

Crowding Out Redefined: The Role of Reserve Accumulation

Carmen M. Reinhart and Takeshi Tashiro

It is well understood that investment serves as a shock absorber at the time of crisis. The duration of the drag on investment following the global financial crisis, however, has been perplexing. For the nine Asian economies we focus on in this study, average investment as a share of GDP was about 6 percentage points lower during the period from 1998 to 2012 than its average level in the *decade* before the crisis; if we exclude China and India the estimated decline exceeds 9 percent. We document how in the wake of crisis home bias in finance usually increases markedly as public and private sectors look inward when external financing becomes prohibitively costly, altogether impossible, or undesirable from a financial stability perspective. Also, previous studies have not made a connection between the sustained reserve accumulation and the persistent and significantly lower levels of investment in the region. Put differently, reserve accumulation involves an official institution (i.e., the central bank) funneling domestic saving abroad and thus competing with domestic borrowers in the market for loanable funds. We suggest a broader definition of *crowding out*, driven importantly by increased “liability” home bias in finance and by official capital outflows. We present evidence from Asia to support this interpretation.

1. Introduction

The literature on early warnings of financial crises generally singles out over-valued currencies, widening current account deficits, large capital inflows, rising leverage, and low and declining international reserves as precursors to disaster.¹ These patterns have been prevalent in innumerable emerging market crises and (with the exception of depleted international reserves) were also prevalent in most of the recent financial crises in advanced economies. Indeed, as Gourinchas and Obstfeld (2012) document, the most notable difference between the emerging markets and advanced economies is that output declines during a currency crisis are larger in emerging markets, while other patterns are qualitatively similar.

Authors' note: *We wish to thank Brad DeLong, Olivier Jeanne, Vincent Reinhart, Kenneth Rogoff, Alan Taylor, and conference participants for helpful comments and suggestions.*

Faced with a sudden stop à la Calvo, (1998), current account deficits can no longer be financed by borrowing from abroad—at least not to the same extent.² Sharp output declines, private and sometimes public debt overhangs, and the scarcity and high cost of finance combine to produce dramatic swings in the current account balance, most often from deficit to surplus. The brunt of this adjustment usually falls on investment.³

The Asian crisis of 1997–98 was most acute in Indonesia, Korea, Malaysia, the Philippines, and Thailand. Yet in 1998, investment as a share of GDP fell across the board in the major Asian economies, from wealthy Japan and Singapore to lower-income India and China, which were relatively shielded from the crisis. In Indonesia, the investment-to-GDP ratio was nearly halved, falling from 32 percent in 1997 to 17 percent the following year.

The decline in investment–GDP ratios among the advanced economies since 2007 has been no less draconian, if somewhat more spread out. From 2007 to 2012, Ireland’s investment–GDP ratio fell 15 percentage points. Even countries with continued access to international capital markets, such as the United Kingdom and the United States, have recorded declines of around 3½ percentage points over that time frame.

While it is not difficult to understand the role of investment as a shock absorber at the time of crisis, it is perplexing why it takes so many years after the crisis to recover—if it recovers at all. For the nine Asian economies we focus on in this study, average investment-to-GDP is about 6 percentage points lower during the period from 1998 to 2012 than its average level in the *decade* before the crisis; if we exclude China and India the estimated decline exceeds 9 percent.⁴ Over the same pre- and post-crisis sample the decline in growth is 2.5 percent for all countries and 3.3 percent if China and India are excluded.⁵

A prolonged investment slump is not a new phenomenon following a deep crisis. Kaminsky and Pereira (1996), who focus on explaining the poor growth performance of Latin America vis-à-vis Asia during the crisis of the 1980s, show that public and private consumption as a share of GDP rose more than 5 percentage points in Latin America from 1982 to 1988, while for the Asian economies the comparable ratio fell by almost 2 percentage points. With public and private saving rates falling sharply in Latin America, current account deficits were closed by even larger declines in investment. The evidence they provide supports the earlier observation by Sachs (1989) that the significant income inequality in Latin America, coupled with rising political instability, were at the root of Latin American governments’ inability to implement austerity measures at the time of crisis. The same factors also made downward adjustments

in private consumption less likely. In that episode, at least, investment was importantly crowded out by a rising share of public and private consumption.⁶ Though it was not discussed by these authors, we would add that the decline in measured domestic saving was also significantly exacerbated by *leakages* to the domestic system in the form of private capital flight, which escalated in the region to record highs.⁷

Unlike Latin America in the 1980s (or modern-day United States), domestic saving rates in post-1997 Asia were high to very high. The significant economic inequality issues that continue to plague Latin America are not a feature of the region (notwithstanding China's increasing troubles on that front). There is little to suggest private capital flight has been an issue in the past decade. Hence, it is unlikely that many of the factors that drove the investment slump during Latin America's lost decade have been at work in Asia on a similar scale in the past 15 years. And yet, countries in both regions turned inward for financing sources in the post-crisis era (in the case of Latin America driven more by necessity).

In this paper, we aim to shed light on some of the factors that may account for the sharp and sustained decline in investment as a share of GDP in many Asian countries since the events of 1997–98. While the evidence does not support one-size-fits-all explanations, the topic may have broader resonance within and outside Asia. China and India (for different reasons) may be on the cusp of a significant investment correction; other large emerging markets (Brazil, South Africa, and others) may be similarly placed; and much of Europe and the United States are entering their fifth or sixth year of an investment slump.

It is not our goal to offer a comprehensive model of the determinants of investment, nor do we compare actual investment ratios to some optimal benchmark. We do not explore supply-side hysteresis effects of financial crises. Young's (1995) hypothesis that the East Asian growth miracle may well have been "primarily the result of one-shot increases in output brought about by the rise in participation rates, investment-to-GDP ratios, and educational standards and the intersectoral transfer of labor from agriculture to other sectors (e.g., manufacturing) with higher value added per worker" may be a primary explanation for the slowdown. But the fact remains that the Philippines and Japan—which were at very different phases of the development cycle—have experienced sustained and sharp declines in investment as well. As we discuss here, all of these countries also experienced an important shift in policy that significantly altered the allocation of domestic saving.

We focus on finance and examine trends that affect the availability of domestic funding for investment and the allocation of the pool of domestic saving. The

old concepts of *leakages* and *crowding out*, which we redefine here to be more encompassing than the conventional definitions, are central to our analysis.

In the wake of crisis, home bias in finance usually increases markedly as governments look inward when external financing becomes prohibitively costly or altogether impossible. Even in milder cases, when capital market access is not lost, governments may seek the relative stability of captive domestic audiences, such as pension funds, insurance companies, and domestic banks to lessen rollover risk.⁸ This post-crisis pattern is not unique to Asia; it was prevalent in acute form in Latin America during the 1980s, and it is also a feature of the post-crisis landscape in Europe, especially (but not exclusively) in the periphery economies. In cases where the government is running substantial deficits and/or rolling over a large stock of debt, these activities would fall under the conventional definition of crowding out. Japan and India, in different dimensions, are examples where this channel may be at work. However, most of the remaining Asian economies do not have particularly high levels of public debt, nor are they financing large sustained fiscal deficits. This leads to a second (related) financing *leakages* channel.

The rise of home bias in Asia has not been symmetric. Acquiring liabilities to the rest of the world is avoided while acquiring assets (reserves) from the rest of the world is actively pursued. But the acquisition of assets is selective, favoring safety and low yields; the accumulation of these assets is not left in the hands of the private sector but orchestrated by the official sector via the central banks. The desire to keep a tight lid on current account deficits and encourage surpluses has translated into an accumulation of foreign exchange reserves on an unprecedented scale. A good deal has been written on the subject, but on the motives for holding reserves, we broadly concur with the interpretation offered in Obstfeld, Shambaugh, and Taylor (2010):

A primary reason for a central bank to hold reserves is to protect the domestic banking sector, and domestic credit markets more broadly, while limiting external currency depreciation. The need for such protection increases given the multiplication of risks in more financially open economies, where potential currency mismatches and a combination of internal drains (runs from bank deposits to currency) and external drains (flight to foreign currency or banks) can place extraordinary demands on a central bank's foreign exchange reserves.

Supporting this view, we sketch in this paper a slice of Asia's history with credit events (or near-credit events) and quantify the lack of adequate reserve cover at these critical moments, which (not surprisingly) has given rise to the

insurance motive described above.⁹ However, we would add that *fear of floating* is not asymmetric, and leaning against the wind of an appreciation has been an important driver of reserve accumulation since the 2007–09 financial crisis.¹⁰

A related literature has attempted to model reserve accumulation via a precautionary motive on the part of households or investors (Caballero and Krishnamurthy 2009 and Carroll and Jeanne 2009) but this misses the point that the acquisition of foreign assets both in timing and magnitude are determined by the central bank (i.e., the official sector). A framework closer to the motivation of a central bank concerned about possible runs is offered in Aizenman and Lee (2007). As of mid-2013 according to Federal Reserve data, about 72 percent of the U.S. Treasuries held abroad were in the hands of official institutions. Furthermore, a careful study of this phenomenon by Warnock and Warnock (2009) points out that the reported figures significantly understate actual official holdings, as oil exporters and other central banks and governments purchase U.S. Treasuries through offshore centers. The dominant role played by official entities in uphill capital flows is also extensively documented in Alfaro, Kalemli-Ozcan, and Volosovych (2013).

Some studies have stressed the social costs associated with this policy, which is closer to our theme in this paper. Rodrik (2006) focused on the income loss associated with acquiring assets that deliver a lower yield than the interest cost of borrowing abroad. Mohanty and Turner (2006) went further, suggesting that sustained reserve accumulation fuels domestic credit booms and asset price bubbles and introduces distortions in the banking system. Filardo and Yetman (2012) provide further evidence on those concerns and suggest compelling reasons why the taxes often associated with sterilized intervention can funnel activity into the riskier and nebulous world of shadow banking.¹¹ Jeanne (2012), who connects the accumulation of reserves in a financially repressed economy (closed capital account) to forced saving, lower consumption, and welfare losses (he is interested primarily in the case of China) comes closer to the cost of reserve accumulation we are interested in investigating. To our knowledge, these and other related papers have not made a connection between the sustained reserve accumulation and the persistent and significantly lower levels of investment in the region.¹² Put differently, in past literature reserve accumulation has involved an official institution (i.e., the central bank) funneling domestic saving abroad and thus competing with domestic borrowers in the market for loanable funds. We suggest a broader definition of *crowding out*, driven importantly by official capital outflows, that is applicable to most Asian economies (and a significant number outside Asia) to varying degrees. In principle, reserve accumulation could also crowd out private consumption (as in the case

of China) or public consumption. Our focus on total (private and public) investment is driven by the large and persistent declines we have already alluded to.

The paper proceeds as follows. The next section examines the evolution of the current account and investment in a 26-year window around the Asian crisis of 1997–98; for comparative purposes, we present the corresponding macroeconomic data for Europe and the United States from the 10 years prior to the 2007–09 crisis to the present. In Section 3, we use our historical data on the level and composition of debt to document the rise of home bias. Section 4 presents and reinterprets the evidence on reserve accumulation as a source of crowding out. The hybrid Asian experiences, which encompass high debt with current account surplus in Japan and low debt with current account deficit in Indonesia, are discussed in the context of the home bias-crowding out framework. Concluding remarks focus on further research and speculate to what extent elements of the Asian experience are present elsewhere.

2. Crises and Investment: The Long Aftermath

The literature on sudden stops (see Calvo 2012) and capital flow surges (Reinhart and Reinhart 2009) has documented the sharp reversals of the current account that take place at times of crisis, including the Asian crisis episode of 1997–98. In this section, we document current account reversals that *persisted* well after the financial crisis was over. Linked by an accounting identity (briefly discussed below), we connect the current account reversal to a change in investment; the corresponding exercise for growth is presented in the Appendix. To set the stage for the discussion on the connection between domestic and external debt and reserves, we review episodes of Asia's brush with default and restructuring (or near default).

2.1. Basics

The simple rules of double-entry accounting ensure that, excluding statistical discrepancies, the capital account surplus or net capital inflow (denoted by KA) is related to the current account surplus (denoted by CA) and to the official reserves account RA of the balance of payments through the identity,

$$CA + KA + RA \equiv 0.$$

Notice that $RA < 0$ implies an accumulation of reserves by the monetary authority.

A property of the current account is that it measures the economy's net foreign wealth. A country that runs a current account surplus must have a capital account deficit (private capital outflow) or an increase in reserves (an official outflow). Another related identity is that the current account surplus equals the difference between national savings (S) and national investment (I),

$$CA \equiv S - I.$$

2.2. External Balances

Table 1 presents selected developments for the current account for two groups of countries: the nine Asian economies we focus on (China, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, and Thailand); and a comparison group composed of Europe and the United States. For Asia, we compare 1987–97 (the 11-year period in the run-up to the Asian crisis) with 1998–2012—the 15-year aftermath. We avoid extending the comparison further back, as Asia was also in crisis in the earlier part of the 1980s. For the Europe and U.S. sample we compare the 1997–2007 pre-crisis with the five years after (2008–12). Table 1 reports the peak deficit level and year it was recorded from 1980 to 2012. The memorandum item calculates the pooled means for the relevant periods before and after the crisis.

Starting with Asia in 2012 (last column), there are two groups, India and Indonesia, with current account deficits and all others with surpluses of varying magnitudes—an issue we will address again in Section 5. Of the core Asian crisis countries (Indonesia, Korea, Malaysia, Philippines, and Thailand), all except Indonesia show a deteriorating current account in the 11 years ahead of the crisis and an improvement in the subsequent 15 years (first two columns).¹³ Indeed, if we had ended the exercise in 2011 Indonesia would also be showing a surplus and subsequent improvement. A more meaningful comparison than point-to-point is the pooled means. For 1987–97, the average current account deficit is 0.1 percent; during the 15 years after the crisis the average turns to a surplus of 5.4 percent (the 5.5 percent difference is statistically significant at all standard levels of confidence).

For the Europe and U.S. sample, which involves a mix of debtor and creditor countries, a common pattern in the crisis countries (marked by an asterisk) is the swing from a worsening deficit to a post-crisis surplus, as in Asia. The most dramatic turnaround shown in Table 1 is Iceland, which records a deterioration of 14 percent, followed by an improvement of nearly the same magnitude. As of 2012, Ireland, Portugal, and Spain had shifted into impressive surplus territory.

TABLE 1

Current Account Balance/GDP, Levels and Changes: Selected Countries, 1980–2012

Country	Change over:		Peak deficit: 1980–2012		2012
	1997–2007	2007–2012	Level	Year	
Europe and United States^a					
Austria	6.0	-1.7	-5.2	1980	1.8
Belgium	-3.6	-3.5	-4.1	1981	-1.6
Denmark	0.8	4.2	-6.0	1986	5.6
Finland	-1.3	-6.0	-5.4	1991	-1.8
France	-3.7	-1.2	-2.2	2012	-2.2
Germany*	7.9	-0.5	-1.7	1980	7.0
Greece*	-9.4	11.2	-14.9	2008	-3.4
Iceland*	-13.9	10.8	-28.4	2008	-4.9
Ireland*	-8.8	9.8	-13.6	1981	4.4
Italy*	-4.1	0.5	-3.6	1980	-0.7
Netherlands*	0.1	3.4	-1.0	1980	10.1
Norway	6.2	1.7	-6.1	1986	14.2
Portugal*	-4.3	8.6	-14.6	1981	-1.5
Spain*	-9.9	8.9	-10.0	2007	-1.1
Sweden	5.3	-3.4	-3.3	1980	6.0
Switzerland	-0.7	2.6	-0.6	1980	11.2
United Kingdom*	-2.1	-1.6	-4.6	1989	-3.8
United States*	-3.3	2.2	-5.8	2006	-2.7
<i>Average</i>	<i>-2.2</i>	<i>2.6</i>	<i>-7.3</i>		<i>2.0</i>
<i>Memorandum items:</i>	<i>1987–1997</i>	<i>1998–2012</i>	<i>Difference</i>		
Average level	0.7	0.3	-0.3		
No. observations	198	90			
Country	Change over:		Peak deficit: 1980–2012		2012
	1987–1997	1997–2012	Level	Year	
Asia					
China*	3.8	-1.5	-3.7	1985	2.3
India	0.4	-3.5	-4.8	2012	-4.8
Indonesia*	1.3	-1.0	-7.5	1983	-2.7
Japan ^b	-1.2	-1.2	-1.0	1980	1.0
Korea*	-9.1	5.4	-8.3	1980	3.8
Malaysia*	-14.2	12.0	-13.4	1982	6.1
Philippines*	-5.3	7.6	-6.9	1980	2.9
Singapore	16.0	3.1	-13.1	1980	18.6
Thailand*	-1.3	2.1	-8.3	1990	0.0
<i>Average</i>	<i>-1.1</i>	<i>2.6</i>	<i>-7.4</i>		<i>3.0</i>
<i>Memorandum items:</i>	<i>1987–1997</i>	<i>1998–2012</i>	<i>Difference</i>		
Average level	-0.1	5.4	5.5		
No. observations	99	135			

Sources: International Monetary Fund (2013c) and Reinhart and Rogoff (2009).

^a An asterisk denotes a banking crisis in the “common crisis year”; the common crisis years for the advanced and Asian economies are 2007–08 and 1997–98, respectively. The years refer to the start of the crisis.

^b Japan’s financial crisis began in 1992.

Notes: The difference in pooled means tests are significant at standard confidence levels.

2.3. Investment in the Shadow of Sudden Stops

Table 2 presents the investment–GDP ratio in the same format as Table 1, replicating the same coverage of countries and time. The table shows the phenomenon we are trying to understand. With the exceptions of China, India, and Indonesia, the second post-crisis column stands out by showing the large declines in investment following deep crises. The top panel showing Europe and the United States is even more uniform in this regard, as not a single country records a higher level of investment in 2012 than in 2007. As with the current account, we place more weight on the pooled means reported as memorandum items. These show a 6.2 percent decline in investment for the full Asian group. If China and India are excluded, however, the decline is 9.4 percent. The standard difference in means tests yield significant results at all standard levels of confidence.

Five years into the aftermath of what began as the subprime crisis in the United States in the summer of 2007, the European economies and the United States seem to be on a similar track. The pooled means point to a decline of 2.6 percent after the onset of the crisis. Furthermore the magnitudes of the declines in a number of the periphery countries match and surpass the investment in Asia.

The investment slump unfolds during a period of lower average growth. Appendix Table A1 replicates the format used in Tables 1 and 2. The pooled estimates show mean growth in the 15-year span after the crisis as 2.5 percent lower for the nine-country Asian sample and 3.3 percent lower if China and India are excluded.

Having shown that current account surpluses and lower investment ratios and growth are the post-crisis “new normal,” we now turn to the crisis episodes that cemented the policies of self-insurance via large-scale reserve accumulation. The motivation for governments to hold reserves is well established in the literature, as discussed in Obstfeld, Shambaugh, and Taylor (2010) and Calvo, Izquierdo, and Loo-Kung (2012). The sketch presented here of past crises only serves to highlight the gap between then and now for international reserve “covers.”

2.4. Disasters and Near Disasters

Table 3 presents a list of external credit events in the form of outright default, debt restructuring, or “near train wrecks” in that the country was on the verge of default. This list does not include banking, currency, and inflation crises; the dates for these can be found in Reinhart (2013). While the intent of

TABLE 2
Investment–GDP Ratios, Levels, and Changes: Selected Countries, 1980–2012

Country	Change over:		Peak: 1980–2012		Level 2012
	1997–2007	2007–2012	Level	Year	
Europe and United States^a					
Austria	–1.9	–0.5	31.72	1980	22.68
Belgium	2.0	–2.0	25.93	1980	21.00
Denmark	2.6	–6.3	23.37	2007	17.06
Finland	3.7	–3.1	30.44	1989	19.75
France	5.1	–2.2	23.36	1980	19.80
Germany	–2.1	–2.0	28.16	1980	17.26
Greece	5.9	–13.1	26.72	2007	13.59
Iceland	9.3	–14.5	35.61	2006	14.55
Ireland	4.7	–15.3	28.16	2006	10.86
Italy	2.4	–4.5	27.59	1980	17.62
Netherlands	–1.8	–2.9	23.96	1989	17.53
Norway	2.4	–0.7	31.34	1986	25.05
Portugal	–3.4	–6.1	37.99	1982	16.70
Spain	8.9	–11.2	30.98	2007	19.75
Sweden	4.1	–1.5	23.99	1989	18.84
Switzerland	–0.1	–1.6	30.44	1990	20.98
United Kingdom	0.8	–3.5	21.99	1989	14.65
United States	0.0	–3.3	25.08	1984	19.05
Average	2.4	–5.2			18.15
<i>Memorandum items:</i>	<i>1997–2007</i>	<i>2008–2012</i>	<i>Difference</i>		
Average level	21.85	19.23	–2.6		
No. observations	198	90			
Country	Change over:		Peak: 1980–2012		Level 2012
	1987–1997	1997–2012	Level	Year	
Asia					
China	0.9	10.9	48.85	2012	48.85
India	3.3	9.8	38.11	2007	35.62
Indonesia	–10.0	3.6	47.71	1989	35.32
Japan ^b	–0.4	–7.5	32.53	1990	20.60
Korea	4.6	–7.9	40.06	1991	27.55
Malaysia	19.9	–17.2	43.64	1995	25.77
Philippines	7.6	–8.9	32.84	1983	18.46
Singapore	1.0	–10.2	46.95	1984	27.00
Thailand	5.8	–3.9	42.84	1991	29.74
Average	3.6	–3.5			29.88
<i>Memorandum items:</i>	<i>1987–1997</i>	<i>1998–2012</i>	<i>Difference</i>		
Average level	33.36	27.14	–6.2		
No. observations	99	135			

Sources: International Monetary Fund (2013c) and Reinhart and Rogoff (2009).

^a An asterisk denotes a banking crisis in the “common crisis year”; the common crisis years for the advanced and Asian economies are 2007–08 and 1997–98, respectively. The years refer to the start of the crisis.

^b Japan’s financial crisis began in 1992.

Note: The difference in pooled means tests are significant at standard confidence levels.

TABLE 3
**Credit Events (Restructuring, Default, and Near-Default),
 Debt, and International Reserves: 1958–2002**
 (Debt as a Percent of GDP)

Country	External credit events <i>Italics = near defaults</i>	Total external debt (public plus private)	Central government debt			Reserves/ external debt
			External	Domestic	Total	
India	1958	12.7	2.3	12.7	15.0	n.a.
	1969	15.2	2.5	15.2	17.7	8.1
	1972–1976	13.8	2.5	24.3	26.8	9.1
	1989–1990	25.2	8.0	15.7	23.7	5.1
Indonesia	1966–1970 ^a	46.9	n.a.	n.a.	n.a.	3.4
	1998–2000	158.7	56.5	10.5	67.0	15.0
	2002	65.5	35.0	35.3	70.3	24.2
Korea	1979–1980	34.9	7.6	3.8	11.4	12.9
	1997–1998	26.5	3.0	7.0	10.0	14.9
Philippines	1983–1992	72.9	22.8	11.3	34.1	3.1
Thailand	1997–1998	72.7	9.5	0.7	10.2	23.9 ^b
<i>Memorandum item:</i>		<i>Average 2013 reserve–external debt ratio for India, Indonesia, Korea, Philippines, and Thailand</i>			85.5	

Sources: Bloomberg, International Monetary Fund (2013b,c), League of Nations, *Statistical Abstract* (various issues), Park (2005), Reinhart and Rogoff (2009), Reinhart (2010), United Nations (1948) and *Yearbook*, various issues, World Bank (2013), World Bank, *Quarterly External Debt Statistics*, (QEDS), <http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/EXTDECQEDS/0,,menuPK:1805431~pagePK:64168427~piPK:64168435~theSitePK:1805415,00.html>

a As no data is available for 1966, we report 1970.

b The amount of reserves reported by the Bank of Thailand did not net out U.S. dollar reserves borrowed in the forward market; nonborrowed reserves were significantly lower.

this discussion is not to evaluate the indicator properties of debt or reserves, two features of Table 3 are noteworthy. First, with the exception of Indonesia's external debt in 1998, none of the debt ratios at the time of crises seem obviously high—certainly not by advanced economy standards. In effect, Indonesia's external debt–GDP ratio in 1997 was 63.2 percent, an implosion in the rupiah and a sharp decline in GDP drove the debt ratio higher by nearly 100 percent in less than a year. In seven of the 11 episodes shown external debt levels would have met the Maastricht criteria—indeed, Reinhart, Rogoff, and Savastano (2003) show that in more than one-half of the defaults since 1970 that also would have been the case. Second, as the last column reveals, while external debt might not have been alarming in its own right, the central bank did not have the reserves to back even a quarter of the outstanding debt stock at the time the crisis broke out. In nearly half the cases, the reserve backing amounted to less than 10 percent of the hard currency debt. The point that the common practice of focusing on reserves-to-import ratios was not especially useful to convey vulnerability to financial crises and that reserves should be compared to the potential stock of liabilities these must back (such as M2 or external debt, or at

least the short-term component of debt) was forcefully made by Calvo and Mendoza (1996).

The crisis experience sets the stage for both a policy that redirects government borrowing toward the domestic market and a central bank that strives to build a foreign exchange war chest as a financial stability policy tool. To what extent private external borrowing was discouraged through macroprudential measures or more explicit capital controls has varied considerably across countries and across time.

In the next section, we document the evolution of home bias in public finance and provide some markers on the magnitudes of the accumulation in foreign exchange reserves.

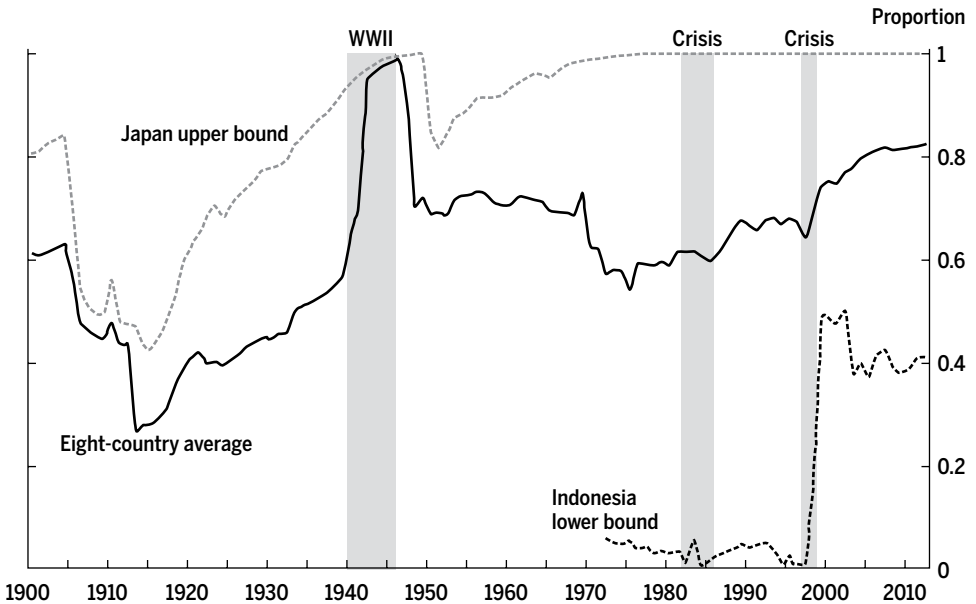
3. Home Bias

Home bias in finance has many dimensions, so it is impossible to measure it by a single indicator or even a handful of indicators. We do not use the term as it's used in the original work of French and Poterba (1991) to describe low shares of foreign equity in domestic portfolios or low shares of foreign bonds in private domestic portfolios. We focus on “liability home bias,” which we define as a preference for borrowing domestically (and usually in the domestic currency) after the 1997–98 crisis. In what follows, we focus primarily on the internal-external composition of government debt as well as the evolution of external total debt (public plus private) in comparison to domestic credit to the private sector.

3.1. Domestic and External Public Debt

The analysis here builds on Reinhart and Rogoff (2009, 2011), who trace out the long (and forgotten) historical evolution of domestic public debt. The debt series begins as early as 1835 for “British” India and 1872 for Japan; for Korea and Thailand the starting date is 1913; for Malaysia and the Philippines it is the 1940s and so on. The data for China are the least comprehensive in every dimension, both in terms of time frame and coverage. The Data Appendix available online (see Reinhart 2013) provides the details. Figure 1 traces the share of domestic central government debt; as such the range of variation is bounded by zero and one. The solid line is the average for eight of the nine economies (excluding China); the gray dashed line plots the ratio for Japan, which is the country with the highest share of domestic debt for the most extended period of time, while the black dashed line is the time series for Indonesia, which recorded the most significant dependence of external borrowing right up to the 1997 crisis (and even subsequently).

FIGURE 1
Share of Domestic Debt in Total Central Government Debt
 Seven Asian Economies, 1900–2012: The Rise of Domestic Debt



Sources: Detailed sources for each country are provided in Reinhart (2013).

Notes: The shaded areas encompass WWII and year in which three or more of the seven Asian economies included experienced systemic banking crises; these two episodes span 1982–85 and 1997–98.

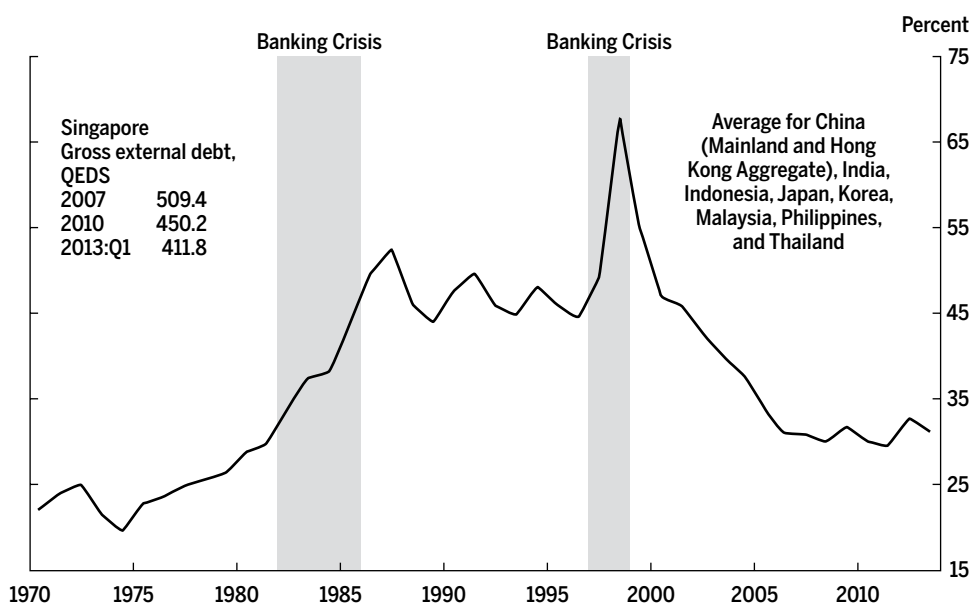
On the basis of the eight-country average, it is evident that, with the exception of the financial autarky imposed by World War II, Asian governments relied heavily on external financing. In the period of financial repression and capital controls during Bretton Woods, home bias was higher than in the more liberal international capital markets of the late 1970s and beyond. During the multiple crises in Asia from 1980 to 1986 (these were not as synchronous as 1997–98) about 40 percent of government debt was external. After that crisis the pendulum began to swing toward domestic debt and the share of domestic debt edged higher still. The average shows the share of domestic debt hovering around 80 percent, but that largely reflects that Indonesia and the Philippines still rely far more heavily on external debt than the others. For Japan and Singapore domestic debt is the whole story, while for India, Korea, Malaysia, and Thailand domestic debt currently accounts for 90 percent or more of the total.¹⁴

3.2. Total (Public and Private) External Debt

The preceding evidence is confined to the central government. Historically a substantive part of external borrowing has come from other sectors of government, such as enterprises and, of course, the private sector. To ascertain how total public and private external indebtedness has evolved, we plot the average external debt-to-GDP ratio for eight of the nine economies from 1970 to 2013:Q1. Singapore, which ranks fourth in the *Global Financial Centres Index* (Z/Yen Group 2013), is the obvious outlier and is excluded from the average shown. Singapore's gross external debt, which is a multiple of GDP, is shown in the inset of Figure 2. Of the 69 countries that participate in providing quarterly gross external debt data in the joint IMF-World Bank Quarterly External Debt Statistics (QEDS) exercise, only four report higher external debt ratios than Singapore: Iceland, Ireland, Luxembourg, and Mauritius. The latter two are offshore centers and the first two were in the past. For China, we report the aggregate external debt of Hong Kong and the Mainland relative to the aggregated GDP.

FIGURE 2

Total (Public Plus Private) External Debt: Selected Asian Economies, 1970–2013:Q1 (Percent of GDP)



Sources: Detailed sources for each country are provided in Reinhart (2013).

Note: Shaded areas encompass years in which three or more of the seven Asian economies included experienced systemic banking crises; these two episodes span 1982–85 and 1997–98.

In line with the home bias redirection, total external debt has been halved since 1987 and hovers around 30 percent. While deleveraging usually follows a deep crisis, the debt reduction, as we shall see, has been far more pronounced for external debt. Indeed, several countries in the region are concerned about an internal credit boom.

3.3. Hidden Debts, Contingent Liabilities, and Private Credit

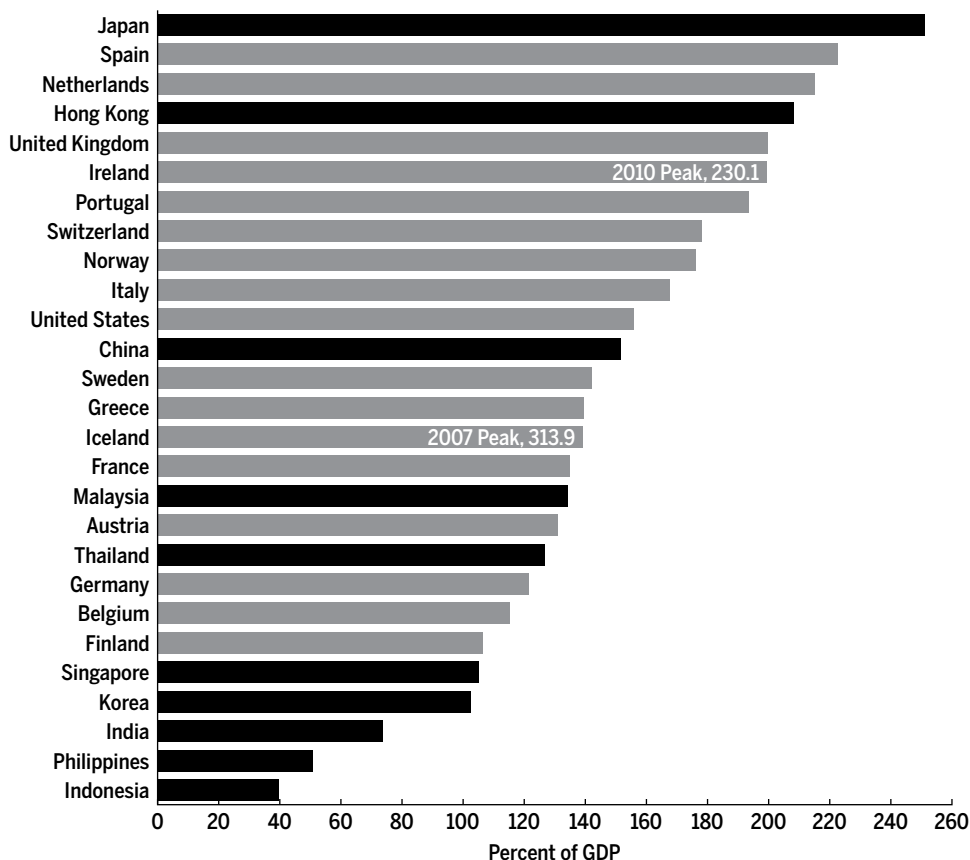
“There are four things every person has more of than they know: sins, debt, years, and foes.” —Persian proverb

The broad debt picture would not be complete without a discussion of domestic credit to the private sector, with its history of past booms and busts and where significant vulnerabilities have re-emerged in a number of the countries studied here.¹⁵ The ratio of domestic credit to the private sector outstanding to GDP as of the second quarter of 2013 is shown in Figure 3 for the Asia, Europe, and U.S. sample.¹⁶ As with the composition of public debt and the extent of external private and public indebtedness, there is considerable cross-country variation within our sample, but the general prevailing pattern (with the exceptions of the Philippines and Indonesia) is that in the remaining seven countries domestic levels are high (if not necessarily at peak levels) by their own historical standards, if not by a broad cross-country comparison (as shown in Figure 2).

Japan’s ratio is the highest (slightly above 250 percent) and it hovers near its 1996 peak. The banking crisis in Japan began in 1991 and, unlike in most severe banking crises where debt ratios begin to decline usually two years after the crisis, deleveraging was slow and partial, as the debt ratio never dips below 215 percent (see Reinhart 2013). Korea’s drastic external deleveraging after the crisis has no obvious domestic counterpart, as the domestic credit ratio continued to climb. At 103 percent as of mid-2013 the credit–GDP ratio is only slightly below the 109 percent peak in 2009. Thailand and Malaysia have also experienced a marked rebound in domestic private credit, especially connected to household debt. China, while still classified as a low-income country, has a domestic credit ratio that is on par with advanced economies; these data reflect the growth of domestic credit in the “formal” banking sector. Hong Kong’s average annual increase in credit–GDP ratio during 2007–13 exceeded Ireland’s during the decade before the crisis (1997–2007) and has only been surpassed by Iceland’s credit boom over the pre-crisis decade (Figure 4). Credit ratios are at all-time highs for Hong Kong, India, Singapore, and the group as a whole (Figure 5).¹⁷

A missing component in this analysis is domestic securitized debt, which varies in importance with the size of the domestic bond market across these

FIGURE 3

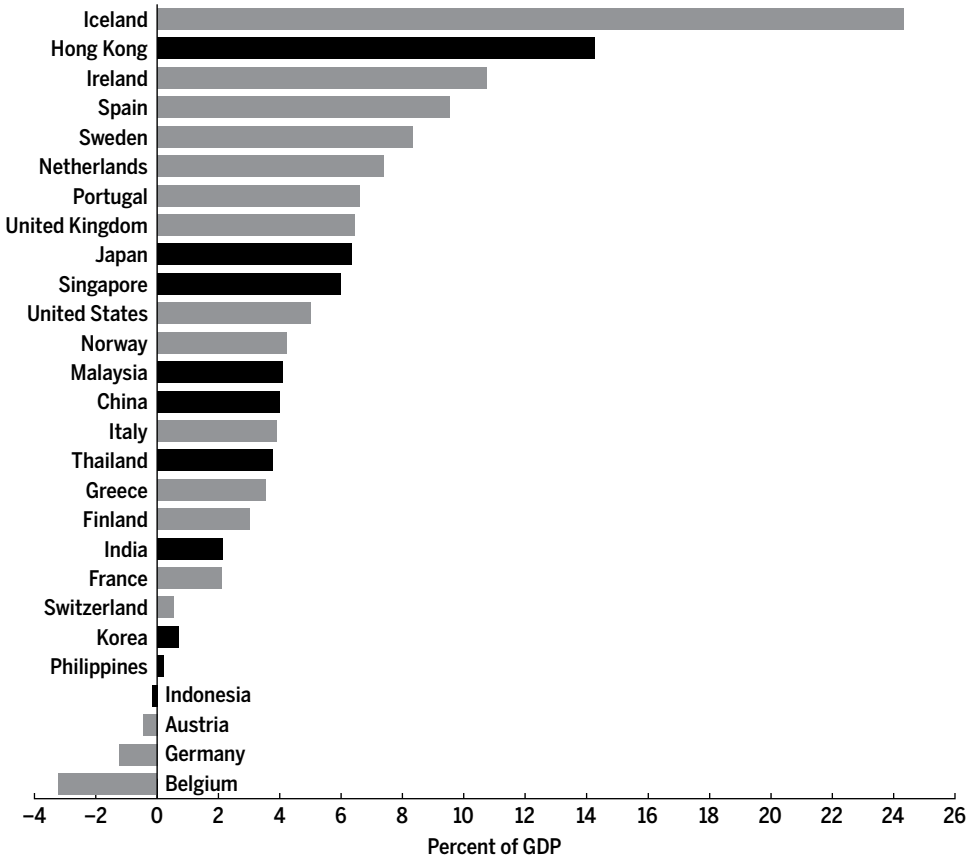
Domestic Credit to the Private Sector Outstanding as a Percent of GDP, 2013:Q2

Sources: Board of Governors of the Federal Reserve System (2013) and International Monetary Fund (2013b).

Notes: Black bars are for Asian countries, and gray bars are for Europe and the United States. Data for Korea, Norway, and Philippines are through 2012. For the United States, debt outstanding of the nonfinancial private sector is used in lieu of domestic bank credit.

countries. Also, important hidden debts for the case of China are provincial liabilities often contracted through the burgeoning shadow banking sector in that country and directly tied to real estate activity. To the extent that central banks issue their own debt to facilitate open market operations or to sterilize the effects of large purchases of foreign exchange reserves, this type of domestic debt is also not quantified here.¹⁸ In Malaysia, there are ongoing discussions of hidden debts in the form of an assortment of off-balance-sheet expenditures involving government enterprises.

FIGURE 4
**Average Annual Change in Domestic Credit–GDP Ratio,
 Asia, Europe, and the United States, 1997–2013:Q2**
 (as a Percent of GDP)

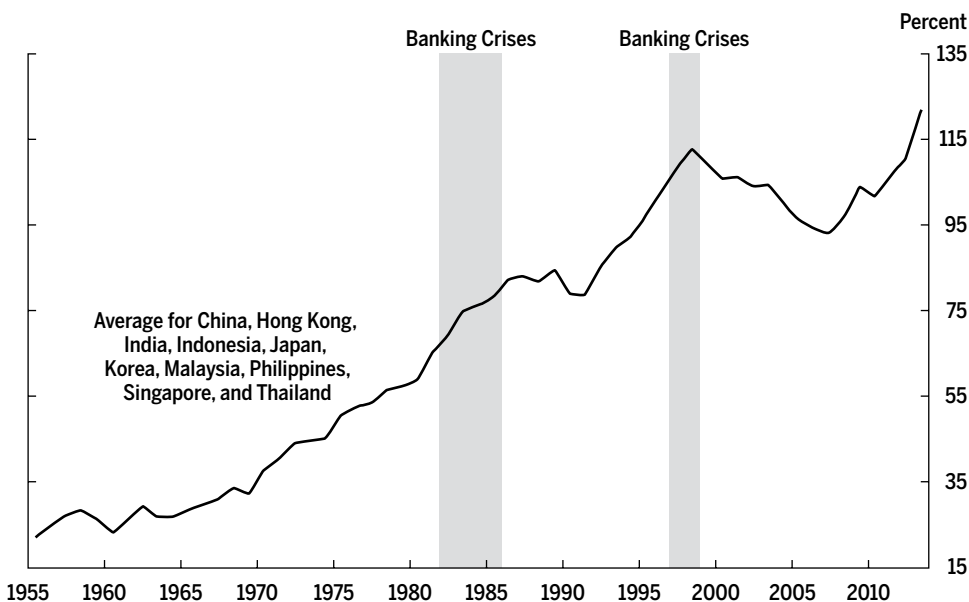


Sources: Board of Governors of the Federal Reserve System (2013) and International Monetary Fund (2013b).

Notes: Black bars show average annual change for Asian countries, 2007–13. Gray bars show average annual change for Europe and the United States, 1997–2007. Data for Korea, Norway, and Philippines is through 2012. For the United States, debt outstanding of the nonfinancial private sector is used in lieu of domestic bank credit.

We have not yet discussed public debt as whole, but we observed that these have become increasingly domestic, as external debt levels have declined and the share of domestic debt in the total pie has risen. The preceding discussion highlighted the growing private domestic debts. Taken together, the implication is that, for Asia's largest economies, domestic leverage is an issue of some concern. Banking crises need not have an external dimension.

FIGURE 5
Domestic Credit, Restructuring, and Banking Crises, 1955–2013:Q2
 (End-of-period as a Percent of GDP)



Sources: International Monetary Fund (2013b), Reinhart and Rogoff (2009) and sources cited therein.

Note: Shaded areas encompass years in which three or more of the seven Asian economies included experienced systemic banking crises; these two episodes span 1982–85 and 1997–98.

3.4. Original Sin and Debt Intolerance

The discussion that follows revolves around seven of the nine sample countries, excluding Japan and Singapore. On the surface, the preceding discussion would suggest that the challenges posed by “original sin” in Eichengreen, Hausmann, and Panizza (2005) have been overcome in this sample. Before jumping to that conclusion, we note that the full original sin phenomenon, as described by the authors, had two dimensions: first, the inability of governments to borrow domestically (in the domestic currency) for the long term at fixed rates; second, the inability of governments to borrow in their own currency abroad (i.e., debt issues under international law).

We have presented evidence that governments turned inward in their funding pattern but there is considerable variation within the group. China and India have historically had a significant domestic debt market, (understandably given their size and inward development strategy for many decades). Korea, Malaysia, and Thailand, which relied extensively on external funding (had both dimensions of original sin) have shifted overwhelmingly to domestic debt

fulfilling the criteria described above. Indonesia (see Figure 1) and the Philippines have also shifted markedly to domestic funding, but external debt still accounts for about half of central government debt.

We have also documented the more generalized (encompassing the private sector and other layers of government) pattern of declining external debt and rising domestic debt. This trend is silent, however, on the external dimension of whether these governments are able to place domestic currency debt in international capital markets, as we have not examined the currency composition of debt issues under external law. In sum, the domestic strand of original sin has significantly diminished, but that is about all that can be said.

Our analysis is equally silent on whether *debt intolerance* has been overcome or not, as external debt levels are low by historical standards. Table 3 is a reminder that crises often occurred at low (and sometimes extremely low) levels of external debt, which is the essence of debt intolerance. At present, the Indian rupee together with Brazil's real, China's renminbi, South Africa's rand, and the Turkish lira, have been dubbed the fragile five.¹⁹ Since the spring of 2013, the central banks of India and Indonesia have lost a substantive amount of reserves in efforts to stem a slide in the currency; India has introduced measures to limit capital flight. As of the first quarter of 2013, India's and Indonesia's total external debt as a percentage of their GDP amounted to 19.8 percent and 26.8 percent, respectively.

4. Crowding Out Redefined

In this section, we revisit the conventional definition of the old concept of crowding out as it applies to Asia. We move on to redefine and broaden the concept of crowding out to the official sector at large, which includes central banks. In light of this broader definition of the official sector, we ask whether the record reserve accumulation that took root at the time of crisis in much of Asia is related to the persistently lower levels of investment since 1997–98. Put differently, we ask whether central bank reserve accumulation has been crowding out private investment in the past 15 years.

4.1. Conventional Crowding Out

Crowding out is usually understood as the process through which increased government borrowing displaces investment spending. If the government is competing with the private sector for a limited supply of loanable funds, then the higher public borrowing crowds out private investing. This crowding out can occur via the rising cost of borrowing for firms, or it can occur without rising interest rates if the government receives preferential access to the supply

of loanable funds. Financial regulation can (and often does) tilt the balance in favor of government debt; financial repression does this more explicitly, often through directed credit.²⁰ Crowding out is typically a pressing policy concern when the public and private sectors' access to international capital markets is limited or non-existent, when government new financing needs are large, and when the government has to roll over large debts on a continual basis. To this list we would add the obvious point that, in cases where foreign saving cannot be tapped, the smaller the pool of domestic saving (all else equal), the greater the problem of crowding out.

As with other indicators, the range of variation in public debt profiles within the region is vast, both in terms of debt levels and their composition.²¹ Table 4, which provides a snapshot of the public debt in selected countries in the region, highlights this diversity. Public debt-to-GDP levels range from around 20 percent for Indonesia and China (for the latter it is likely an understatement) to Japan's record (a multiple of 12) near 240 percent. These extremes support the obvious point that the fiscal policy challenges faced by these countries are of a very hybrid nature. Our intention is not to have a discussion of the complex regional fiscal panorama but to focus on two cases where the conventionally defined challenge of crowding out is most applicable, Japan and India.²²

4.1.1. Japan

Since 2009, Japan's general government debt-to-GDP ratio has surpassed 200 percent (Figure 6). According to the Reinhart and Rogoff (2009) historical public debt database, few sovereigns have recorded comparable levels. Of the seven episodes we identify of a debt-GDP ratio above 200 percent (France 1921–23;

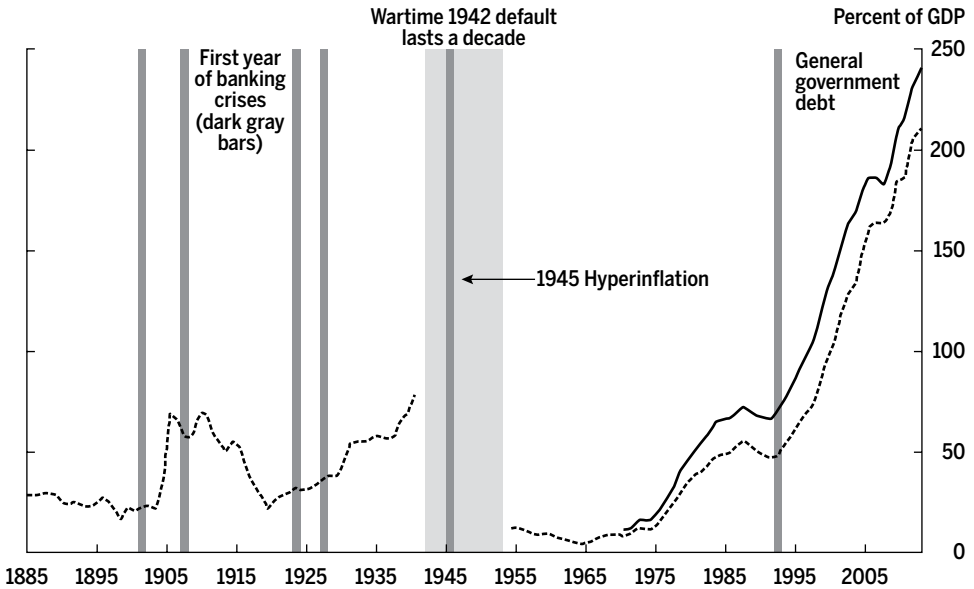
TABLE 4
Central Government Debt: Selected Asian Economies as a Percent of GDP

	China*	India	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Thailand
Start of coverage	1984	1835	1972	1872	1913	1949	1948	1963	1913
Average, all years	13.0	28.8	35.6	50.0	15.2	44.6	35.4	67.6	17.2
Peak year	2010	1945	2000	2012	1938	1987	2004	2012	1986
Peak level	33.5	79.5	95.2	209.7	35.8	106.0	74.4	111.4	40.1
Average, 1980–2013	13.0	38.0	41.7	100.5	19.4	57.8	55.3	82.7	24.7
Change, 2007–2013	3.3	0.2	–10.0	45.4	3.4	12.2	–6.5	21.1	6.3
2013	22.9	40.3	20.9	208.7	33.1	52.3	47.4	108.4	30.3
Memorandum item: General government									
Start of coverage	1984	1991	2000	1970	1990	1990	1994	1990	1996
2013	22.9	67.2	26.2	243.5	35.7	57.0	41.2	107.8	47.1

*For China, General Government Debt is used in lieu of Central Government Debt.

Sources: Detailed sources are provided in Reinhart (2013).

FIGURE 6
Japan: Central and General Government (Domestic Plus External) Debt, Default, and Banking Crises, 1885–2013



Sources: Financial Bureau, Ministry of Finance, Japan; League of Nations, *Statistical Abstract*, various years; Reinhart and Rogoff (2009) and sources cited therein; Reinhart (2010); United Nations (1948); *Yearbook*, various issues.

Note: Dark gray vertical bars show first year of banking crises.

Germany 1944; Greece 1894–97; Netherlands, 1821–53; New Zealand 1932–34; and the United Kingdom 1813–25 and 1945–48), only two lasted longer than five years.²³ In three (Germany, Greece, and New Zealand) of the seven cases, the country was in full default or undergoing a restructuring. Still, in the four episodes that did not involve a default or restructuring, the debt was intimately connected with a war or a series of wars; France in the aftermath of World War I, the United Kingdom in the wake of the Napoleonic War and World War II, and the Dutch, who fought two wars in what is now Indonesia in 1821–37 while engaged in the Belgian fight for independence (1830–39) at home.

To say history offers little guidance on how the debt is unwound in these more extreme cases is an understatement. On the surface, the two longer episodes involving the United Kingdom and the Netherlands in the 1800s are of greater interest. Both countries played a prominent role as international financial centers at the time, and as the high level of public debt coexisted with high levels of private saving, both were creditors to the rest of the world (like Japan). Even so, the comparison is a stretch, as the two countries enjoyed a stream of

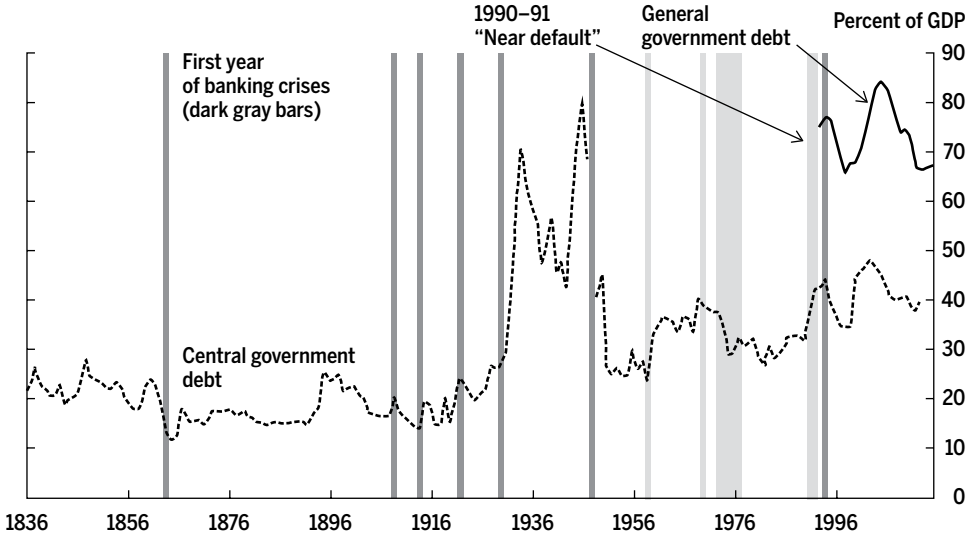
substantial transfer of resources from their colonies that modern-day Japan cannot count on, and in both cases the tapering of war efforts played a role in debt reduction that is strikingly at odds with the concerns of an aging population.²⁴ It is noteworthy that the post-1900 episodes (even in less extreme cases than those listed here) often involved substantial debt erosion through inflation or financial repression.²⁵

More to the point of this paper, since its peak shortly before the 1991 crisis (Table 2), Japan's investment ratio has declined by 12 percentage points while household consumption as a share of GDP has risen by about 6 percentage points over that period (not a surprise in light of the country's aging population). Private debt has remained above 210 percent of GDP, where it has oscillated since the mid-1980s. Government debt, which was 47 percent of GDP in 1991 on the eve of crisis, has multiplied by a factor of five. In light of these combined developments, it may be possible in an in-depth case study to fully account for the observed investment slump. However, as the next section discusses this is not the full picture; a significant share of Japan's savings was channeled abroad through reserve accumulation (official capital outflows) during this period. Foreign exchange reserves (excluding gold) relative to GDP rose from about 2 percent of GDP in 1991 to 24 percent in mid-2013.

4.1.2. India

If Japan's predicament is rare, a more common pre-crisis pattern of vulnerability is recently visible in India. The troublesome combination involves relatively high public debt (especially evident in general government, Figure 7); large budget deficits (about 8.5 percent of GDP); a widening current account deficit (despite what are still low levels of external debt); slowing growth; and private domestic credit at a historic high. Added to this list are accumulated past mistakes or missed opportunities. Frankel, Végh, and Vuletin (2013) recently re-examined the issue of fiscal procyclicality. Their analysis, which controls for the endogeneity of institutions and other determinants of procyclicality, shows that, over the last decade, about a third of the developing world has been able to escape the procyclicality trap and actually become countercyclical. Unfortunately, this uplifting finding does not apply to India's fiscal policy, which they find to be procyclical as in the past. With growth rates consistently above 5 percent in the past six years, fiscal deficits have oscillated between 8 and 10 percent of GDP; one can only imagine what fiscal finances will look like with slower growth. If the past is any guide, India will rely on financial repression and a negative real interest rate as one of the tools for debt erosion. Reinhart and

FIGURE 7
India: Central and General Government (Domestic Plus External)
Debt Restructuring, Near-Default, and Banking Crises, 1835–2013
 (as a Percent of GDP)



Sources: League of Nations, Statistical Abstract (various issues); International Monetary Fund (2013c); Ministry of Finance; Reinhart and Rogoff (2009); Reinhart (2010); United Nations (1948) and *Yearbook*, various issues; and World Bank (2013). Additional sources for debt, exports, and GDP: 1835–1839, Brahmananda (2001); 1840–1920, *Statistical Abstract Relating to British India*.

Note: Dark gray vertical bars show first year of banking crises. Light gray vertical bars show debt restructuring.

Sbrancia (2011) estimated the financial repression tax as amounting to 2 percent of GDP a year.²⁶

India along with China showed no evidence of an investment slump after 1997 as investment has risen by about 9 percentage points since that time, while household consumption has fallen by about 6 percentage points. India is an outlier in this group in that investment has been partially financed by foreign saving (India is the only country in the Asian group that has recorded consistent current account deficits since 2004). In 2012, the country's current account deficit widened to 5 percent of GDP (Table 1), its peak level since 1980. If external finance falters, India's strong investment could quickly reverse.

4.2. Central Bank Crowding Out

We discuss some understudied aspects of what is a well-documented and researched phenomenon—the buildup of foreign exchange reserves in much of Asia. This process began immediately after the Asian crisis of 1997–98 but

became especially marked since 2000–01, when China accelerated its purchases of foreign exchange to an unprecedented scale. The premise explored here is an extremely simple one and connected to the balance of payments identity and the definition of the current account.

We have presented evidence that most governments in the region have, to varying degrees, shifted from external financing to domestic financing and that the private sector, especially households, have entered domestic credit markets forcefully. Both public and private sectors were relying on foreign saving prior to the crisis. Taken together, these observations suggest that there are more players competing for domestic saving in post-1997 crisis Asia. These trends by themselves would, perhaps, have more modest implications for domestic investment, if it were not coupled with a macroeconomic policy objective of building an insurance war chest of foreign exchange reserves and avoiding current account deficits (or fickle foreign saving) if at all possible. Possibly, *fear of floating* combined with *fear of current account deficits*—a very understandable prudential reaction to severe crisis.

A reserve buildup is an official capital outflow, funneling domestic saving abroad. The decision to intervene or not and at what pace to accumulate reserves is determined by an official institution (the central bank) and is distinct from the process of the private sector's allocation of saving. Accordingly, we broaden the definition of crowding out to include the central bank under the umbrella of the public sector. This broader definition might not have made much difference over large tracts of history. Ironically, under fixed exchange rates, annual changes in reserves relative to GDP were smaller (except in the immediate vicinity of a crisis) than those observed under floating exchange rates since 1997.^{27,28} Furthermore, under fixed exchange rates reserve changes were more symmetric, with years of reserve losses alternating with reserve accumulation, than post-1997. If reserve purchases are sterilized to some degree, as is most often the case, it is done by increasing reserve requirements or by open market sales of government or central bank bills (or bonds).²⁹ In the narrower conventional definition of crowding out, the government is issuing more debt; in the more encompassing definition, the government need not be issuing more debt—the central bank is, either by selling its holdings of government debt or by selling its own sterilization bonds, and a key point is that the central bank is doing so persistently over an extended period of time.

In the debt crisis of the 1980s in Latin America, private capital flight funneled domestic saving abroad, to the detriment of investment in the region. We do not suggest that from a *macroprudential* and *signaling* standpoint the process of a central bank accumulating reserves and capital flight are comparable.

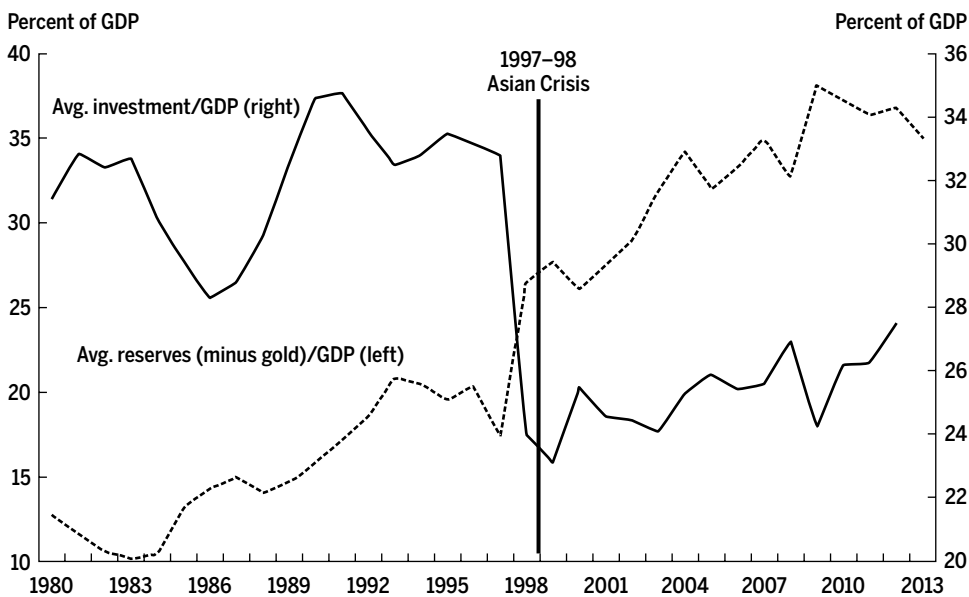
Foreign exchange purchases create a backing for foreign currency debt in times of stress and, more generally, for the monetary aggregates (M2), as in Calvo and Mendoza (1996) and Obstfeld, Shambaugh, and Taylor (2010). Large current account deficits (capital flow bonanzas, Reinhart and Reinhart 2009) are precursors of crises, so avoiding them has a distinct financial stability objective. But the fact remains that whether the outflows are official or private, a slice of domestic saving is directed to the purchase of foreign assets in lieu of domestic investment. In the case of capital flight, this wealth held outside the country is difficult or impossible to tax; in the case of reserves, given the low yield of the assets purchased and domestic foreign interest rate differentials, quasi-fiscal losses have often been significant.³⁰

4.3. Not All That Glitters Is Gold

Table 5 presents some summary statistics quantifying the reserve buildup in the nine Asian economies in the sample plus Hong Kong, which we report both separately and combined with Mainland China. As scale variables, we use two domestic and two external variables. Both the stock of and annual change in reserves are expressed as a share of GDP to facilitate magnitude comparisons with investment, saving consumption, and the current account. Since a major impetus to reserve accumulation is to provide insurance, particularly (but not exclusively) in the event that foreign currency debts (public and private) have to be immediately repaid, we also report reserves relative to these external debts. To gauge the magnitude of the reserve buildup (stocks and flows) from the perspective of the United States, which is a major recipient of official flows, we present the data relative to U.S. GDP and the level of marketable U.S. Treasury debt. The evolution of reserves over the period 1980–2013 is also traced in Figures 8 and 9.

Starting with the averages for the region, which conceal cross-country variation (in magnitudes, not direction), reserves on average rose around 4 percent of GDP; Singapore and China are on the upper end and Indonesia on the lower end. On average, as of August 2013 the ratio of reserves to GDP was 36 percent, which is very close to the total amount of public and private external debt outstanding. At 93.1 percent, reserves-to-external debt is indeed a contrast to the reserve-to-debt ratios reported in the last column of Table 3, where reserve ratios in times of crises were uniformly less than 25 percent and frequently less than 10 percent. As shown in Table 5, the magnitude of official outflows (reserve accumulation), relative to the size of the economy are on a scale that can potentially help account for an important component of the decline in investment simply from the narrow vantage point of balance of payments accounting.

FIGURE 8
Investment and Reserves, Eight Asian Economies, 1980–2012
 (as a Percent of GDP)



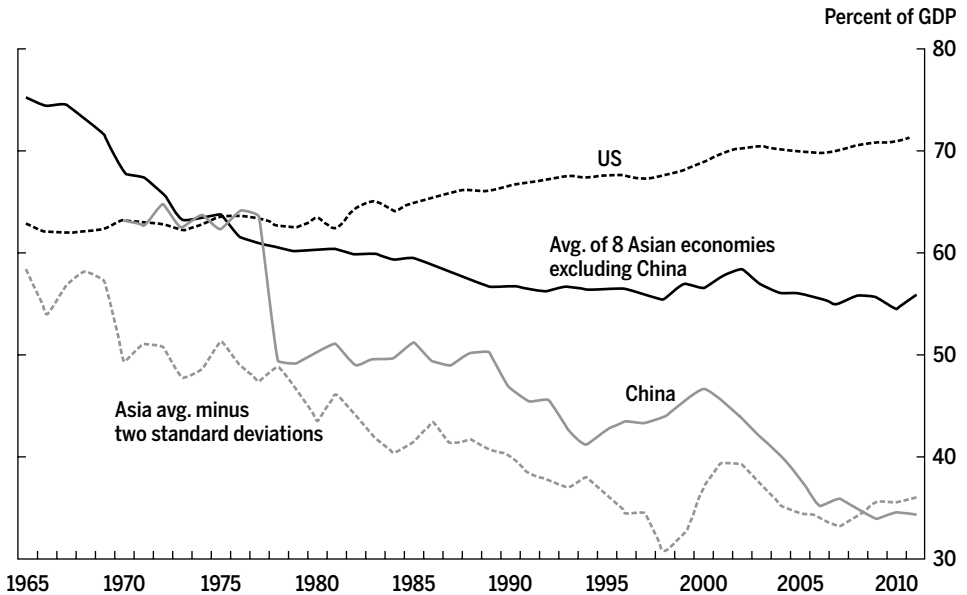
Sources: Bloomberg, International Monetary Fund (2013b,c).

Notes: Eight economies include India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, and Thailand. Correlation of investment and reserve ratio is -0.76 . The standard error on the correlation coefficient of the investment and reserve ratio reported in Figure 8 is 0.073; if China and India are included the correlation is 0.66 and the corresponding standard error is 0.098. Both sets of correlations are significant at the standard confidence levels.

The magnitude of the reserve buildup in these nine countries combined from the U.S. vantage point is no less substantial, although it may somewhat overstated by Table 5, which presents total reserves minus gold, not just Treasury securities or government-sponsored enterprises debt. That line of inquiry, however, is beyond the scope of this paper.

Table 5 covered the period of most intense reserve accumulation post-2001 but Figure 8 traces the evolution of reserves since 1980, thus covering before and after the 1997–98 crisis. It is important to remember that while 1997–98 was the most severe crisis (by a number of metrics including investment) and certainly the most synchronous, it was not the only crisis in Asia since 1980. Indeed from 1980 to 1985, in addition to the Korean debt crisis (no default or restructuring ensued) of 1979–80 and the default by the Philippines in 1983 (Table 3), there were systemic banking crises in Korea in 1983, Malaysia in 1985, Philippines in 1981, Singapore in 1982, and Thailand in 1983.³¹ These crises did not produce as sharp a change in public policy attitudes toward the

FIGURE 9
**Household Consumption as a Share of GDP:
 Eight Asian Economies, China, and the United States, 1965–2011**



Sources: World Bank, *World Development Indicators*.

external sector as did the later crises, specifically as regards the danger of current account deficits and the desirability of a generous pool of foreign exchange reserves. So, while there is a sharp downturn in investment (which falls 5 percentage points between 1983 and 1986), the post-crisis recovery in reserves is neither as sharp nor sustained as post-1997.³² The simple correlation between the foreign exchange reserve and investment ratios over 1980–2013 is -0.76 . In interpreting the correlation, it is important to remember that these are linked via the balance of payments accounting identity. An increase in official outflows (reserve accumulation), however, could just as plausibly translate to a reduction in the consumption–GDP ratio (public, private, or both) as in China post-2001. While reserve intervention or accumulation is a policy choice, it is probable that it is connected to a policy reaction function of one form or another, a point made by Obstfeld (1982).

The obvious question is, of course, China, the country with the most significant buildup in reserves where average investment ratios are almost 3 percent higher after 1997. If China is included so that it is a nine-country average the correlation drops to -0.66 . The space for simultaneous reserve accumulation

TABLE 5
**International Reserves minus Gold, Stocks, and Flows
 for Selected Asian Countries, 2001–August 2013**

	Average annual change in reserves over 2001–13 relative to:		Reserves as of end of August 2013 relative to:*			
	Domestic GDP	U.S. GDP	Domestic GDP	External debt	U.S. GDP	U.S. marketable debt
<i>China, Mainland</i>	7.12	1.81	39.12	467.28	20.91	29.35
<i>China, Hong Kong</i>	7.03	0.10	108.67	29.38	1.82	2.55
China, Combined	7.01	1.92	41.23	210.12	22.72	31.90
India	2.04	0.13	14.66	66.08	1.54	2.16
Indonesia	0.99	0.03	10.72	36.73	0.56	0.78
Japan	1.46	0.53	24.78	43.90	7.42	9.95
Korea	2.29	0.14	27.73	80.95	1.99	2.79
Malaysia	4.95	0.06	43.20	134.17	0.81	1.13
Philippines	2.65	0.03	27.30	125.84	0.44	0.62
Singapore	8.12	0.10	91.05	22.11	1.57	2.20
Thailand	4.34	0.07	41.34	118.04	0.99	1.39
Sum		3.01			38.04	52.93
Average	3.76		35.78	93.10		

*China (Mainland) does not participate in the joint International Monetary Fund and World Bank Quarterly External Debt Statistics (QEDS) exercise nor the Special Data Dissemination Standard (SDDS). As such, the most recent external debt data are year-end 2011. Hong Kong data are available through 2013:Q1 in the QEDS database; the aggregates reported for the Mainland and China, Combined end in 2011.

Sources: Bloomberg, Board of Governors of the Federal Reserve System (2013), International Monetary Fund (2013b,c), and World Bank QEDS.

and higher investment in the case of China was largely accommodated by a sharp decline in household consumption (Figure 9 and Appendix Figure A1) that leaves the consumption share of households in 2011 at around 35 percent of GDP, roughly one-half the U.S. share and more than two standard deviations lower than the Asia average. Lardy (2008, 2012) has connected the decline in household consumption (and household income) share of GDP in China to the large reserve buildup post-2000 in combination with financial repression. Jeanne (2012) formalizes this connection. Massive purchases of foreign exchange reserves (ranging from 9 to 13.5 percent per year from 2004 to 2009) coupled with partial sterilization helped fuel a credit boom and accelerating inflation. With interest rates on deposits capped, real ex-post interest rates fell from around 1.5 percent to about -7 percent during this period. The financial repression tax on households depressed incomes and consumption, as shown in Figure 9.

5. Concluding Remarks

Much has been said about the macroprudential rationale for holding sufficient foreign currency reserves to cover short-term liabilities. There is less

agreement on how broad that coverage should be, especially if there is the potential for hidden debts and implicit guarantees on private sector liabilities. As a consequence, the concept of an optimal level of reserves is subject to debate. As reserve accumulation picked up momentum around 2000–01, a number of studies have also emphasized that there is no free lunch. Reserve accumulation carries costs. Calvo's (1991) perils of sterilization, written well before the Asian crisis, focused on the higher nominal interest rates that result from the central bank's effort to sterilize reserve accumulation.³³ Other perils, including creating distortions in the banking sector, fueling credit booms, and impairing central bank balance sheets, have been considered.

The point emphasized in Bussière et al. (2013) that reserve accumulation and capital controls may be best viewed as complements rather than substitutes has resonance to the analysis presented here. They found the greatest resilience to the global shock of 2008–09 was among countries with high reserves and less-than-open capital accounts. In the longer-horizon focus of this paper, the parallel would be that countries with relatively more pervasive capital account barriers may have a better chance of limiting the crowding out effects of reserve accumulation (official outflows) on investment. This may be because the controls themselves limit private outflows or capital flight—a leakage (to the extent, of course the measures are effective) because the magnitude of the desired reserve accumulation is smaller (as the controls also insulate the domestic economy from external shocks), or a combination of the two.

The global consequences of this reserve buildup have been debated under various headings, including Bernanke's saving glut and the risks it poses to capital-importing countries like the United States. Bernanke (2005) argued that interest rates in advanced economies were held down by a glut of saving from Asian economies. To this we would add that Asia's investment has been held down because Asian governments have been absorbing domestic saving to purchase the securities of the rest of advanced economies.

Then there is the eternal quest in the international finance literature for how to measure capital mobility.³⁴ For one, the reserve buildup drives a large and variable wedge between domestic saving and investment. Thus a test of the mobility of capital in the spirit of Feldstein and Horioka might conclude capital flows freely because national investment is not constrained by saving. Actually, domestic investment may be crowded out from using domestic saving because of the government's decision to build reserves. Interest parity conditions are silent on the volume of official-to-official versus private international capital flows, a phenomenon convincingly documented in Alfaro, Kalemli-Ozcan, and Volosovych (2013) and our discussion of rising post-crisis home bias.

This paper is silent on the global implications of official capital outflows from Asia, but it adds another dimension to the policy dilemma of capital exporting countries—when are high and rising levels of reserves too much of a good thing? Since the 1997–98 crisis, investment ratios in Asia have not recovered outside of China and India, and now those two countries may be on the cusp of a correction. We have hypothesized here that the persistent and quantitatively important official outflows orchestrated by central banks have crowded out investment—and not necessarily just private investment but public as well. Since 1997, growth has slowed significantly in the region, even when China and India are included in the calculus.

We are not aware of other studies addressing this particular trade-off between the size of the security blanket and the price in terms of the medium-term growth consequences it may carry. This is to say that this is a fruitful area for policy research. It is relevant for Asia, not just because China and India are now part of the fragile five, but also because several of the other countries have their own challenges, ranging from Japan's gargantuan public debt to signs of internal household credit booms in some of the other former crisis countries. Perhaps Asia's investment slump has been largely overlooked because, after all, Asia's investment ratios are still among the highest worldwide—but their post-crisis average is more than 9 percentage points below average in the decade before the crisis. If there were another round of turbulence in Asia with its usual attendant impact on investment, that gap could narrow further.

Of course, the problem of dwindling investment is also a compelling policy challenge for many of the advanced economies facing large public and private debt overhangs. Indeed, it is an acute problem in the cases of periphery Europe, where capital market access remains limited at best and an ongoing credit crunch unfolds. In much of Europe, finance has turned inward, and banks, pensions, and insurance are largely in the business of buying domestic government bonds and evergreening significant levels of moribund private debt. Unlike Asia, however, the leakage draining domestic saving is not coming from central bank purchases of foreign assets as a rainy day fund is built. As Eichengreen et al. (2013) convincingly illustrate, much of Europe's post-crisis experience to date aligns more closely with Latin America's lost decade—to their analysis we would add that, like Latin America in the 1980s, capital flight from the periphery remains a drain on its domestic saving.

Appendix

TABLE A1
GDP Growth for Selected Countries, 1980–2012

Country	Change over:		Peak: 1980–2012		Level 2012
	1997–2007	2007–2012	Level	Year	
Europe and United States^a					
Austria	0.6	–1.4	4.35	1990	0.87
Belgium	1.4	–4.0	4.72	1988	–0.28
Denmark	2.9	–3.6	5.53	1994	–0.38
Finland	2.7	–7.0	6.20	1997	–0.83
France	–0.2	–2.2	4.67	1988	0.01
Germany	0.3	–0.9	5.72	1990	0.90
Greece	5.9	–10.0	5.94	2003	–6.39
Iceland	–3.6	–3.3	8.55	1987	1.64
Ireland	7.6	–11.1	11.27	1997	0.16
Italy	–1.3	–4.2	4.19	1988	–2.37
Netherlands	2.4	–5.5	4.68	1999	–1.25
Norway	3.6	–2.4	5.90	1984	3.02
Portugal	–3.2	–7.6	7.86	1990	–3.24
Spain	–1.8	–5.5	5.71	1987	–1.64
Sweden	–0.7	–1.8	6.56	2010	0.95
Switzerland	0.5	–1.0	5.11	1980	1.05
United Kingdom	–0.8	–4.2	5.57	1988	0.17
United States	1.0	–1.7	7.26	1984	2.78
Average	1.0	–4.3			–0.27
<i>Memorandum items:</i>	<i>1997–2007</i>	<i>2008–2012</i>	<i>Difference</i>		
Average level	3.10	–0.38	–3.5		
No. observations	198	90			

Country	Change over:		Peak: 1980–2012		Level 2012
	1987–1997	1997–2012	Level	Year	
Asia					
China	–2.3	–1.6	15.20	1984	7.70
India	0.1	–0.8	10.55	2010	3.24
Indonesia	–0.2	1.5	9.88	1980	6.23
Japan ^b	–2.5	0.4	7.15	1988	1.96
Korea	–6.5	–3.7	12.27	1987	2.04
Malaysia	1.9	–1.7	10.00	1996	5.64
Philippines	0.9	1.6	7.63	2010	6.82
Singapore	–2.3	–7.2	14.78	2010	1.32
Thailand	–10.9	7.9	13.29	1988	6.49
Average	–2.4	–0.4			4.60
<i>Memorandum items:</i>	<i>1987–1997</i>	<i>1998–2012</i>	<i>Difference</i>		
Average level	7.17	4.69	–2.5		
No. observations	99	135			

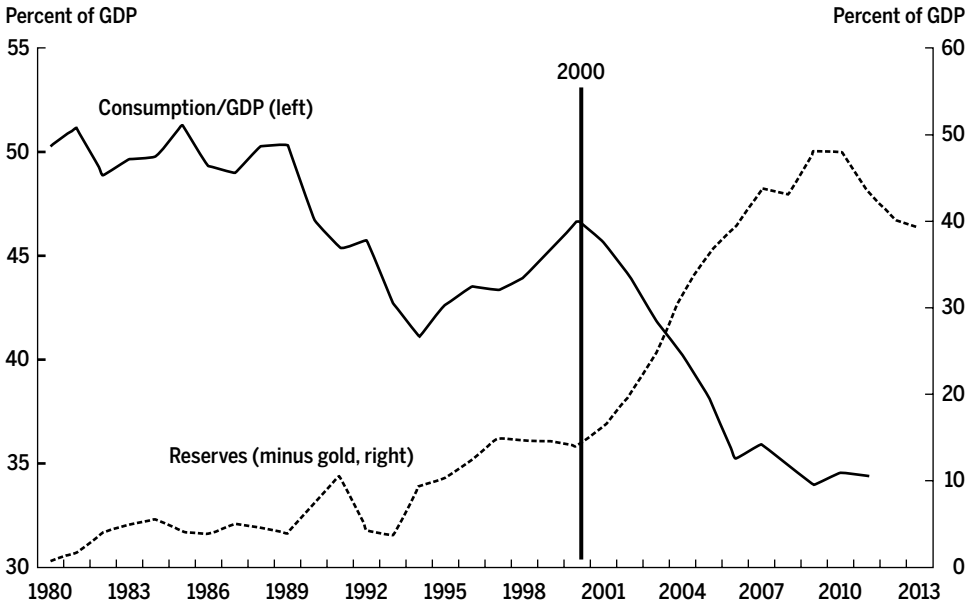
Sources: International Monetary Fund (2013c) and Reinhart and Rogoff (2009).

a An asterisk denotes a banking crisis in the “common crisis year”; the common crisis years for the advanced and Asian economies are 2007–08 and 1997–98, respectively. The years refer to the start of the crisis.

b Japan’s financial crisis began in 1992.

Notes: The difference in pooled means tests are significant at standard confidence levels.

FIGURE A1
Household Consumption and International Reserves: China, 1980–2012



Sources: Bloomberg, International Monetary Fund (2013b,c).

REFERENCES

- Aizenman, Joshua, and Jaewoo Lee. 2007. "International Reserves: Precautionary versus Mercantilist Views: Theory and Evidence." *Open Economies Review* 18(2), pp. 191–214.
- Alfaro, Laura, Sebnem Kalemli-Ozcan, and Vadym Volosovych. 2013. "Sovereigns, Upstream Capital Flows, and Global Imbalances." Harvard Business School Working Paper 12-009 (2011, revised October 2013).
- Athukorala, Prema-chandra. 2010. "Malaysian Economy in Three Crises." Australian National University Working Paper 2010/12.
- Badkar, Mamta. 2013. "Morgan Stanley Presents: 'The Fragile Five'—The Most Troubled Currencies in Emerging Markets." *Business Insider*, September 24. <http://www.businessinsider.com/morgan-stanley-fragile-5-emerging-markets-2013-9>
- Bernanke, Ben. 2005. "The Global Saving Glut and the U.S. Current Account Deficit." Remarks delivered at the Sandridge Lecture, Virginia Association of Economists, Richmond, VA, March 10. <http://www.federalreserve.gov/boarddocs/speeches/2005/200503102/>
- Board of Governors of the Federal Reserve System. 2013. "Flow of Funds," Financial Accounts of the United States, Federal Reserve Statistical Release. <http://www.federalreserve.gov/releases/z1/>
- Bos, Frits. 2007. "The Dutch Fiscal Framework: History, Current Practice and the Role of the CPB." CPB Netherlands Bureau for Economic Policy Analysis Document 150.
- Brahmananda, P.R. 2001. *Money, Income, Prices in 19th Century India*. Mumbai: Himalaya Publishing House.
- Bussière, Matthieu, Gong Cheng, Menzie Chinn, and Noémie Lisack. 2013. "Capital Controls and Foreign Reserve Accumulation: Substitutes or Complements in the Global Financial Crisis?" Paris: Banque de France, March.
- Caballero, Ricardo, and Arvind Krishnamurthy. 2009. "Global Imbalances and Financial Fragility." *American Economic Review* 99(2), pp. 584–588.
- Calvo, Guillermo A. 1991. "The Perils of Sterilization." *IMF Staff Papers* 38(4, December), pp. 921–926.
- Calvo, Guillermo A. 1998. "Capital Flows and Capital-Market Crises: The Simple Economics of Sudden Stops." *Journal of Applied Economics* 1(1, November), pp. 35–54.
- Calvo, Guillermo A. 2012. "On Capital Inflows, Liquidity, and Bubbles." Columbia University, New York.
- Calvo, Guillermo A., Alejandro Izquierdo, Rudy Loo-Kung. 2012. "Optimal Holdings of International Reserves: Self-Insurance against Sudden Stop." NBER Working Paper 18219, July.
- Calvo, Guillermo A., and Enrique G. Mendoza. 1996. "Mexico's Balance-of-Payments Crisis: A Chronicle of a Death Foretold." *Journal of International Economics* 41(November), pp. 235–264.

- Calvo, Guillermo A., and Carmen M. Reinhart. 2002. "Fear of Floating." *Quarterly Journal of Economics* 117(2, May), pp. 379–408.
- Carroll, Christopher, and Olivier Jeanne. 2009. "A Tractable Model of Precautionary Reserves or Net Foreign Assets." NBER Working Paper 15228.
- Claessens, Stijn. 1997. "Estimates of Capital Flight and Its Behavior." *Revista de Análisis Económico* 12(1), pp. 3–34.
- Cordella, Tito, Carlos Végh, and Guillermo Vuletin. 2013. "Reserve Requirements in the Brave New Macropprudential World." Washington, DC: World Bank.
- Eichengreen, Barry, Ricardo Hausmann, and Ugo Panizza. 2005. "The Pain of Original Sin." In *Other Peoples' Money*, eds. B. Eichengreen and R. Hausmann. Chicago: University of Chicago Press, pp. 13–47.
- Eichengreen, Barry, Naeun Jung, Stephen Moch, and Ashoka Mody. 2013. "The Eurozone Crisis: Phoenix Miracle or Lost Decade?" Berkeley Economic History Lab Working Paper 2013-08, May.
- Filardo, Andrew, and James Yetman. 2012. "The Expansion of Central Bank Balance Sheets in Emerging Asia: What Are the Risks?" *BIS Quarterly Review*, June, pp. 47–62.
- Frankel, Jeffrey A., and George Saravelos. 2012. "Are Leading Indicators Useful for Assessing Country Vulnerability? Evidence from the 2008–09 Global Financial Crisis." *Journal of International Economics* 87(2, July), pp. 216–231.
- Frankel, Jeffrey A., Carlos A. Végh, and Guillermo Vuletin. 2013. "On Graduation from Fiscal Procyclicality." *Journal of Development Economics* 100(1, January), pp. 32–47.
- French, Kenneth, and James Poterba. 1991. "Investor Diversification and International Equity Markets." *American Economic Review* 81(2), pp. 222–226.
- Gourinchas, Pierre-Olivier, and Maurice Obstfeld. 2012. "Stories of the Twentieth Century for the Twenty-First." *American Economic Journal: Macroeconomics* 4(1, January), pp. 226–265.
- Hills, Sally, and Ryland Thomas. 2010. "The UK Recession in Context—What Do Three Centuries of Data Tell Us?" Bank of England *Quarterly Bulletin* 2010:Q4.
- International Monetary Fund. 2013a. *Fiscal Monitor*. <http://www.imf.org/external/ns/cs.aspx?id=262>
- International Monetary Fund. 2013b. *International Financial Statistics*. <http://elibrary-data.imf.org/>
- International Monetary Fund. 2013c. *World Economic Outlook*, April and October. <http://www.imf.org/external/pubs/ft/weo/2013/01/weodata/index.aspx>
- Jeanne, Olivier. 2012. "Capital Account Policies and the Real Exchange Rate." NBER Working Paper 18404, September.
- Kaminsky, Graciela L., and Alfredo M. Pereira. 1996. "The Debt Crisis: Lessons of the 1980s for the 1990s." *Journal of Development Economics* 50(1), pp. 1–24.

- Kaminsky, Graciela L., and Carmen M. Reinhart. 1999. "The Twin Crises: The Causes of Banking and Balance of Payments Problems." *American Economic Review* 89(3, June), pp. 473–500.
- Korea Herald*. 2013. "S. Korea Mulling Including Central Bank's Debt in Public Debt." <http://www.koreaherald.com/view.php?ud=20130702000679>
- Lardy, Nicholas. 2008. "Financial Repression in China." Peterson Institute Policy Brief PB 08-8se, September.
- Lardy, Nicholas. 2012. *Sustaining China's Economic Growth after the Global Financial Crisis*. Washington, DC: Peterson Institute for International Economics, January.
- League of Nations. Various years. *World Economic Survey: 1926–1944*. All issues. Geneva: League of Nations.
- Levy-Yeyati, Eduardo, and Federico Sturzenegger. 2007. "Fear of Appreciation." Working Paper Series rwp07-047, Harvard University, John F. Kennedy School of Government.
- Mendoza, Enrique G., and Marco E. Terrones. 2012. "An Anatomy of Credits Booms and Their Demise." Central Bank of Chile, *Journal Economía Chilena* (The Chilean Economy) 15(2, August), pp. 4–32.
- Mohanty, Madhusudan, and Philip Turner. 2006. "Foreign Exchange Reserve Accumulation in Emerging Markets: What Are the Domestic Implications?" Bank for International Settlements, *BIS Quarterly Review*, September 1.
- Obstfeld, Maurice. 1982. "Can We Sterilize? Theory and Evidence." *AEA Papers and Proceedings* 72(2), pp. 45–50.
- Obstfeld, Maurice. 1995. "International Capital Mobility in the 1990s." In *Understanding Interdependence: The Macroeconomics of the Open Economy*, ed. Peter B. Kenen. Princeton, NJ: Princeton University Press.
- Obstfeld, Maurice, Jay C. Shambaugh, and Alan M. Taylor. 2010. "Financial Stability, the Trilemma, and International Reserves." *American Economic Journal: Macroeconomics* 2(2), pp. 57–94.
- Park, Yung Chul. 2005. "A Tale of Two Crises: Korea's Experience with External Debt Management 1979–80 and 1997–98." In *Debt Sustainability and Development Strategies*, UNCTAD, September.
- Reinhart, Carmen M. 2010. "This Time Is Different Chartbook: Country Histories on Debt, Default, and Financial Crises." NBER Working Paper 15815.
- Reinhart, Carmen M. 2013. "Asia Chartbook: Crises, Credit, and Debt, 1835–2013." Harvard University, October. <http://www.carmenreinhart.com/data/browse-by-country/>
- Reinhart, Carmen M., and Vincent R. Reinhart. 1999. "On the Use of Reserve Requirements in Dealing with the Capital-Flow Problem." *International Journal of Finance and Economics* 4(1, January), pp. 27–54.

- Reinhart, Carmen M., and Vincent R. Reinhart. 2009. "Capital Flow Bonanzas: An Encompassing View of the Past and Present." In *NBER International Seminar in Macroeconomics 2008*, eds. Jeffrey Frankel and Francesco Giavazzi. Chicago: Chicago University Press for the NBER, pp. 1–54.
- Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.
- Reinhart, Carmen M., and Kenneth S. Rogoff. 2011. "The Forgotten History of Domestic Debt." *Economic Journal* 121(552, May), pp. 319–350.
- Reinhart, Carmen M., Kenneth S. Rogoff, and Miguel A. Savastano. 2003. "Debt Intolerance." *Brookings Papers on Economic Activity* 34(1), pp. 1–74.
- Reinhart, Carmen M., and M. Belen Sbrancia. 2011. "The Liquidation of Government Debt." NBER Working Paper 16893. Forthcoming in *Economic Policy*, 2014.
- Rodrik, Dani. 2006. "The Social Cost of Foreign Exchange Reserves." *International Economic Journal* 20(3), pp. 253–266.
- Sachs, Jeffrey. 1989. "Social Conflict and Populist Politics in Latin America." NBER Working Paper 2897.
- Schularick, Moritz, and Alan Taylor. 2012. "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles and Financial Crises, 1870–2008." *American Economic Review* 102(2), pp. 1029–1061.
- United Nations. 1948. Department of Economic Affairs, *Public Debt, 1914–1946*. New York: United Nations.
- Warnock, Francis E., and Veronica Caedac Warnock. 2009. "International Capital Flows and U.S. Interest Rates." *Journal of International Money and Finance* 28, pp. 903–919.
- World Bank. 2013. *International Debt Statistics*. Washington, DC. <http://data.worldbank.org/data-catalog/international-debt-statistics>
- Young, Alwyn. 1995. "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience." *Quarterly Journal of Economics* 110(3), pp. 641–680.
- Z/Yen Group. 2013. "The Global Financial Centres Index 14." http://www.longfinance.net/images/GFCI14_30Sept2013.pdf

NOTES

1 See Bussière et al. (2013), Frankel and Saravelos (2012), and Gourinchas and Obstfeld (2012) for new contributions to the analysis of early warnings as well as the comprehensive discussions of the existing literature therein.

2 See also Calvo (2012) on the dynamics, incidence, and time profile of sudden stops.

3 Recall the current account balance equals saving minus investment.

4 The countries are China, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, and Thailand.

5 This growth comparison showing lower growth during the era of high reserves is not at odds with the finding in Bussière et al. (2013) that emerging markets with higher reserves performed better (in terms of output) during the global financial crisis of 2008–09. The period we are comparing spans 26 years (11 years through 1997, and 1998 to 2012); our focus is on the long-term growth performance.

6 In the Kaminsky and Pereira (1996) sample, increases in public and private consumption (as a share of GDP) were of comparable magnitudes.

7 See Claessens (1997) for a comprehensive analysis of the capital flight magnitudes involved.

8 See Reinhart and Sbrancia (2011).

9 See Aizenman and Lee (2007) and Calvo, Izquierdo, and Loo-Kung (2012).

10 Calvo and Reinhart (2002); Aizenman and Lee (2007) find the “mercantilist” motive statistically significant but quantitatively small relative to self-insurance, but their sample does not extend to recent post-subprime years. Jeanne (2012) also emphasizes the fear of floating or, in this particular instance, “fear of appreciation” motive (see Levy-Yeyati and Sturzenegger 2007 for compelling documentation of this tendency in emerging markets for the pre-crisis period).

11 On the use of reserve requirements to sterilize capital inflows see Reinhart and Reinhart (1999) and Cordella, Végh, and Vuletin (2013).

12 This is not to suggest that some declining investment ratios have other important drivers relating to technological change and the transition to a more mature stage of development. We would observe that, by 1991, Japan was considered a mature economy and that Singapore did not lag far behind.

13 If we use a narrower window around the crisis of three or five years, this pattern is even more pronounced and uniform.

14 The individual country series are plotted in Reinhart (2013).

15 For historic dimensions of these credit cycles, see Schularick and Taylor (2012)—Japan is in their sample; for the interaction between capital flows, credit, and crisis (including the nine Asian economies covered here, see Mendoza and Terrones (2012).

16 Denmark is excluded as there is a substantive break in the credit series reported in *International Financial Statistics* in 2000, which needs to be sorted out.

17 In Figure 5, Hong Kong is not combined with Mainland China, as for external debt in Figure 2.

18 For example, the issue of including central bank debt in public sector debt statements is under discussion in Korea (*Korea Herald* 2013).

19 Badkar (2013).

20 Reinhart and Sbrancia (2011).

21 Reinhart (2013) presents a pictorial history through the time series for all the categories of debt for which data are available.

22 See International Monetary Fund (2013a).

23 While the United Kingdom public debt data are available from 1692, the nominal GDP data prior to 1830 is of a more tentative nature (see Hills and Thomas 2010); as such the debt ratios immediately following the Napoleonic Wars are to be interpreted with care.

24 The *Statistical Abstract Relating to British India*, various volumes spanning 1840 to 1920, quantify the transfer of treasure to the United Kingdom, while Bos (2007) chronicles the use of revenue from Indonesia directed to reduce Dutch public debt.

25 See Reinhart and Rogoff (2009) and Reinhart and Sbrancia (2011).

26 As is discussed in that paper, the estimate is a conservative lower bound.

27 Commodity price booms and busts were also associated with larger-than-normal fluctuations in reserves.

28 Standard textbook definitions of floating exchange rates do not involve foreign exchange market intervention, and a common simplifying assumption is that reserve changes are zero.

29 See Reinhart and Reinhart (1999) and Cordella, Végh, and Vuletin (2013).

30 See for instance, Mohanty and Turner (2006) and Rodrik (2006).

31 See Kaminsky and Reinhart (1999) and Park (2005) for a comparison of the two Korean crises and Athukorala (2010), who reviews the mid-1980s and 1997–98 crises in Malaysia and the turbulence of 2008.

32 The decline in investment by 5 percentage points in a period of three years is not far off from the 5.4 percent decline for the United States and Europe in the five years after the crisis (Table 2).

33 This has not been the case in the most recent period of heavy financial repression in China, as discussed in Lardy (2008).

34 Obstfeld (1995) provides a comprehensive tour of this literature and Obstfeld, Shambaugh, and Taylor (2010) also deal with some of these issues.