

Secular Stagnation and Asia: International Transmission and Policy Spillovers

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Abstract

This paper evaluates the channels and mechanisms by which the symptoms of secular stagnation (low interest rates and low growth) can be transmitted across economies. We write a model to understand how a small open economy is dynamically affected by secular stagnation in the rest of the world. These mechanisms are then studied in the data taking the global financial crisis as a watershed event. We find that the transmission of secular stagnation is largely orthogonal to measures of international trade or financial integration. We conclude with a discussion of the implications of these findings for Asian economies.

WORK IN PROGRESS

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1 Introduction

The two main symptoms of secular stagnation are depressed levels of economic growth and interest rates. Low interest rates can generate problematic side effects (such as liquidity traps or unsustainable credit and asset price booms). The relationship between these symptoms and their underlying causes are a matter of debate. If secular stagnation were a health condition, it would more probably be called a "syndrome" than a disease.

To extend the medical metaphore, the topic that I explore in this chapter is the contagion of secular stagnation across countries. As we will see below in more detail, the symptoms of secular stagnation have affected at the same time (although to different extents) many countries across the world, from advanced economies to emerging markets and developing countries, and in different regions from Asia to Latin America. This may suggest that some form of international transmission or contagion was at work, and begs the question of the mechanisms and processes by which secular stagnation can be transmitted from a country to its neighbors.

The extent to which secular stagnation comes from within or from without matters for important policy questions. In particular, should the policies aimed at minimizing the risk of secular stagnation focus on domestic or foreign factors? There is little systematic analysis of this question in the literature. This paper attempts to fill the gap, with a special focus on Asia.

Let us start with a few stylized facts. Figures 1 and 2 show the interest rate and productivity in various country groups.¹ Figure 1 shows the monetary policy rate in selected groups of countries between 1990 and 2016. (Real interest rates will be discussed later.) We see that the nominal interest rate has been decreasing everywhere since 1990, with advanced economies at—or close to—the zero-bound after the global financial crisis. The interest rate was higher on average in emerging market and developing countries, especially outside Asia. For emerging markets and developing countries (whether in Asia or not) we observe a progressive decrease in interest rates without a sharp break at the time of the global financial crisis.

¹The country groups in the sample are defined as in the World Economic Outlook (WEO). The Asian countries are reported in Table 1.

Figure 2 shows the evolution of total factor productivity (TFP) for the same groups of countries. As noted by Adler et al. (2017) the drop in TFP growth following the global financial crisis has been widespread and persistent across advanced, emerging, and low-income countries. Growth seems to have declined in advanced economies around 2005, whereas the turning point seems to come later (around the global financial crisis) for emerging markets.

The point is that the two main symptoms of secular stagnation (low interest rate and low economic growth) have not been limited to a particular group of countries. They have been observed at different levels of economic development and in many regions. It is difficult to believe that the concomitance of the symptoms reflect domestic causes that would have appeared independently in many countries. And in a globally integrated economy it is not difficult to imagine channels of transmission between countries.

First, global financial integration means that a surplus of saving in one part of the world should depress interest rates globally. A country might attempt to resist lowering its interest rate but this would come at the cost of currency appreciation. Trade integration also means that a negative demand shock in one part of the world may reduce growth in the rest of the world. Textbook macroeconomic theory has less to say about spillovers in productivity growth. But it is not difficult to imagine channels of transmission related to international finance and international trade that explain such spillovers—as we will do later in this paper.

Against this background the paper will proceed as follows. First, we try to better understand the channels of international transmission of secular stagnation with a model. The model features a country that is an "innocent bystander" affected by secular stagnation in the rest of the world. Secular stagnation abroad takes the form of lower real interest rates and lower demand in the rest of the world. Some adjustments must take place for the country to maintain full employment. As we will show the response must involve the real interest rate, the real exchange rate, and capital inflows. The response also depends on the country's level of international financial integration.

We then try to tease out information about the international transmission of secular stagnation from the data. For this we focus on the impact of the global financial crisis. This crisis was an important step in the development of secular stagnation and we know that it originated in the advanced economies at the epicenter of the banking crisis. We can then learn something about the transmission of secular stagnation from the way that different countries

were affected depending on their circumstances and policies. For example, how did the impact of the crisis on interest rates or growth depend on the openness of countries to trade or capital flows?

Literature. There is a growing literature on secular stagnation since Larry Summers highlighted this theme in 2103. A large part of this literature considers this topic in a closed-economy context—see for example Andrews et al. (2016) or IMF (2017) for recent discussions of internal factors of stagnation such as the IT revolution, population aging, slowing human capital accumulation or fading structural reform efforts. These factors may exercise their effects concomitantly, which could explain why the symptoms of secular stagnation have affected many countries at the same time without this being the result of contagion. This paper is more closely related to the papers that consider international transmission of secular stagnation in the open economy.

One part of this literature has focused on the financial channels by which excess saving in some countries can depress the real interest rate in others. That literature is mostly theoretical. Eggertsson et al. (2016) and Caballero, Farhi and Gourinchas (2015) study global equilibria in which negative spillovers can spread secular stagnation worldwide.² These models have overlapping generations and permanent liquidity traps. The permanency of the liquidity trap leads to indeterminacy in the exchange rate and the international allocation of economic activity. In the model of Caballero, Farhi and Gourinchas (2015) secular stagnation comes from a shortage of safe assets. They argue that the supply of safe assets has not kept up with global demand because the collective growth rate of the advanced economies that produce safe assets has been lower than the growth rate of emerging markets and developing countries. Corsetti and Wolf (2017) build on the model of Eggertsson et al. (2016) to study the behavior of exchange rates and capital flows. They find that closing domestic capital markets does not necessarily enhance the monetary authorities' ability to rescue the economy from stagnation.

There is obviously a large literature on the determinants of productivity growth and some of it involve international spillovers that could explain why secular stagnation is contagious across countries. I am not aware of a paper

²Earlier papers had studied the international propagation of liquidity traps, see e.g. Fujiwara et al. (2013), Devereux and Yetman (2014), Cook and Devereux (2013), and Acharya and Bengui (2016).

that has harnessed the theoretical insights from that literature to study the international transmission of secular stagnation and I delay a discussion of the relevant literature to section 4. Adler et al. (2017) discuss these channels and present empirical evidence. There is an existing empirical literature that finds no robust relationship between measures of trade and financial integration on the one hand and the decline in growth during the Great Recession on the other hand (Kalemli-Ozcan, Papaioannou and Perri, 2013; Kamin and DeMarco, 2012; Hausmann-Guil, van Wincoop and Zhang, 2016; IMF, 2013; Lane and Milesi-Ferretti, 2011) although Hausmann-Guil, van Wincoop and Zhang (2016) find that integration does matter beyond some threshold.

The paper is structured as follows. Section 2 presents a model that is used to guide the empirical analysis. Sections 3 and 4 then present evidence about the international financial spillovers and the growth spillovers of secular stagnation. Finally section 5 concludes with a summary of the analysis and a discussion of its policy implications.

2 A model

As a benchmark for the empirical analysis this section presents a model of how a small open economy responds to secular stagnation abroad. The model captures the situation of an "innocent bystander" that imports secular stagnation from abroad. Foreign secular stagnation is represented as the combination of two developments: first, a decrease in the foreign real rate of interest, and second, a decrease in foreign demand for the country's exports. These are the two developments observed in Figures 1 and 2. The question is whether these foreign developments are conducive to foreign stagnation at home, and through which channels.

The model is written in real terms and is intended to capture the long run as secular stagnation is a persistent phenomenon. The model makes predictions about the behavior of the real interest rate, real exchange rate and capital flows in response to foreign secular stagnation. The real interest rate predicted by the model can be interpreted as the "natural" rate of interest that should be targeted by monetary policy. The natural (sometimes called "Wicksellian") real rate of interest is a key concept in the theory of secular stagnation. This the interest rate level that ensures full employment. Higher levels lead to unemployment and lower levels lead to overheating. Modern

macroeconomic theory holds that the main function of monetary policy is to keep the real rate of interest close to the natural level.

The model is simple and does not capture all the spillovers of interest. In particular it takes domestic growth as given and so does not have anything to say about productivity spillovers. The model focuses on the trade and financial rebalancing that must take place in response to foreign secular stagnation. Some features missing from the model will be discussed at the end of the section.

The model is in continuous time and can be summarized by the following three equations

$$\begin{cases} \dot{a}_t = x(q_t, y_t^*) + r_t^* a_t, \\ \dot{a}_t = \sigma [\bar{a}(r_t^*) - a_t], \\ r_t = r_t^* + \dot{q}_t/q_t. \end{cases}$$

The main variables are: the net foreign assets a_t , the net trade balance x_t , the real exchange rate q_t , and the home and foreign real rates of interest r_t and r_t^* . The derivative of a variable is denoted with a dot (Newton's notation).

The first equation is the balance-of-payments equation: the rate of increase in net foreign assets a_t is equal to the trade balance x_t plus the return on foreign assets. The trade balance is an increasing function of the real exchange rate q_t and of foreign demand y_t^* . The real exchange rate is defined in such a way that an increase in q corresponds to a real depreciation. A real depreciation shifts domestic and foreign spending towards the home good.

The second equation describes the dynamics of foreign assets. Foreign assets converge towards a desired level \bar{a} which is a function of the return on these assets. The desired stock of net foreign wealth is an increasing function of the interest rate. This is a shortcut to capture in reduced form the kind of foreign asset dynamics that result from models with overlapping generations such as Coeurdacier and Jin (2015) or Eggertsson et al. (2016) (although the dynamics are more complicated in these models).³

The third equation is interest parity. The domestic real rate of interest rate is equal to the foreign rate plus real exchange rate depreciation. As a

³Models with infinitely-lived representative agents have unpleasant properties if one wants to study the response of the economy to persistent changes in foreign interest rates. The representative agent, being forward-looking and infinitely-lived, has a tendency to respond excessively to these changes.

starting point we assume perfect financial integration, implying that interest parity holds between domestic and foreign bonds.

The model assumes full employment so that r_t is the natural rate of interest. Foreign secular stagnation takes the form of decreases in the foreign real rate of interest, r_t^* , and in foreign demand for the country's exports, y_t^* . The question of interest is how capital flows, the real interest rate and the real exchange rate must respond to ensure full employment at home.

Let us summarize a few key properties of the model, starting with the long run. Foreign variables converge towards long-run values denoted with bars

$$\lim_{t \rightarrow +\infty} r_t^* = \bar{r}^* \text{ and } \lim_{t \rightarrow +\infty} y_t^* = \bar{y}^*.$$

The second condition does not literally mean that there is no growth in foreign demand in the long run. Rather y_t^* should be interpreted as a deviation from a baseline path and the assumption made here is that this deviation is bounded.

In the long run the country's foreign assets converge to $\bar{a}(\bar{r}^*)$. It then follows from the first equation that the real exchange rate is constant and satisfies

$$x(\bar{q}, \bar{y}^*) + \bar{r}^* \bar{a}(\bar{r}^*) = 0.$$

Secular stagnation reduces the foreign interest rate \bar{r}^* and demand \bar{y}^* in the long run. It follows from the equation above that \bar{q} goes up, that is, there is a real depreciation in the long run. The real exchange rate must depreciate to offset lower foreign demand as well as the lower domestic demand coming from the accumulation of foreign debt.

The real exchange rate is constant in the long run so that interest parity implies,

$$\bar{r} = \bar{r}^*.$$

The domestic real interest rate is equal to the foreign real rate of interest in the long run. That is, the domestic interest rate decreases by the same amount as the foreign interest rate in the long run. This is an implication of perfect financial integration.

The transition dynamics are different. Assume that foreign secular stagnation is "announced" at time $t = 0$. Then given that the initial foreign assets are equal to zero ($a_0 = 0$) we have

$$\sigma \bar{a}(r_0^*) = x(q_0, y_0^*).$$

The impact of secular stagnation on the real exchange rate is ambiguous on impact. On one hand, the lower foreign demand y_0^* should be offset by a real depreciation (an increase in q_0). On the other hand, the lower foreign interest rate r_0^* leads to capital inflows that have an expansionary effect on the domestic economy. The real exchange rate depreciates only if the impact of lower foreign demand dominates that of higher domestic demand.

The model unambiguously predicts that the real exchange rate depreciates less in the short run than in the long run,

$$q_0 < \bar{q}.$$

This implies that the real exchange rate must depreciate over time ($\dot{q}/q > 0$) so that by interest parity

$$r_0 > r_0^*.$$

In the short run the domestic rate of interest decreases by less than the foreign rate—transmission is less than one-for-one.

It is important to observe that foreign secular stagnation must lead initially to a boom in capital inflows and an expansion in domestic demand. These responses are part of the natural adjustment process to secular stagnation abroad. Low foreign interest rates are expansionary and domestic demand must increase to offset the fall in foreign demand.

However this adjustment process may have problematic side effects. The first one comes from the zero bound on the nominal interest rate. The analysis has been in real terms so far but it is not difficult to introduce monetary policy. The home central bank determines the nominal interest rate i which is equal to the real interest rate plus inflation,

$$i_t = r_t + \pi.$$

Inflation is equal to the inflation target, which is exogenously determined. There is nothing that guarantees in general that the natural rate of interest should be positive. If the inflation target is too low, the implied nominal interest rate may violate the zero lower bound. Then the economy falls into a liquidity trap with some unemployment.

The second side effect is related to the booms in capital inflows and in domestic demand. These developments may lead to excessive growth in domestic credit and asset prices. The associated risks could in principle be kept in check by using macroprudential policy but not all countries have the appropriate policy instruments and frameworks in place.

We have assumed perfect financial integration so far but it is not difficult to extend the analysis to the case where the arbitrage between foreign and domestic bonds is limited by financial frictions, risk premia or capital controls. For that one simply needs to replace r_t^* by $r_t^* + \tau_t$ in the equations of the model, where the wedge τ_t could be interpreted as a risk premium or a tax on capital inflows. Then it is easy to see that the country can insulate its interest rate from foreign secular stagnation by increasing τ_t as the foreign interest rate r_t^* goes down. This can prevent the country from falling into a liquidity trap for example. However, this policy requires the real exchange rate to depreciate earlier and by a larger amount as the country will no longer benefit from capital inflows to sustain its domestic demand. Insulating the real interest rate can be achieved at the cost of a larger response of the real exchange rate.

The main lessons of the model to keep in mind for the empirical analysis are that in response to foreign secular stagnation:

- the domestic natural rate of interest falls by the same amount as the foreign rate in the long run, less so initially;
- the real exchange rate depreciates in the long run, but the short-run response is ambiguous;
- there is a net capital inflow and an increase in domestic demand in the short run (which is reversed in the long run);
- restrictions to capital mobility may reduce the response of the domestic interest rate but amplify that of the real exchange rate.

3 Financial spillovers

At a theoretical level it is not difficult to explain that low interest rates spill over from countries affected by secular stagnation to the rest of the world. However it is not clear from Figure 1 that such spillovers were important in the data, at least from advanced economies to emerging markets and developing economies. This section takes a closer look at the data.

In section 3.1 we document the interest rate spillovers more carefully and explore whether they were limited by restrictions to financial integration. The following sections focus on the consequences of low interest rates. Section

3.2 looks at the extent to which interest rate spillovers have pulled countries into liquidity traps and section 3.3 looks at credit markets.

3.1 Interest rate transmission

Figure 3 compares the levels of interest rates before the global financial crisis (2000-07) and after the crisis (2008-2016). The upper and lower panels respectively show the nominal policy rate and the real interest rate. The figure compares non-Asian advanced economies with emerging markets and developing countries, both in Asia (middle panel) and outside Asia (right-hand side panel).

The figure shows several interesting facts. First, the zero bound constraint on the nominal interest rate has not prevented advanced economies from lowering the real interest rate into negative territory after the crisis as they have maintained positive levels of inflation. In those economies the real interest rate has decreased by about the same amount as the nominal interest rate (about two percentage points).

Second, the crisis does not seem to have affected the nominal interest rate in Asian emerging markets but the same is not true for the real interest rate. Remember that the averages are GDP weighted so that the Asian emerging markets are dominated by China and to a lesser extent India. In both countries the nominal interest rate barely moved but inflation increased after the crisis (more so in India than in China). Thus the *real* interest rate decreased by almost as much in Asian emerging markets as in advanced economies. The same is true of non-Asian emerging markets on average although for a different reason. In those countries inflation was significantly higher than in advanced economies or Asian emerging markets both before and after the crisis and it decreased with the crisis. The real interest rate went down because of a large decrease in nominal interest rates. The bottomline is that if one looks at real interest rates, there seems to have been significant transmission from advanced economies to emerging markets and developing countries, both in Asia and elsewhere.

These averages mask considerable cross-country variation, as illustrated by Table 2 for Asia. In most countries both the nominal and real interest rates fell after the crisis, but the magnitude of the fall is very different across countries. What does explain these differences and in particular are they related to different levels of economic integration?

One can investigate this question by cross-country regressions of the in-

terest rate change on country characteristics. Table 3 reports the results of regressing the change in the nominal interest rate that followed the global financial crisis on different measures of international economic integration. The dependent variable is the change in the average central bank policy rate between 2000-07 and 2008-16. Trade openness is measured by the ratio of exports to GDP (a standard measure). Financial openness is more difficult to measure and we use three different indicators. The first measure is the Chinn-Ito index of *de jure* financial openness. The index was initially introduced in Chinn and Ito (2008) and was regularly updated since. It is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The second measure focuses on restrictions on bond flows, which are perhaps more relevant for interest parity than flows such as FDI or equity. This measure is taken from the database recently constructed by Fernández et al. (2016). The third indicator is a standard measure of *de facto* financial integration: the ratio of the sum of total foreign assets plus total foreign liabilities to GDP, based on the data in Lane and Milesi-Ferretti (2017). Finally, the regression also included the interaction between trade openness and financial openness since the two forms of openness might complement each other in the transmission of interest rates. All the indicators of financial integration are taken in 2007, the year before the crisis erupted.

The upshot from the table is that none of the indicators explains the cross-country differences in interest rate transmission. The absence of explanatory power is robust to many changes in the regression specification. For example it remains true if the dependent variable is the real interest rate instead of the nominal interest rate, if the restrictions are to money market flows rather than bond flows, if *de facto* integration is measured for banking specifically,⁴ if the explanatory variables are averaged before or after the crisis. It also remains true if one restricts the regression to emerging markets and developing countries. In other words, the cross-country differences in interest rate transmission seem unrelated to their openness to trade or finance.

Countries that are less financially integrated have not taken advantage of this to insulate their interest rates but the reason does not seem to be that

⁴This can be done using the "other investment" category in the database of Lane and Milesi-Ferretti (2017).

limited financial integration offers no autonomy. Figure 4 shows how the distribution of nominal and real interest rates depends on the countries' degree of financial openness. The dispersion of interest rates is significantly larger in the countries that are less open, suggesting that that limiting financial integration may preserve some leeway in setting interest rates. However this leeway was not used to prevent interest rates from going down on average after the crisis.

3.2 Liquidity traps

Countries are more likely to hit the zero bound if they already had a relatively low nominal interest rate before the crisis. This explains why liquidity traps have been more prevalent in advanced economies.

By contrast very few emerging markets have been drawn into liquidity traps. Bulgaria is the only emerging markets economy to have a policy rate below 0.5 percent in 2016.⁵ Figure 5 shows a scatter plot of the policy interest rate before the global financial crisis (averaged over 2000-07, on the horizontal axis) against the same variable after the crisis (averaged over 2008-16, on the vertical axis). Most countries are located below the 45 degree line because their policy rate was reduced after the crisis. The figure allows us to compare how advanced economies differ from emerging markets and developing countries and shows the country labels for Asian economies.

The figure shows that the experience of advanced economies and emerging markets with the zero lower bound has been quite different. Most advanced economies are situated in the lower left part of the chart. These countries lowered their interest rates after the crisis, but the rates were already relatively low before and so they were constrained by the zero lower bound. In Asia this group includes Japan (which was already at the lower bound before the crisis and so could not reduce its rate), Korea, Singapore, Hong Kong and to a lesser extent Taiwan. Australia and New Zealand stayed away from the zero bound.

Most emerging markets also reduced their policy interest rates but they were much less likely to come close to the zero bound because they started from higher levels. Asian exceptions include Nepal and (to a lesser extent) Thailand. Emerging market economies had higher nominal interest rates in

⁵Bulgaria has a currency board with the euro. No other emerging markets economy had a policy rate below 0.5 percent in any year after 2008.

part because of higher inflation but this is not the only reason. They also had higher *real* interest rates before the crisis. This is a silver lining from limited financial integration: by keeping real interest rates higher it leaves more room for reducing them if necessary.

3.3 Credit

Real interest rates have gone down in emerging markets and developing economies. What was the impact on credit conditions? An expansion in domestic credit is a natural part of the rebalancing of the economy from foreign to domestic demand, as shown in the model of section 2. At the same time, this expansion is problematic if it is excessive and generates the risk of a credit bust. The build-up of excessive credit features prominently in discussions about financial crises. Importantly from a policy perspective, large credit expansions have been found to be a reliable early warning indicator of banking crises or severe distress. Some models such as Eggertsson and Krugman (2012) explain secular stagnation in advanced economies by the deleveraging in the private nonfinancial sector that took place after the crisis. An excessive expansion of credit in emerging markets and developing countries might generate concerns about a delayed transmission of secular stagnation from advanced economies.

We look into this question by using the credit gap measures produced by the Bank for International Settlements (BIS) for forty-three countries. While it is difficult to quantify "excessive credit" precisely, the credit-to-GDP gap captures this notion in a simple way. The credit-to-GDP gap is measured by the BIS as the difference between the credit-to-GDP ratio and its long-run trend. This measure takes account of all sources of credit to the private non-financial sector, rather than just bank credit. Drehmann (2013) finds that total credit developments predict the risk of systemic crises better than indicators based solely on bank credit.

Figure 6 shows the credit gap in advanced economies and emerging markets between 2000 and 2016. Advanced economies show a sharp expansion, followed by a sharp restriction after the global financial crisis. By contrast there was a continuous expansion of the credit gap in emerging markets and developing countries. However this development reflects primarily the expansion of credit in China (the credit gap of emerging markets is heavily influenced by China because the average is GDP-weighted). The credit gap plateaued out in non-Asian emerging markets after the global financial crisis

as the middle panel of the figure shows. And in Asia the large increase the credit gap came from China as the right-hand-side panel makes clear. Credit booms are not significantly correlated with low real or nominal interest rates in the data. In the case of China the expansion in credit was driven by administrative measures rather than lower market interest rates.

To conclude we find that nominal or real interest rates were affected by secular stagnation in a wide range of countries irrespective of their financial openness. The implications of lower interest rates were not the same for countries at different levels of economic and financial development. In more advanced economies the main adverse effect was to bring policy rates close to the zero-bound constraint. Affected countries include Korea, Hong Kong, Taiwan, and Singapore in Asia. Emerging markets and developing countries were generally not affected by this problem, although Thailand and Nepal are borderline in this regard. There was a large credit expansion in China but not elsewhere.

4 Growth spillovers

The other feature of secular stagnation with potential international spillovers is a persistent fall in growth. In the short run international growth spillovers can be explained by trade linkages on the demand side (a fall in one country's demand reduces its imports from other countries) but secular stagnation is a long-run phenomenon that involves productivity on the supply side. By contrast with financial transmission there is no well established theory of international spillovers in productivity growth. Thus we start by a discussion of the theoretical channels by which productivity growth in one country could be affected by secular stagnation in the rest of the world (section 4.1). Section 4.2 then looks for evidence on the relevant channels in the data.

4.1 Theory

Development economists make a distinction between advanced economies that are at the world technology frontier and less advanced economies that are catching up to this frontier. Productivity growth is determined by innovation at the frontier whereas for less advanced economies it is determined by the diffusion of advanced technologies and processes. Techno-pessimists such

as Gordon (2016) or Fernald (2015) attribute secular stagnation to a slow-down in productivity growth caused by a natural exhaustion of economies' innovative potential. One problem with this view is that it does not explain why productivity growth also slowed down in the countries that catch up to the frontier.

One possible explanation for the generalized slowdown in productivity growth is that it was everywhere affected by the same kind of financial friction. Financial frictions can bias business investment toward more liquid, low-risk/low-return projects, which may in turn slow down technological progress—which is often embodied in new capital goods or results from risky investments. For example Caballero, Hoshi and Kashyap (2008) provide a model of how banking problems in Japan may have led to lower productivity growth there. Anzoategui et al. (2016) propose a theoretical model in which the increase in demand for liquidity, as observed during the crisis, increases the spread between the cost of capital and the risk-free rate of liquid assets, leading to a decline in investment and productivity growth. On the empirical side there is micro evidence suggesting that TFP growth fell more in companies with weaker balance sheets prior to the global financial crisis than their counterparts with stronger balance sheets (Adler et al., 2017). Financial contagion could transmit financial frictions across countries and lower productivity growth .

The diffusion could also involve trade in goods and services. The concomitance between slowing productivity growth and slowing trade integration has often been noted after the global financial crisis. Trade integration enhances productive efficiency so slowing trade integration might result in slower TFP growth. There is a literature on how productivity growth could result from active participation in world trade.⁶ Known as the learning-by-exporting hypothesis, the idea is that export participation may foster improvements in innovation and productivity. This could be due to the fact that a firm's expected profits from process or product innovation rise with the size of the final market so that increased exports allow the fixed costs of research and development activities to be borne and justified (Rodrik (1988) and Yeaple (2005)). Alternatively, one might think that trade flows facilitate in-

⁶This channel does not necessarily need internationally traded goods to be special. It would be enough to assume that productivity growth is endogenous to demand to obtain international spillovers. For example Benigno and Fornaro (2017) present a model in which low demand leads to low productivity growth simply because firms spend less on productivity-enhancing activities.

ternational knowledge spillovers and thus contribute to the adoption of new technologies (Coe and Helpman, 1995). If this is true, the fact that many advanced economies reduced their demand for imports could result in lower productivity growth for the rest of the world.

4.2 Data

Like for financial spillovers I investigate the channels of transmission for productivity growth by looking at the international impact of the global financial crisis. The theories discussed above have different implications for which countries should have been most affected by the crisis. If the channel involves finance one should expect the countries that are more financially integrated to be more affected by the crisis. Perhaps this channel involves specific forms of integration such as banking. If the channel involves trade then it is the countries that are more integrated in world trade that should suffer from a larger fall in their productivity growth. What do we see in the data?

Tables 4 and 5 shed light on this question. These tables present the results of cross-country regressions of the post-crisis growth rate on measures of financial and trade integration. The level of pre-crisis TFP is also included to control for catching-up—the fact that countries that start from a lower level of TFP should grow faster because of convergence. Each table has three regressions with different combinations of the measures of international economic integration. For trade integration we use the same measure as in the previous section (the ratio of exports to GDP). Financial integration is measured by the ratio of external assets and liabilities to GDP. Tables 4 and 5 present the results for the growth rate in GDP per capita and for TFP growth respectively. The results in the second table are perhaps more relevant for an analysis of secular stagnation as TFP growth should not be influenced (according to standard theory) by cyclical fluctuations in demand.

We observe in both tables that less productive countries grow faster (as expected). But the variables measuring economic integration are never statistically significant. This result is quite robust to changes in the specification, such as alternative measures of financial integration (for example using *de jure* rather than *de facto* measures of openness). One could argue that the dependent variable should be the change in the growth rate following the global financial crisis rather than the post-crisis growth rate—for example, productivity growth should fall more in countries that are more internation-

ally integrated other things equal. Thus we also tried regressions with the change in growth associated the crisis as the dependent variable. This does not make the explanatory variables more significant.

The absence of statistically significant results might come from the fact that our measure of trade openness is too coarse. We also constructed a more refined measure of the trade shock by looking at the destination of exports for each country. We decomposed the exports of each country in the sample by regional destinations. We then constructed for each country an index for export markets growth by taking the average of growth in these regional export markets weighted by the pre-crisis share of each region in the country's exports. This captures the fact that two countries should be differently affected by changes in foreign demand if they export to different regions and countries. In addition this measure is clearly exogenous to the country and so any statistically significant impact of this measure on the productivity growth of the exporting country would have to reflect causality from foreign demand to domestic productivity. But we found this new explanatory variable to be insignificant in the regressions (the results are not reported here).

To conclude, we found the cross-country differences in post-crisis growth to be orthogonal to all the measures of international economic integration that we tried. This is a puzzling result for the view that international spillovers are important in explaining why productivity growth fell in so many countries at the same time after the crisis.

5 Conclusions

Let us conclude by summarizing the evidence on international transmission of secular stagnation and by discussing the implications for Asia. Our analysis revolved around two symptoms of secular stagnation, low interest rates and low economic growth. Interest rates and growth have decreased everywhere since the early 1990s, with the global financial crisis marking a watershed in these developments. In the global financial crisis spillovers went from the advanced economies that were at the epicenter of the banking crisis to the rest of the world. Thus we have used the global financial crisis as a kind of "natural experiment" that can shed light on the mechanisms of international transmission involved in secular stagnation.

Nominal interest rates hit the zero lower bound in most advanced economies at the time of the global financial crisis whereas they did not seem to change

very much in the rest of the world. However we found that *real* interest rates decreased by the same amount in emerging market economies as in advanced economies. There is no evidence that countries that were more closed financially systematically used this margin of freedom to insulate their nominal or real interest rates from foreign developments.

Low interest rate environments can have a number of adverse effects. One is to push the economy into a liquidity trap where monetary policy loses a lot of its traction. Another potential problem is the emergence of unsustainable booms in capital inflows, credit and asset prices. To some degree credit and asset price increases should be expected as they are part of the natural process of adjustment to foreign secular stagnation. But these developments, if excessive and left unchecked, can also lead to costly financial crises down the road. What did we see in Asia after the global financial crisis?

First, Asian advanced economies have behaved similarly to advanced economies elsewhere. They had relatively low levels of inflation and nominal interest rates before the crisis (these had been already close to zero in Japan for a long time) and were pulled towards liquidity traps at the time of the crisis. Leaving Japan aside, nominal interest rates fell closest to zero in Hong Kong and Singapore, followed by Korea and Taiwan. Australia and New Zealand were somewhat less affected because these countries had higher real and nominal interest rates before the crisis.

Emerging markets and developing countries generally remained at a safer distance from liquidity traps (with Thailand perhaps an exception in Asia). These countries were protected not so much by lower levels of international financial integration as by the fact that they had higher levels of nominal interest rates before the crisis. This is due in part to higher inflation than in advanced economies but also to higher levels of *real* interest rates, leaving more scope for a reduction. Thus what could be construed as cost of low financial integration (a higher cost of capital) became somewhat of a blessing in an environment of global secular stagnation.

As for the other potential cost of low interest rates—the risk of unsustainable credit booms—we showed is evidence that the credit boom that turned to a bust in advanced economies was replaced by a credit boom of even greater magnitude in emerging market economies (based on the BIS measure of the credit gap). But this is primarily a Chinese problem. Credit growth seems to have plateaued after the crisis in most emerging markets and developing countries outside of China.

On the side of growth, we observed that growth rates in GDP per capita

and productivity have gone down in advanced economies as well as countries that are far behind the technology frontier. This is puzzling because the determinants of growth should be different for the countries at the technology frontier and those that are behind. We discussed several channels involving trade and financial flows by which low productivity growth could spill over across countries at different levels of development. However the importance of these channels is not supported by our analysis of the data. Essentially, cross-country differences in post-crisis growth are orthogonal to any measure of international economic integration that we have tried in our regressions (whether in the realm of trade or finance).

There are important policy debates about the best policies to respond to the occurrence or the risk of secular stagnation. Central banks can combat liquidity traps by unconventional policy measures or by raising inflation targets. The slowdown in productivity growth can be resisted by boosting private investment, spending on infrastructure, strengthening balance sheets, reducing policy uncertainty, or structural reforms—to borrow a list of policy recommendations from Adler et al. (2017). This paper started with the conjecture that the panoply of relevant policy actions could also include prophylactic measures to prevent the spread of secular stagnation across countries. It is not difficult to find theoretical arguments for such measures but it turned out to be difficult to validate them in the data. The symptoms of secular stagnation seem to have diffused across countries in a way that is orthogonal to all known measures of international economic integration (that we have tried in this paper).⁷

⁷In particular it does not seem that countries can insulate themselves against foreign secular stagnation by restricting financial flows. This may come as a disappointment to the proponents of capital controls and capital flow management. However note that capital flow management should be used to smooth the financial cycle, not to permanently affect interest rates.

TABLES

Table 1: Asian country sample (WEO Classification)

| Advanced | Emerging and developing | Low income or Least developed |
|-------------|-------------------------|-------------------------------|
| Australia | Bangladesh | Bangladesh |
| Hong Kong | China: Mainland | Lao |
| Japan | India | Mongolia |
| Korea | Indonesia | Myanmar |
| New Zealand | Lao | Nepal |
| Singapore | Malaysia | Papua New Guinea |
| Taiwan | Mongolia | Vietnam |
| | Myanmar | |
| | Nepal | |
| | Papua New Guinea | |
| | Philippines | |
| | Sri Lanka | |
| | Thailand | |
| | Vietnam | |

This table reports the Asian countries in our sample. It includes the countries under the surveillance of the Asia and Pacific Department (APD) of the IMF, excluding those with a population of less than 1 million, as well as Cambodia and Timor Leste for which there were insufficient data.

Table 2: Interest rates and growth rates in Asia before and after the global financial crisis

| | Nominal interest rate (%) | | Real interest rate (%) | | Growth in real GDP p | |
|------------------|---------------------------|---------|------------------------|---------|----------------------|---------|
| | 2000-07 | 2008-16 | 2000-07 | 2008-16 | 2000-07 | 2008-16 |
| Australia | 5.5 | 3.2 | 2.3 | 0.8 | 2.0 | 0.9 |
| Bangladesh | 5.5 | 5.0 | 0.2 | -2.5 | 4.3 | 4.9 |
| China | 3.2 | 3.0 | 1.5 | 0.3 | 9.7 | 7.5 |
| Hong Kong | 4.8 | 0.6 | 5.6 | -2.9 | 4.3 | 1.8 |
| India | 6.3 | 6.6 | 1.9 | -1.6 | 5.7 | 5.3 |
| Indonesia | 11.4 | 6.8 | 2.7 | 1.1 | 3.5 | 4.1 |
| Japan | 0.3 | 0.3 | 0.6 | 0.0 | 1.2 | 0.4 |
| Korea | 2.6 | 1.1 | -0.4 | -1.2 | 4.3 | 2.5 |
| Lao PDR | 22.9 | 5.6 | 13.9 | 1.2 | 5.1 | 5.5 |
| Malaysia | 3.0 | 2.9 | 1.0 | 0.5 | 2.9 | 2.8 |
| Mongolia | 8.4 | 11.8 | 1.3 | 1.3 | 5.6 | 5.3 |
| Myanmar | 10.5 | 10.9 | -12.9 | 4.7 | 11.3 | 5.3 |
| Nepal | 2.6 | 1.3 | -2.0 | -7.9 | 2.1 | 2.9 |
| New Zealand | 6.4 | 2.9 | 3.8 | 1.0 | 2.3 | 0.8 |
| Papua New Guinea | 9.0 | 6.4 | 1.7 | 0.3 | na | na |
| Philippines | 5.7 | 3.9 | 1.1 | 0.1 | 2.8 | 3.5 |
| Singapore | 1.8 | 0.5 | 0.8 | -2.0 | 4.0 | 1.9 |
| Sri Lanka | 15.5 | 15.0 | 4.9 | 8.2 | 3.6 | 4.9 |
| Taiwan | 2.5 | 1.7 | 1.6 | 0.6 | 4.1 | 2.3 |
| Thailand | 2.6 | 2.1 | 0.9 | 0.1 | 4.4 | 2.4 |
| Vietnam | 5.5 | 8.6 | 0.8 | -0.3 | 5.8 | 4.7 |

See appendix for data sources.

Table 3: Interest rate transmission and economic integration

| | (1) | (2) | (3) |
|------------------------------|-------------------------|-------------------------|--------------------------|
| | diffnrate | diffnrate | diffnrate |
| Trade openness | -.0569122 (.1122083) | -.0666234 (.1370957) | .007986 (.0646663) |
| Financial openness Chinn-Ito | -1.078905 (4.435847) | | |
| Financial openness bonds | | -3.698819 (6.145984) | |
| Financial openness de facto | | | .0284119 (.4169877) |
| Interaction | .0945689 (.1361244) | .1480955 (.1889136) | .0010936 (.0077778) |
| Constant | -3.397716 (3.193183) | -2.930149 (4.285386) | -4.331391* (2.079493) |
| R-squared | .0088872 | .0114815 | .0028025 |
| N. of observations | 109 | 76 | 110 |

This table reports the results of cross-country regressions of the change in the nominal interest following the global financial crisis (the average level over 2008-16 minus the average level over 2000-07) on measures of international economic integration. Trade openness is measured as the ratio of exports to GDP in 2015. The first measure of financial openness is the Chinn-Ito index in 2007. The second measure is the level of openness for bond markets from Fernández et al. (2016) in 2007. The third measure is the ratio of foreign assets and liabilities to GDP in 2007. The t-statistics are in parenthesis.

Table 4: Post-crisis GDP growth and economic integration

| | (1) | (2) | (3) |
|--------------------|----------------------------|----------------------------|---------------------------|
| | Growth rate 2007-16 | Growth rate 2007-16 | Growth rate 2007-16 |
| TFP2007 | -.0234049*** (.0050069) | -.0227081*** (.0050476) | -.023957*** (.0052755) |
| Trade openness | .0000181 (.0000896) | | 7.99e-06 (.0000946) |
| Financial openness | | .0001586 (.0003639) | .0001488 (.0004276) |
| Constant | .032198*** (.0041163) | .0322904*** (.0037154) | .0324002*** (.0041769) |
| R-squared | .2038404 | .1846402 | .2049098 |
| N. of observations | 94 | 100 | 94 |

The dependent variable is the growth in real GDP per capita over 2007-16. Trade openness is measured as the ratio of exports to GDP in 2015. Financial openness is measured as the ratio of foreign assets and liabilities to GDP in 2007. (See the data appendix for the sources.) The t-statistics are in parenthesis.

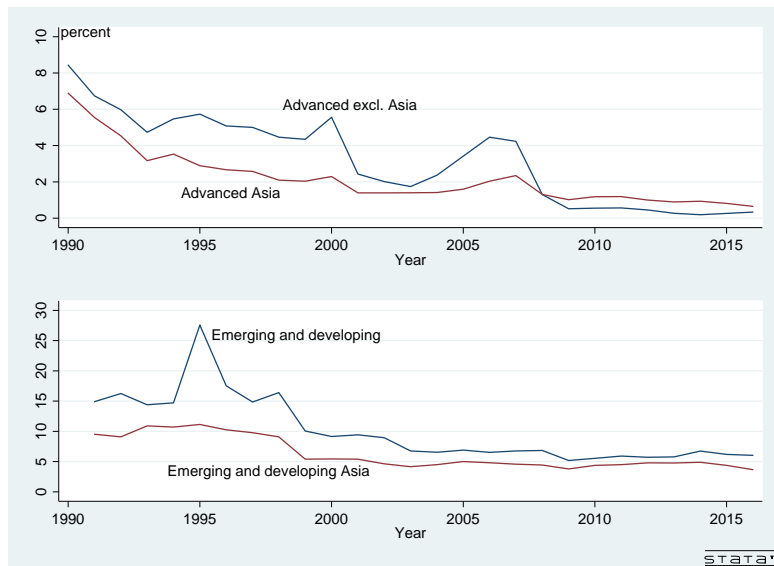
Table 5: Post-crisis TFP growth and economic integration

| | (1) | (2) | (3) |
|--------------------|----------------------------|----------------------------|----------------------------|
| | TFP growth 2007-14 | TFP growth 2007-14 | TFP growth 2007-14 |
| TFP2007 | -.0315251*** (.0067115) | -.0311129*** (.0068898) | -.0306299*** (.0070694) |
| Trade openness | -.0000874 (.0001201) | | -.0000711 (.0001268) |
| Financial openness | | -.0004749 (.0004968) | -.0002412 (.000573) |
| Constant | .0145115* (.0055177) | .0117507* (.0050715) | .0141835* (.0055973) |
| R-squared | .2276327 | .2260483 | .2291508 |
| N. of observations | 94 | 100 | 94 |

The dependent variable is TFP growth over 2007-14. Trade openness is measured as the ratio of exports to GDP in 2015. Financial openness is measured as the ratio of foreign assets and liabilities to GDP in 2007. (See the data appendix for the sources.) The t-statistics are in parenthesis.

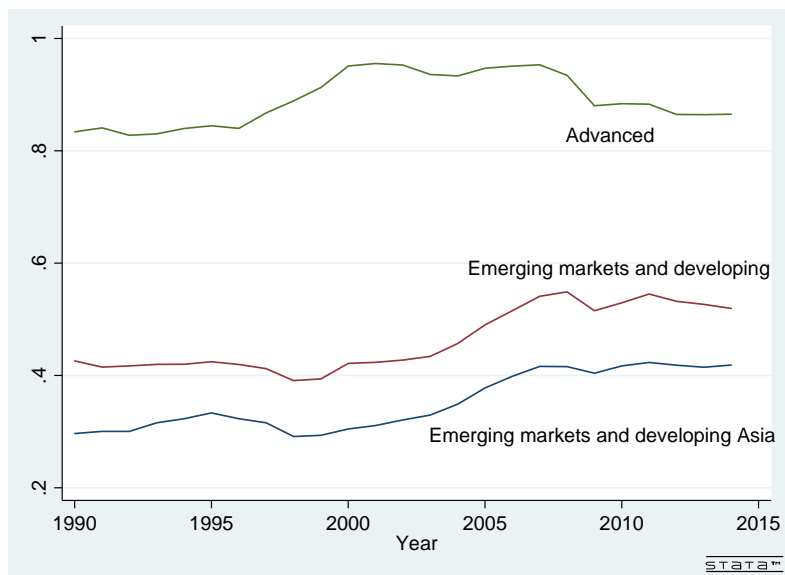
FIGURES

Figure 1: Policy nominal interest rate (percent)



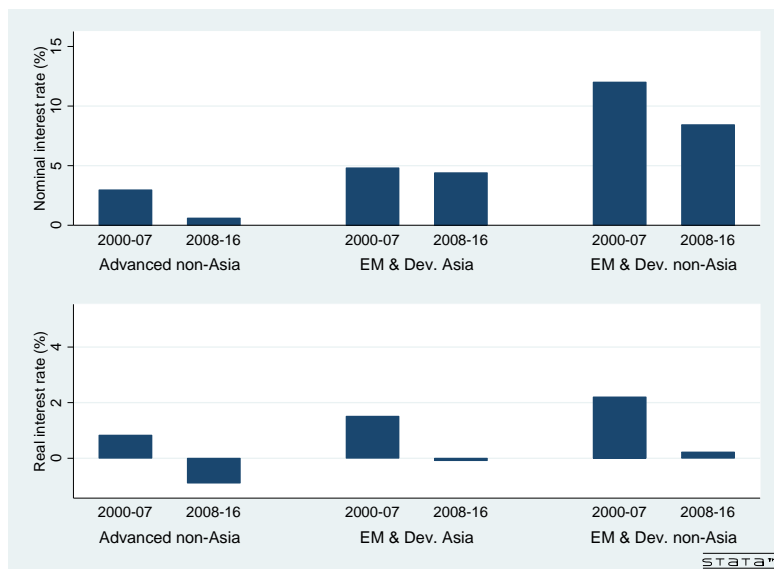
The figure shows the monetary policy interest rate. Country classification from the WEO (see Table 1 for Asian countries). Averages are GDP-weighted.

Figure 2: Total factor productivity (TFP)



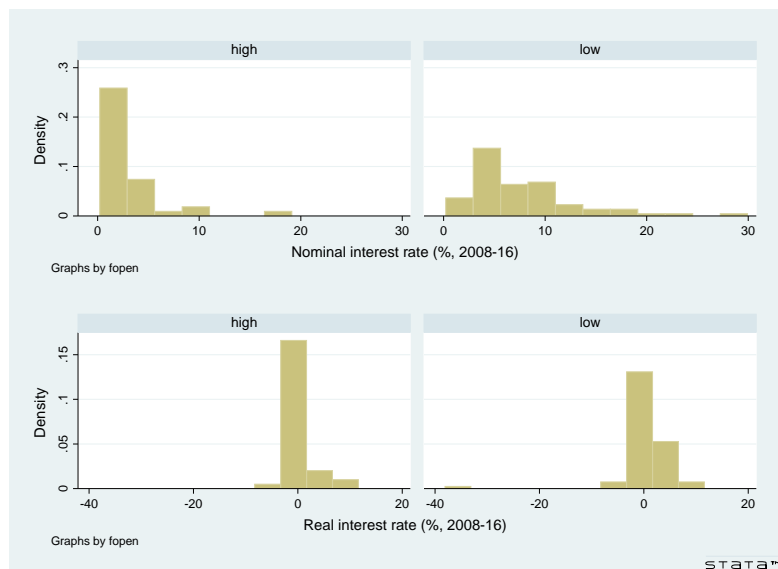
Source: Penn World Tables. Country classification from the WEO (see Table 1 for Asian countries). Averages are GDP-weighted.

Figure 3: Pre- and post-crisis interest rate (percent)



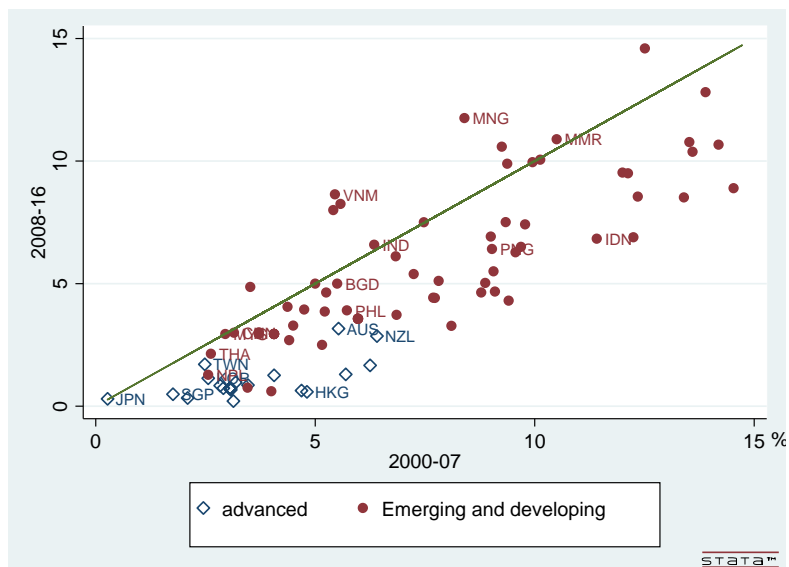
The figure compares the level of the interest rate before the crisis (2000-07) and after the crisis (2008-17). The upper panel shows the monetary policy interest rate and the lower panel shows the real interest rate. Country classification from the WEO and averages are GDP-weighted.

Figure 4: Distribution of interest rates and financial openness



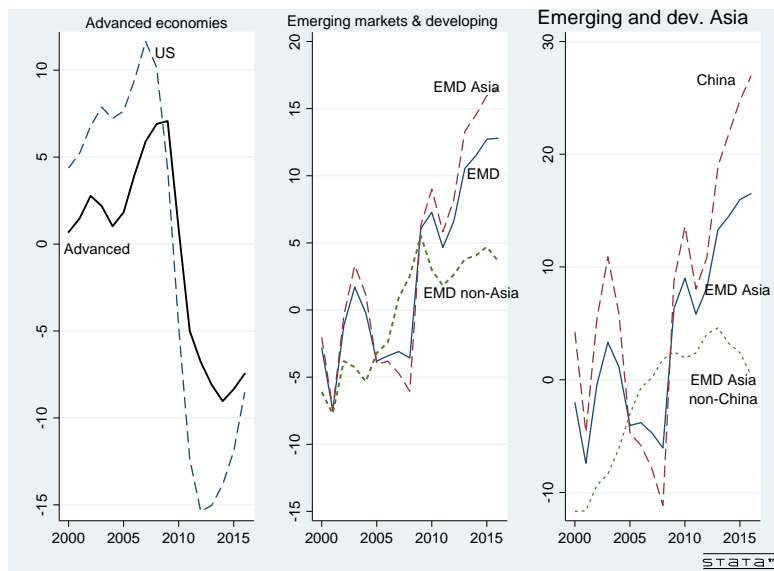
The figure shows the histograms for the nominal interest rate (upper panel) and the real interest rate (lower panel) after the crisis (2008-16). The left-hand-side panels correspond to countries with high levels of financial openness (defined as a ratio of external assets and liabilities to GDP in excess of 2 in 2007). The right-hand-side panel corresponds to countries with lower levels of financial openness.

Figure 5: Pre- and post-crisis interest rate (percent)



This figure presents a scatter plot of the policy interest rate before the global financial crisis (averaged over 2000-07, on the horizontal axis) against the same variable after the crisis (averaged over 2008-16, on the vertical axis). The figure does not include the countries that had a pre-crisis interest rate in excess of fifteen percent. Most countries are located below the 45 degree line because their policy rate was reduced after the crisis.

Figure 6: Credit gap (percent, BIS)



This figure presents the credit gaps as measured by the BIS. The country classification are from the WEO. Averages are GDP-weighted. See Table 1 for the list of included Asian countries.

DATA SOURCES

Interest rates. The source for the nominal interest rate is the IMF International Financial Statistics (IFS). The central bank interest rate is the minimum of the Discount Rate and the Central Bank Policy Rate when one or the other is available. In selected economies where neither rate was available (Argentina, the Czech Republic, Malaysia, Mexico, Poland and Russia), we used the minimum of the Money Market Rate and the Treasury Bill Rate.

The real exchange rate was derived by subtracting the inflation rate (the annual change in the CPI from the WEO).

Productivity. Total Factor Productivity is from the Penn World Tables version 9.0.

Credit. Source: BIS credit-to-GDP gap statistics. See Dembiermont, Drehmann and Muksakunratana (2013).

Financial openness. The Chinn-Ito index of financial openness is described in Chinn and Ito (2008). This index is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

The second measure of financial openness comes from Fernández et al. (2016).

The data to construct de facto measures of international financial integration come from the "External Wealth of Nations" data set, constructed by Lane and Milesi-Ferretti (2007).

References

- Acharya, Susant, and Julien Bengui.** 2016. “Liquidity Traps, Capital Flows and Currency Wars.” *manuscript, University of Montreal*.
- Adler, Gustavo, Mr Romain A Duval, Davide Furceri, K Sinem, Ksenia Koloskova, and Marcos Poplawski-Ribeiro.** 2017. “Gone with the Headwinds: Global Productivity.” *IMF Staff Discussion Note*.
- Andrews, Dan, Chiara Criscuolo, Peter N Gal, et al.** 2016. “The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy.” OECD Productivity Working Paper No 5, OECD Publishing.
- Anzoategui, Diego, Diego Comin, Mark Gertler, and Joseba Martinez.** 2016. “Endogenous Technology Adoption and R&D as Sources of Business Cycle Persistence.” National Bureau of Economic Research.
- Benigno, Gianluca, and Luca Fornaro.** 2017. “Stagnation traps.” *European Central Bank Working Paper 2038*.
- Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas.** 2015. “Global Imbalances and Currency Wars at the ZLB.” *NBER Working Paper 21670*.
- Caballero, Ricardo J, Takeo Hoshi, and Anil K Kashyap.** 2008. “Zombie lending and depressed restructuring in Japan.” *The American Economic Review*, 98(5): 1943–1977.
- Chinn, Menzie D, and Hiro Ito.** 2008. “A new measure of financial openness.” *Journal of comparative policy analysis*, 10(3): 309–322.
- Coe, David T, and Elhanan Helpman.** 1995. “International r&d spillovers.” *European economic review*, 39(5): 859–887.
- Coourdacier, Nicolas, Guibaud Stéphane, and Keyu Jin.** 2015. “Credit Constraints and growth in a Global Economy.” *American Economic Review*, 105(9): 2838–81.

- Cook, David, and Michael B Devereux.** 2013. “Sharing the burden: monetary and fiscal responses to a world liquidity trap.” *American economic Journal: macroeconomics*, 5(3): 190–228.
- Corsetti, Giancarlo, Mavroeidi Eleonora Thwaites Gregory, and Martin Wolf.** 2017. “Step away from the zero lower bound: Small open economies in a world of secular stagnation.” *mimeo, Cambridge University*.
- Dembiermont, Christian, Mathias Drehmann, and Siriporn Muk-sakunratana.** 2013. “How much does the private sector really borrow? A new database for total credit to the private non-financial sector.” *BIS Quarterly Review*, March.
- Devereux, Michael B, and James Yetman.** 2014. “Capital controls, global liquidity traps, and the international policy trilemma.” *The Scandinavian Journal of Economics*, 116(1): 158–189.
- Drehmann, Mathias.** 2013. “Total credit as an early warning indicator for systemic banking crises.” *BIS Quarterly Review*, June.
- Eggertsson, Gauti B, and Paul Krugman.** 2012. “Debt, deleveraging, and the liquidity trap: A Fisher-Minsky-Koo approach.” *The Quarterly Journal of Economics*, 127(3): 1469–1513.
- Eggertsson, Gauti B, Neil R Mehrotra, Sanjay R Singh, and Lawrence H Summers.** 2016. “A Contagious Malady? Open Economy Dimensions of Secular Stagnation.” *IMF Economic Review*, 64(4): 581–634.
- Fernald, John G.** 2015. “Productivity and Potential Output before, during, and after the Great Recession.” *NBER Macroeconomics Annual*, 29(1): 1–51.
- Fernández, Andrés, Michael W Klein, Alessandro Rebucci, Martin Schindler, and Martín Uribe.** 2016. “Capital control measures: A new dataset.” *IMF Economic Review*, 64(3): 548–574.
- Fujiwara, Ippei, Tomoyuki Nakajima, Nao Sudo, and Yuki Teranishi.** 2013. “Global Liquidity Trap.” *Journal of Monetary Economics*, 60(3): 936–949.

- Gordon, Robert J.** 2016. *The rise and fall of American growth: The US standard of living since the civil war*. Princeton University Press.
- Hausmann-Guil, Guillermo, Eric van Wincoop, and Gang Zhang.** 2016. “The great recession: Divide between integrated and less integrated countries.” *IMF Economic Review*, 64(1): 134–176.
- IMF.** 2013. “Dancing Together? Spillovers, Common Shocks, and the Role of Financial and Trade Linkages.” *World Economic Outlook (Chapter 3, October)*.
- IMF.** 2017. “Asia At Risk of Growing Old before Becoming Rich?” *Regional Economic Outlook, April 2017, Asia and Pacific*.
- Kalemli-Ozcan, Sebnem, Elias Papaioannou, and Fabrizio Perri.** 2013. “Global banks and crisis transmission.” *Journal of international Economics*, 89(2): 495–510.
- Kamin, Steven B, and Laurie Pounder DeMarco.** 2012. “How did a domestic housing slump turn into a global financial crisis?” *Journal of International Money and Finance*, 31(1): 10–41.
- Lane, Philip R, and Gian Maria Milesi-Ferretti.** 2011. “The cross-country incidence of the global crisis.” *IMF Economic Review*, 59(1): 77–110.
- Lane, Philip R., and Gian Maria Milesi-Ferretti.** 2017. “International Financial Integration in the Aftermath of the Global Financial Crisis.” *IMF Working Paper 17/115*.
- Rodrik, Dani.** 1988. “Closing the Technology Gap: Does Trade Liberalization Really Help?” National Bureau of Economic Research Working Paper 2654.
- Yeaple, Stephen Ross.** 2005. “A simple model of firm heterogeneity, international trade, and wages.” *Journal of international Economics*, 65(1): 1–20.