of pre-crisis levels, that is, the crisis started with a flight to quality from emerging to developed economies. In reality, the crisis had a negative impact on aggregate demand, reducing Asian exports worldwide and in trade within Asia.

However, Asia was resilient and more prepared for the GFC (see Park et al. 2013). After the Asian financial crisis, economies accumulated global reserves, contributing to macro stability and avoiding large swings of exchange rates. Yet there was some degrees of financial stress in private markets (in banks and stock markets, together with drops in corporate profits) and delayed increase in unemployment, affecting mostly small and medium-sized enterprises.

Notes:
PRC = People's Republic of China.
Year-on-year output growth in percentage terms.
Source: Asian Development Bank, Asia Regional Integration Center.

Figure 7.1 Output growth (%)

Note: Contribution of exports and investment to growth in percentage terms.

Source: Asian Development Bank, Asia Regional Integration Center.

Figure 7.2 Contribution to growth (%)

Notes:
PRC = People's Republic of China.
Current account-to-output ratio and short-term external debt to reserves in percentage terms.
Source: Asian Development Bank, Asia Regional Integration Center.

Figure 7.3 Financial fragility indicators (%)

Nevertheless, the contagion (and resolution) of the GFC was very fast. Large Asian economies managed to exploit domestic demand but the small and emerging Asian economies suffered large drops in foreign demand. Lee and Park (2009) attributed the limited impact of the GFC on Asia to (a) the limited exposure of these economies to mortgage-related assets in the US; (b) the good balance sheets and liquidity cushions of banks—the predominant operators in financial intermediation in this region—which were restored after the Asian crisis; and

(c) the region's deeper financial sectors and rising equity and bonds markets compared with the 1997/1998 crisis.

Nevertheless, the GFC was not innocuous in Asia, as highlighted by the former IMF Deputy Managing Director Takatoshi Kato in his 12 May 2009 speech. Figure 7.1 shows that Asian economies experienced large negative output growth (or slowdown) during 2008 and 2009 and a strong rebound during 2010–2012. Since 2018, output growth seems to be slowing down even further, which can potentially imply a weak position to face the current crisis derived from the spread of COVID-19, particularly for the PRC; India; the Republic of Korea; Singapore; and Hong Kong, China.

The contribution of demand to output growth provides insights into the drivers of the recession and economic slowdown after 2008. The contribution of investment to growth was very volatile and it did not seem to be a driver of growth in the sample, except for Singapore and the Republic of Korea in 2012 (Figure 7.2). In his 2009 speech, Kato pointed out that the whole domestic demand shared this pattern. Exports seemed to contribute negatively to growth in these economies. As investment and exports are not strong drivers of the growth, there may not be good reasons to expect export-led growth in the future, which can be an issue in the case of debt overhang. These variables were affected during the 2008 crisis and, currently, after 2018, they seem to be slowing down output growth in all the economies.

The recent dynamics of the ratio of nonperforming loans and the profitability of the financial sector show mixed results with regard to the evolution of nonfinancial corporate debt and its impact on financial stability. Data from the Bank for International Settlements show a fall of nonperforming loans since the GFC. In Malaysia, the Philippines, and Thailand, nonperforming loans fell from around 6 percent, 4 percent, and 7 percent, respectively, to around 2 percent. In the PRC, India, and Indonesia, there was instead an increase in the rate of nonperforming loans. Rosenkranz and Lee (2019) also studied the rise in nonperforming loans in some Asian economies. Related to the performance of banks, even though bank asset returns are relatively stable in the sample, equity returns are large but decreasing. In turn, capital adequacy ratios are mostly increasing except in Singapore and the Philippines, where this variable is fairly stable. This measure gives a sense of the increases in risk exposure of financial intermediaries.

On top of the evolving vulnerability of the financial sector, current account surpluses have been falling since 2015, particularly for Indonesia, Malaysia, the Philippines, and the PRC (Figure 7.3). This evidence, combined with the large exposure of short-term debt as a share of foreign reserves, should be considered seriously to assess the degree of financial fragility. The average short-term debt to foreign reserves for all economies seems to be around 50 percent, but in some cases such as Hong Kong, China; Malaysia; and Japan, this ratio is more than 100 percent and, in most cases, it is increasing. In this context, many economies in the region seem to be exposed to a sudden stop in foreign capital flows risk.

To provide a summary of financial vulnerability, the Asian Development Bank (ADB) calculates the financial stress index. This index measures the degree of financial stress with a focus on banks, foreign exchange rates, equity, and bond markets. Park and Mercado (2014) include details about the construction of the index. The Asian crisis in 1997/1998 and the GFC in 2008 represented a strong deterioration of this index (Figure 7.4). Currently, the index seems to have stabilized at a lower level. However, it is important to highlight that in most cases, there seems to be an increase in the degree of financial stress from 2018 onward, which is in line with the slowing down of the economies described above.

Notes:
PRC = People's Republic of China.
Year-on-year output growth in percentage terms.
Source: Asian Development Bank, Asia Regional Integration Center.

Figure 7.4 Financial stress index for Asian economies

After the deleveraging that followed the 1997 Asian crisis, corporate debt increased, particularly after the GFC, in the PRC; Hong Kong, China; Singapore; Malaysia; the Republic of Korea; and Indonesia, reaching around 100 percent of gross domestic product (GDP) or more

(Figure 7.5). The current levels are in some cases comparable to the 1997/1998 levels while larger in others, such as in Hong Kong, China.

Notes:

GDP = gross domestic product; PRC = People's Republic of China.

Nonfinancial corporate debt-to-output ratio in percentage terms.

Source: Bank for International Settlements.

Figure 7.5 Nonfinancial corporate debt-to-output ratio (%)

It is instructive to compare the policy response of Asian economies with the GFC and the Asian financial crisis. Asia faced a sharp deterioration in demand from developed economies during the GFC. This shock was absent during the 1997 crisis when external demand contributed to the recovery. On the other hand, currencies depreciated against the US dollar, and there was an expansive fiscal stimulus larger than that in the average G20 economy.

Comparing both crises, the key difference was the fiscal and monetary space and the stronger balance sheets of the private sector. While during the 1997 crisis governments had to implement fiscal austerity and contractionary monetary policy to avoid capital flight and an even further depreciation of the currency, during the 2008 crisis, the Asian economies were in better shape and had major fiscal and monetary space to implement countercyclical policies that accelerated the recovery. As the Asian crisis was local, the recovery came through the export sector, but the international goods market did not help to the same extent after 2008.

4. EMPIRICAL ANALYSIS

The previous section suggests that during the 1997 crisis the private sector played a destabilizing role due to overaccumulation of short-term debt denominated in foreign currency, while in 2008 and 2012, the crises started in developed economies with the balance sheets of the private

sector stronger than before. The situation was somewhat different in 2019. The economies that had been in good shape after the GFC, with strong recovery, seem to be experiencing some vulnerability in terms of domestic financial sector and foreign exposure to capital flow reversals. Although not all economies are alike, the corporate sector in many Asian economies increased their debt stocks substantially after 2010. Moreover, the COVID-19 crisis affected both domestic and world demand.

In this section, we estimate a separate VAR model for the PRC; Hong Kong, China; India; Indonesia; Japan; the Republic of Korea; Malaysia; Thailand; and Singapore over the 1990–2019 period, to study the relationship between corporate debt, financial vulnerability, and macroeconomic fundamentals. We consider three main questions: (a) how do nonfinancial corporate debt, financial fragility, and output growth interact?; (b) how do international factors affect the dynamics of corporate debt?; and (c) how strong is the economic environment in the current crisis?

For each economy, we postulate a model:

$$y_t = A_1 y_{t-1} + \dots + A_4 y_{t-4} + Cx_t + \varepsilon_t$$

where $t = 1, \dots, T$. The matrices A_i are unknown coefficients of the reduced form VAR, and ε_t is a vector of reduced form shocks that is assumed to be normally distributed with mean zero and unknown variance–covariance matrix Σ and non-autocorrelated. The vector of x_t includes the exogenous variables, constant and trends, and y_t includes all endogenous variables. The models include five endogenous variables: output growth (in percent), current account-to-output ratio (in percent), nonfinancial corporate debt-to-output ratio (in percent), the annual change in external reserves to output ratio (in percent), and the financial stress index. We include two exogenous variables: the three months' T-bill rate, whose evolution may be important, to assess the search for yield behavior in international asset markets that occurred after the GFC; and the VIX from the Federal Reserve Economic Data (FRED) from the St. Louis Fed that measures the degree of international financial markets' volatility as well as being an indicator of financial crisis. We include a linear trend and a constant. The data, at quarterly frequency, are seasonally adjusted before estimation if we observe evidence of a seasonal component. We include four lags for the endogenous variables. Our data sources include the Asia Regional Integration Center database from ADB, the International Financial Statistics database from the IMF, the Organisation for Economic Co-operation, and FRED from the St Louis Fed. Appendix 7.1 presents details on the data treatment.

The choice of variables is motivated by the experiences described in the previous sections, including those that have been closely interrelated in these economies over the last 30 years. Output growth measures the macroeconomic performance, the current account-to-output ratio measures the risk of external exposure, and the external reserves-to-output ratio was at the core of macroprudential policies implemented by Asia after 1997. Our variable of interest is the nonfinancial corporate debt-to-output ratio. Also, given that these economies are among the most open economies in the world, we include two variables that summarize the world macroeconomic and financial environment: the risk-free rate measured by the T-bill rate and the VIX.

We use the financial stress index to proxy the degree of financial fragility. This variable is constructed by Park and Mercado (2014) and is available at ADB's Asian Regional Integration Center. The index is constructed using information from four financial sectors: the banking sector, stock market, sovereign debt market and foreign exchange rate market. It is designed to capture episodes of financial stress in line with Balakrishnan et al. (2011), where the financial system fails in its role of intermediation among agents. In particular, the measure of stress for the different sectors is represented as follows: (1) in the banking sector by comparing information about bank equity return volatility with the volatility of stocks, in which the banks become a source of financial stress when they are relatively riskier than stocks; (2) in the stock market, the index includes stress from equity returns and from the volatility of those returns computed using a GARCH(1,1); (3) in the sovereign debt market by measuring sovereign yields for long-term bonds; and (4) in the exchange rate markets by measuring the exchange rate depreciations with respect to the US dollar and the change in the level of foreign exchange reserves.²

4.1 Overview of the VAR Results

We base our VAR analysis on impulse response functions, which allows us to quantify the importance of shocks (from endogenous and exogenous variables) and analyze the way transmission channels work; and on historical variance decomposition, which analyzes the contribution of structural shocks to the evolution of financial fragility since the 1997 crisis. We focus on the role of corporate debt and its impact on macroeconomic variables and the degree of financial fragility at the country level.

Before moving to the main part of the analysis, we highlight a few additional findings that are robust in the sample.

Regarding the role of exogenous variables, we find that including the VIX and T-bill matters. Increases in the VIX and the T-bill tend to have negative effects on the macroeconomic variables, inducing negative growth, declining external reserves, and increasing the financial stress index. Moreover, they tend to reduce the firm's borrowing by increasing borrowing costs and increasing financial stress. In the cases of Japan and the Republic of Korea, even though the results are similar to the other economies in terms of growth and the financial stress index, the T-bill and VIX increase debt-to-output ratios (which does not necessarily imply that firms issue more debt; they may reflect a larger output drop).

4.2 The Effect of Private Debt Shocks

Figure 7.6 shows the impulse response functions of endogenous variables to a unitary shock to the nonfinancial corporate debt-to-output ratio for each economy.

Notes:
PRC = People's Republic of China.
The figures present the posterior median impulse responses together with the 68% credible set (1 standard deviation) in dashed lines. Impulse response function of the financial stress index to an $\varepsilon_{cd}^s = 1$ that denotes the structural innovation to the nonfinancial corporations' debt-to-output ratio.
Source: Author's elaboration.

Figure 7.6 *Response of financial stress index to a nonfinancial corporation's debt-to-output ratio*

As seen in the figure, in most of the cases an increase in the nonfinancial corporate debt-to-output ratio tends to increase the degree of financial fragility measured by the financial stress index. In the cases of Japan and Singapore, the increase is on impact, while in the other cases the initial impact is small or negative but makes the economy financially fragile on a 5- to 10-quarter horizon. The dynamic after an increase of corporate debt is heterogeneous. In the cases of the PRC, the Republic of Korea, Japan, and Malaysia, when corporate debt-to-output ratio increases, output growth accelerates, and the change in global reserves to output tends to fall (Figures 7.7 and 7.8). Intuitively, an increase in nonfinancial corporate debt-to-output ratio has two effects, which may operate in different directions with respect to its impact on financial stability. First, if the increase in debt-to-output ratio is used to finance investments, successful investments contribute to the repayment of the debt, so in this case, there is no reason to expect a deterioration of financial conditions. On the other hand, higher debt level causes the firms' balance sheets to deteriorate, potentially increasing the investors' perception of risk in the context of risky investments. In the medium term, according to the figures the second channel tends to dominate.

Notes:

PRC = People's Republic of China.

The figures present the posterior median impulse responses together with the 68% credible set (1 standard deviation) in dashed lines. Impulse response function of output growth to an $\varepsilon_{cd}^s = 1$ that denotes the structural innovation of the nonfinancial corporations' debt-to-output ratio.

Source: Author's elaboration.

Figure 7.7 Response of output growth to a nonfinancial corporation's debt-to-output ratio shock

In the remaining cases, in contrast, debt increases tend to reduce output growth and reserves-to-output ratio. These dynamics contribute to financial deterioration.

Note:
PRC = People's Republic of China.
The figures present the posterior median impulse responses together with the 68% credible set (1 standard deviation) in dashed lines. Impulse response function of a change in reserves-to-output ratio to an $\varepsilon_{cd}^s = 1$ that denotes the structural shock of the nonfinancial corporations' debt-to-output ratio.
Source: Author's elaboration.

Figure 7.8 Response of a change in reserves to output ratio to a nonfinancial corporation's debt-to-output ratio shock

4.3 Private Debt and Financial Stress

We find that shocks to the level of corporate debt tend to increase financial stress, even though they have a less clear impact on the economy. Not all debt reduces output growth as corporations issue debt to finance investment which, if successful, is expected to have a positive impact on output. This section studies the extent to which the degree of financial vulnerability can be explained by private debt accumulation from 1995 to 2019, using a historical variance decomposition, a tool that allows us to assess the importance of corporate debt shocks at every point in time.

Figure 7.9 presents the contribution of the ratio of nonfinancial corporate debt to output shocks to the variability of the financial stress index. The vertical axis depicts the part of financial stress index variation that can be attributed to the ratio of nonfinancial corporate debt to output shocks, with positive bars indicating that corporate debt increases the financial

stress index and negative bars indicating that it contributes to a reduction of the financial stress index. It is important to point out that there is not much information we can draw from India and Malaysia as the credible sets always include zero, suggesting there is a high degree of uncertainty around those estimates.

For those cases in which we have data before 1997, part of the increase in financial stress is explained by the high debt-to-output ratios of corporations. This is particularly clear for Indonesia, Japan, the Republic of Korea, Singapore, and Thailand. After the 1997 crisis the correction in the debt-to-output ratios of the firms contributed to economic stability in financial terms, explaining part of the fall in the financial stress index observed before the GFC.

Note: PRC = People's Republic of China.

Source: Author's elaboration.

Figure 7.9 *Variability of financial stress generated by nonfinancial corporate debt-to-output ratio shocks*

The increase in the financial stress index following the 2007 crisis seems to be detached from the evolution of the firms' debt-to-output ratios. In other words, the firms' indebtedness did not play a major role in the increase in financial fragility during the GFC. After 2018, the financial stress of the economies increased. Even though there is mixed evidence, we can see that the firms' debt seems to explain part of the deterioration in the cases of the PRC; Indonesia; Japan; and Hong Kong, China. That is, the private debt-to-output ratio does not

seem to have had a generalized impact on the financial stability of all economies, but it seems to be a problem for some of the most important economies in the region.

5. THE COVID-19 CRISIS

The current crisis differs from the 1997 and 2009 crises. The fundamentals in 1997 were weaker, the pre-crisis exuberance strong and the economies less flexible. In contrast, the business and banking sectors in 2009 were more resilient, balance sheets were stronger, the regulatory frameworks better suited to face the financial crisis, and the level of external reserves of these economies put them in a much better position.

The COVID-19 crisis seems to be somewhat in between. A negative effect of the GFC was the search for yield that boosted the firms' financing. The level of corporate debt is currently larger than during the earlier crises, making economies more vulnerable. The degree of uncertainty is comparable to that brought by the 1997 crisis but the fundamentals are stronger.

To examine the role of corporate debt in the COVID-19 crisis, we compare the results of conditional versus unconditional forecasts. First, we simulate an evolution of exogenous variables of a similar order to the data in 2020, assuming the current situation lasts until the first quarter (Q1) of 2021, that is, an initial increase in VIX (assuming that it is 40 in Q4 2019, 80 in Q1 2020, and 30 from Q2 2020 onward) and a drop in T-bill rates from 1.5 percent in Q4 2019 to 0.1 percent from Q1 2020 onward. We compare two scenarios: one in which we do not impose assumptions to the trajectory of private debt-to-output ratio, and one in which we assume a strong increase in private debt-to-output ratio to 200 percent, 210 percent and 220 percent from Q4 2019 to Q2 2020. Due to space limitations and given the size and the importance for the region, we focus on the case of the PRC.

Figure 7.10 presents the unconditional forecast. The crisis, modeled as an increase in VIX and a drop in T-bill, is expected to generate an increase in the debt-to-output ratio of nonfinancial corporations and an increase in financial fragility, a drop in reserves, and slowdown in output growth. Figure 7.11 plots the scenario for an economy in which debt increases faster to 200 percent of output.

Overaccumulation of debt has increased financial fragility and in a more persistent way to the unconditional forecast, driven the economy into a recession during 2020, and induced substantial deterioration of the current account, causing global reserve assets to decline.

5.1 Policy Analysis

We also examine the role of macroprudential policies in this context. Our base model does not include policy variables due to data availability limitations (policy variables are available from Q1 2000 to Q4 2016). We construct an alternative VAR for a subset of the variables including the regulatory loan-to-value ratio and a macroprudential database. Due to space limitations, we focus once more on the case of the PRC.

The model includes a variable that measures the tightening (or loosening) of macroprudential policies using dummy-type indexes, regulatory level of the loan-to-value ratio, output growth (in percent), nonfinancial corporate debt to output (in percent), and the financial stress index, in that order. We include the T-bill, VIX and the linear trend for exogenous variables as in the baseline model and identify the model using a Cholesky decomposition.

Source: Author's elaboration.

Figure 7.10 Unconditional forecast

The database for the macroprudential policies is constructed in Alam et al. (2019) and provides two variables for measuring macroprudential policies: (1) the average regulatory limit on the loan-to-value ratio; and (2) the dummy index that takes a value of (+1) if a particular macroprudential instrument was tightened, (0) if it remained unchanged, and (−1) if it was loosened. They considered 17 instruments, and our variable that measures the change in macroprudential policies is the sum of these 17 dummy indexes.³

Figure 7.12 presents the median, upper and lower bounds of the estimates of the historical variance decomposition for the nonfinancial corporate debt-to-output ratio and the financial stress index using a variant of the model that includes policy variables. These include the change in macroprudential stance (MAPP), regulatory average loan-to-value ratio, output growth, nonfinancial corporate debt-to-output ratio (NFCD/Y), and financial stress index (FSI). Part of the below-trend behavior of both corporate debt and FSI between 2012 and 2015 is explained by both changes in the loan-to-value ratio and the macroprudential dummy indexes.

These findings suggest that macroprudential policies in the PRC seem to be effective for controlling private indebtedness and financial stress in the post-GFC period.

6. DISCUSSION AND POLICY REMARKS

This chapter has studied the interaction between nonfinancial corporate debt, output growth and financial fragility in Asia over the last 30 years. We find that corporate private debt played a role in explaining financial stress during the 1997 crisis, but not during the 2007 GFC.

Source: Author's elaboration.

Figure 7.11 Conditional forecast to large private debt-to-output ratio increase

Lately, presumably as a consequence of large liquidity provision and a search for yield behavior in international markets, the private debt levels-to-output ratio has been increasing in Asian economies, positively contributing to an increase in financial stress.

The results of the forecasting exercise for the PRC suggest that the current crisis will lead to an accumulation of private debt, which in turn can have a dramatic impact on the economy. A major concern in this case is the possible emergence of zombie firms and the limits this situation will impose on fiscal responses and the behavior of international capital. In sum, the challenges of the COVID-19 crisis can be related to the following three issues: the emergence of zombie firms, the impact of countercyclical fiscal policies, and the reversal of capital flows.

6.1 Zombie Firms

Persistent and unforecastable lockdowns may lower aggregate demand. While expecting a temporary crisis to loom, firms are likely to issue debt to finance operations while restrictions are in place. Lenders are likely to make credit lines available to these firms, while also expecting a temporary crisis. Hence, the COVID-19 crisis may increase firms' debt and the risk of zombie firms, that is, those that cannot service their debt using their own profits for several periods.

Highly indebted firms face many problems. Banerjee and Hofmann (2018) find, using firm-level data from 14 developed economies, that these firms cause economic performance to deteriorate. Additionally, they tend to decrease their investment more than other firms

Note: Variables: Change in macroprudential stance (MAPP); regulatory average loan-to-value ratio (LTV); output growth (YGSA); nonfinancial corporate debt-to-output ratio (NFCD/Y); and financial stress index (FSI).
Source: Author's elaboration.

Figure 7.12 Historical decomposition of NFCD/Y and FSI

after a crisis (Kalemli-Ozcan et al. 2018). Ahearne and Shinada (2005) showed that zombie firms in Japan have contributed to weak economic performance and low dynamism over the last decades. Industries with a higher concentration of zombie firms tend to experience lower productivity growth than the other industries, and reallocation of market shares in industries with zombie firms tend to operate in the wrong direction, that is, these firms hinder productive firms from increasing their market share.

Andrews and Petroulakis (2019) found that zombie firms in Europe tend to borrow from unhealthy banks, crowd out credit to productive firms, and have a negative effect on productivity and capital allocation. In turn, banks keep lending to these firms in order to avoid recognizing nonperforming loans and facing losses on their balance sheets. This relates to regulation of the banking industry and particularly, as studied by Andrews and Petroulakis (2019), to the role of insolvency frameworks. In this regard, the authors find that it seems important to design frameworks that do not prevent corporate restructuring during insolvency regimes. This last

point was studied by Adalet McGowan and Andrews (2018), who found differences across European countries in corporate restructuring policies.

6.2 Fiscal Impact of Countercyclical Policies

The COVID-19 crisis is likely to be a transitory negative shock. Therefore, we should expect the government to implement countercyclical fiscal policies, as has indeed been the case in emerging and developed economies. Economies with more fiscal space, that is, low deficits and low debt, can run countercyclical policies to smooth the impact of the crisis on macroeconomic aggregates for longer periods.

A consequence of the crisis in these economies should translate into higher sovereign debts, potentially leading to a debt overhang situation that will necessitate fiscal consolidation in the future, which may slow down the recovery. Moreover, the risk of poorly forecasting the end of the crisis may lead economies to incur too much debt or respond inadequately to the crisis.

The firms' performance is likely to be affected by this situation because fiscal consolidation will potentially affect tax systems for firms and households and consequently affect domestic aggregate demand. Given that this situation is also relevant worldwide and in the region, the fiscal consolidation will potentially drag down the recovery even for economies that rely on external demand.

6.3 Flight to Quality, Search for Yields, and the Regulatory Framework

International capital flows are likely to flee from emerging Asian economies at the beginning of the crisis and return later if the interest rates of developed economies still remain low. This, in turn, introduces extra volatility and puts pressure on exchange rates, prices, and aggregate demand. Even though this may be an important driver of uncertainty, the large accumulation of external reserves is likely to make this problem less relevant for Asian economies compared with other emerging economies in Latin America. The design of financial market regulation should take into account the role of banks and nonbank financial intermediaries (shadow banks) as their share of private sector loans has been growing in recent years according to Bank for International Settlements data.⁴

6.4 Policy Remarks

We have seen that the risks brought by the current crisis are associated with the accumulation of large private (and sovereign) debt. This may lead some firms to default. Regarding nonperforming loans during the crisis, Rosenkranz and Lee (2019) suggest early resolution of these loans. In the context of the COVID-19 crisis, the early resolution of nonperforming loans will help contain the emergence of zombie firms.

We have shown that macroprudential policies can have substantial effects on the economy—lowering corporate debt and exposure to risks and controlling the degree of financial stress. These policies can help shield the economy against sudden capital inflows/outflows. In line with our findings, Kim (2019) studied the impact of macroprudential policies in Asia and found that tightening them had negative effects on output growth, comparable to a restrictive monetary policy. Where monetary policy space is limited, relaxing macroprudential policies

may help to smooth out the cycle in terms of output growth, albeit at the risk of financial fragility. This trade-off has to be taken into account to avoid exposing corporations and the entire financial system to excessive risk.

NOTES

1. The views expressed therein are those of the authors and do not necessarily reflect the views and policies of ADB, its Board of Governors or the governments they represent.
2. Park and Mercado (2014) and the companion webpage at the Asian Development Bank, Asia Regional Integration Center. Asia Financial Stress Index: <https://aric.adb.org/database/fsi> provide details about the construction of the index.
3. The instruments considered in the database are: (1) bank requirements for countercyclical capital buffers; (2) bank requirements for capital conservation buffer; (3) capital requirements for banks; (4) bank leverage limits; (5) provisions for loan losses; (6) limits for the growth/volume of credit; (7) restrictions on loans; (8) limits on foreign currency lending; (9) limits on loan-to-value ratios; (10) limits on loans-to-income or loan repayment-to-income ratios; (11) taxes on some financial transactions with a macroprudential objective; (12) liquidity measures; (13) loan-to-deposit ratios; (14) limits on FX positions/exposures; (15) reserve requirements; (16) measures to mitigate risks of systemically important financial institutions (SIFI); and (17) other macroprudential policies not considered before.
4. I thank Maria Teresa Punzi for pointing out this feature of data pertaining to developing Asia and the Pacific.
5. See European Central Bank. The BEAR Toolbox: <https://www.ecb.europa.eu/pub/research/working-papers/html/bear-toolbox.en.html>.

REFERENCES

- Adalet McGowan, M. and D. Andrews. 2018. Design of Insolvency Regimes across Countries. *OECD Economics Department Working Papers*. No. 1504. Paris: OECD Publishing.
- Ahearne, A.G. and N. Shinada. 2005. Zombie Firms and Economic Stagnation in Japan. *International Economics and Economic Policy*. 2(4), pp. 363–81.
- Alam, Z., A. Alter, J. Eisman, G. Gelos, H. Kang, M. Narita, E. Nier and N. Wang. 2019. Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database. *IMF Working Paper*. No. 19.66. Washington, DC: IMF.
- Andrews, D. and F. Petroulakis. 2019. Breaking the Shackles: Zombie Firms, Weak Banks and Depressed Restructuring in Europe. *ECB Working Paper*. No. 2240.
- Balakrishnan, R., S. Danninger, S. Elekdag and I. Tytell. 2011. The Transmission of Financial Stress from Advanced to Emerging Economies. *Emerging Markets Finance and Trade*. 47(sup2). pp. 40–68.
- Banerjee, R. and B. Hofmann. 2018. The Rise of Zombie Firms: Causes and Consequences. *BIS Quarterly Review*. September. pp. 67–78.
- Carson, M. and J. Clark. 2013. Asian Financial Crisis. Federal Reserve History Essay. Federal Reserve Bank of New York. Accessed at: https://www.federalreservehistory.org/essays/asian_financial_crisis.
- Corsetti, G., P. Pesenti and N. Roubini. 1998. What Caused the Asian Currency and Financial Crisis? Part I: A Macroeconomic Overview. *NBER Working Paper*. 6833. Cambridge, MA: National Bureau of Economic Research.
- International Monetary Staff (IMF). 1998. The Asian Crisis: Causes and Cures. *Finance and Development*. 35(2). Washington, DC. Accessed at: <https://www.imf.org/external/pubs/ft/fandd/1998/06/imfstaff.htm>.
- International Monetary Staff (IMF). 2000. Recovery from the Asian Crisis and the Role of the IMF. IMF Issues Brief. Accessed at: <https://www.imf.org/external/np/exr/ib/2000/062300.htm#I>.
- Kalemli-Ozcan, S., L. Laeven and D. Moreno. 2018. Debt Overhang, Rollover Risk, and Corporate Investment: Evidence from the European Crisis. *NBER Working Paper Series*. No. w24555. Cambridge, MA: National Bureau of Economic Research.

- Kim, S. 2019. Macroprudential Policy in Asian Economies. *ADB Economics Working Paper Series*. No. 577. Manila: Asian Development Bank (ADB).
- Lee, C.S. and C-Y. Park. 2009. Beyond the Crisis: Financial Regulatory Reform in Emerging East Asia. *ADB Working Paper Series on Regional Economic Integration*. No. 34. Manila: ADB.
- Rosenkranz, P. and J. Lee. 2019. Nonperforming Loans in Asia: Determinants and Macrofinancial Linkages. *ADB Working Paper*. No. 574. Manila: Asian Development Bank.
- Page, J. 1994. The East Asian Miracle: Four Lessons for Development Policy. *NBER Macroeconomics Annual*. 9. pp. 219–69.
- Park, C-Y. and R. Mercado, Jr. 2014. Determinants of Financial Stress in Emerging Market Economies. *Journal of Banking and Finance*. 45. pp. 199–224.
- Park, D., A. Ramayandi and K. Shin. 2013. Why Did Asian Countries Fare Better during the Global Financial Crisis than during the Asian Financial Crisis. In C. Rhee and A.S. Posen (eds), *Responding to Financial Crisis: Lessons from Asia Then, the United States and Europe Now*. pp. 103–139. Washington, DC: ADB / Peterson Institute for International Economics.

APPENDIX 7.1 DATA SOURCES

People's Republic of China: Second quarter (Q2) 1995–Q3 2019 variables included in the vector autoregression (VAR): output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the financial stress index (FSI).

Hong Kong, China: Q1 1998–Q4 2019 variables included in the VAR: output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

India: Q1 1997–Q4 2018 variables included in the VAR: output growth, current account-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

Indonesia: Q2 1995–Q3 2019 variables included in the VAR: output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

Japan: Q1 1996–Q4 2019 variables included in the VAR: output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

Republic of Korea: Q2 1995–Q4 2019 variables included in the VAR: output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

Malaysia: Q1 1999–Q4 2018 variables included in the VAR: output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

Singapore: Q2 1995–Q4 2019 variables included in the VAR: output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

Thailand: Q1 1995–Q4 2019 variables included in the VAR: output growth, current account-to-output ratio, reserve change-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI.

Data Treatment

Overall, we have been fairly conservative in the treatment of the data with the exception of two variables: the FSI and the nonfinancial corporate debt-to-output ratios. For these variables, we had to impose some assumptions to be able to extend the sample for some of the economies.

The FSI

For economies that do not have a complete sample of the FSI, we extend it back using as a proxy the regional FSI as the data suggest strong co-movement between country-specific FSI for our sample and the regional one. In particular, given that the FSI takes negative values (and switches from negative to positive values, with some values very close to 0), we use the growth rate of the exp (FSI) to construct backward a proxy for the missing data (instead of using regular growth rates), that is, suppose the first available observation of variable y for

country i is the one in period $t+1$, but we fully observe that variable for all periods for the whole region “A”, then we assume:

$$e^{y(\text{imputed}, i, t)} = e^{y(\text{observed}, i, t+1)} \frac{e^{y(\text{observed}, A, t)}}{e^{y(\text{observed}, A, t+1)}}$$

Or,

$$y(\text{imputed}, i, t) = \ln \left(e^{y(\text{observed}, i, t+1)} \frac{e^{y(\text{observed}, A, t)}}{e^{y(\text{observed}, A, t+1)}} \right)$$

Where $y(\text{imputed}, i, t)$ is the imputed value for country i unobserved value in period t using the observed value for country i in period $t+1$ under the assumption of the same growth rate to the one observed for the whole Asian index.

Nonfinancial corporate debt-to-output ratios

As this variable is always positive, we extend the sample of Malaysia, the People's Republic of China (PRC), India and Indonesia by assuming that the growth rate of nonfinancial corporate debt-to-output ratios is equal to the growth rate of the credit to the private nonfinancial sector-to-output ratio.

On top of this, if for some variable we have a missing observation (or a short interval of missing data) we impute it by averaging the closest available observations.

APPENDIX 7.2 METHODOLOGY

We estimate the VAR model using the BEAR toolbox developed by the European Central Bank (ECB).⁵

Following some standard derivations, which are described in the companion resources of the toolbox, we can define:

$$Y = \begin{bmatrix} y_1' \\ \vdots \\ y_T' \end{bmatrix}; X = \begin{bmatrix} y_0' & \cdots & y_{-4}' & x_1' \\ \vdots & \ddots & \vdots & \vdots \\ y_{T-1}' & \cdots & y_{T-4}' & x_T' \end{bmatrix}; B = \begin{bmatrix} A_1' \\ \vdots \\ A_4' \\ C' \end{bmatrix}; J = \begin{bmatrix} \varepsilon_1' \\ \vdots \\ \varepsilon_T' \end{bmatrix}$$

And using the following convenient notation: $y = \text{vec}(Y)$, $\bar{X} = I_n \otimes X$, $\beta = \text{vec}(B)$ and $\xi = \text{vec}(J)$, the VAR can be written as $y = \bar{X}\beta + \xi$.

In the Bayesian approach, it is standard to refer as θ the vector containing all unknown parameters, y for the data, $f(y|\theta)$ for the likelihood, and $\pi(\theta)$ for the prior distribution.

The estimation has the objective of computing the posterior distribution of the parameters conditional on the data, that is:

$$\pi(\theta | y) \propto f(y | \theta)\pi(\theta)$$

We estimate each model using a Bayesian VAR approach with independent Normal-Wishart priors with the prior assumptions as shown in Table 7A.1. The parameters in the table determine the shape of the prior distributions, each of them affecting the dimension described in the “Description” label. The values in the table are standard for this model in the literature.

Table 7A.1 Values for prior hyper-parameters

Parameter	Description	Value
Autoregressive coefficients		0.8
λ_1	Overall prior tightness	0.1
λ_2	Cross-variable weightings	0.5
λ_3	Lag decay	2
λ_4	Exogenous variables tightness	100

The standard strategy for the estimation of this model is to use a Gibbs Sampler. We run 20 000 draws and keep the last 10 000 for computing the posteriors of interest. The structural decomposition is recursive (Cholesky factorization) with the following order (from first to last): output growth, current account-to-output ratio, the change in external reserves-to-output ratio, nonfinancial corporate debt-to-output ratio, and the FSI. That is, the FSI is assumed to respond contemporaneously to all variables while output growth responds with one period lag. As the data are quarterly, we include four lags for all endogenous variables and only contemporaneous values for the exogenous variables.