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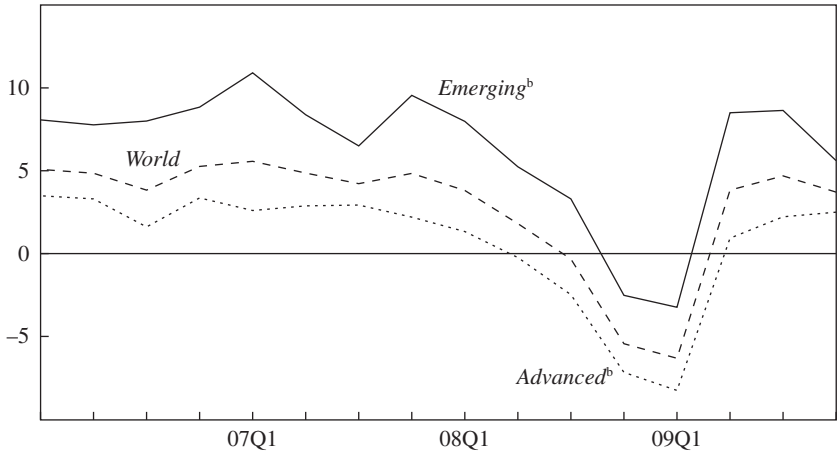
The Initial Impact of the Crisis on Emerging Market Countries

ABSTRACT To understand the diverse impact of the crisis across emerging market countries, we explore the role of two shocks—the collapse in trade and the sharp decline in financial flows—in the transmission of the crisis from the advanced economies. We first develop a simple open economy model, which allows for imperfect capital mobility and potentially contractionary effects of currency depreciation due to foreign debt exposure. We then look at the cross-country evidence. The data suggest a strong role for both trade and financial shocks. Perhaps surprisingly, the data give little econometric support for a central role of either reserves or exchange rate regimes. We end by presenting case studies for Latvia, Russia, and Chile.

One of the striking characteristics of the financial crisis that originated in the United States is how quickly and how broadly it spread to the rest of the world. When the crisis intensified, first in the United States and then in Europe, in the fall of 2008, emerging market countries thought they might escape more or less unharmed. There was talk of decoupling. This was not to be.

Figure 1 shows growth rates of GDP for a group of advanced economies and a group of emerging market countries from the first quarter of 2006 through 2009. The two series have moved largely in tandem. In the fourth quarter of 2008 and the first quarter of 2009, economic growth in the advanced group averaged −7.2 percent and −8.3 percent, respectively (at annual rates). In the same two quarters, growth in the emerging market countries was −1.9 percent and −3.2 percent, respectively. As the figure shows, the better numbers for the emerging market countries reflect their

Figure 1. Growth in GDP in Advanced and Emerging Market Economies, 2006–09



Sources: IMF, Global Data Source, and IMF staff estimates.

a. Quarter over quarter at an annual rate. Series are averages weighted by GDP at purchasing power parity (PPP).

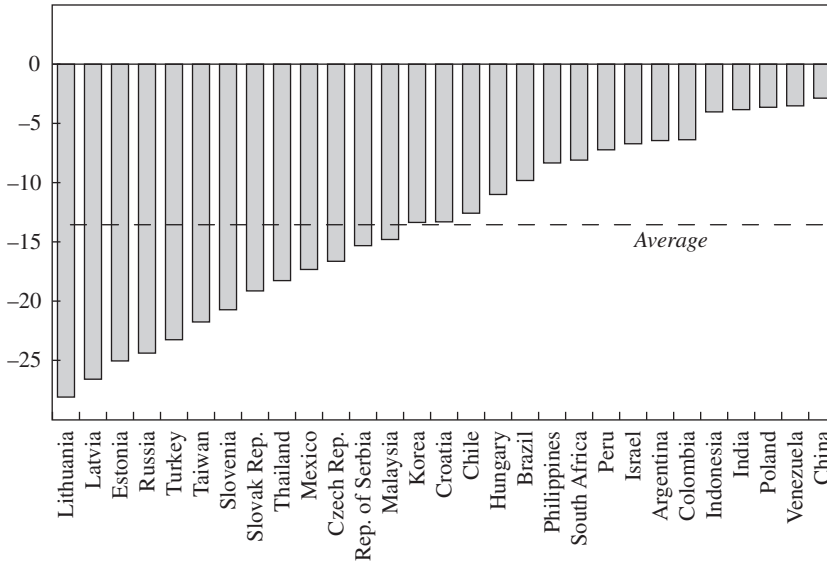
b. The figure is based on 17 advanced economies (including the euro area as a single economy) and 25 emerging market countries. See footnote 1 for the list of emerging market countries.

higher underlying average growth rate. Growth rates for both groups during those two quarters were roughly 10 percentage points below their 2007 value.

The parallel performance of the two groups in figure 1 hides substantial heterogeneity within each group. Figure 2 shows, for a sample of 29 emerging market countries, the actual growth rate for the semester composed of the two quarters with large negative growth, 2008Q4 and 2009Q1, minus the April 2008 International Monetary Fund (IMF) forecast growth rate over the corresponding period—"unexpected growth" in what follows.[1] All the countries in the sample had negative unexpected growth, but with

1. The countries and their abbreviations are as follows: Argentina (ARG), Brazil (BRA), Chile (CHL), China (CHN), Colombia (COL), Croatia (HRV), Czech Republic (CZE), Estonia (EST), Hungary (HUN), India (IND), Indonesia (IDN), Israel (ISR), Republic of Korea (KOR), Latvia (LVA), Lithuania (LTU), Malaysia (MYS), Mexico (MEX), Peru (PER), Poland (POL), Philippines (PHL), Russia (RUS), Republic of Serbia (SER), Slovak Republic (SVK), Slovenia (SVN), South Africa (ZAF), Taiwan Province of China (TWN), Thailand (THA), Turkey (TUR), and Venezuela (VEN). In figure 1, the series for emerging market countries includes Bulgaria, Pakistan, Romania, and Ukraine (not in our sample) but excludes HRV, CZE, ISR, SER, SVK, SVN, and TWN. Some of the emerging market countries listed here are classified as "advanced economies" in the IMF's *World Economic Outlook.*

Figure 2. Unexpected Growth in GDP in Emerging Market Countries, 2008Q3–2009Q1



Sources: IMF, Global Data Source and World Economic Outlook; Eurostat.
a. Actual growth in GDP over the two quarters 2008Q4 and 2009Q1, seasonally adjusted at an annual rate, minus April 2008 IMF forecast for the same period.

considerable variation across them. In seven countries, including some as diverse as Latvia and Turkey, growth was lower than forecast by more than 20 percentage points (again at an annual rate); at the same time, in five countries, China and India most notable among them, the unexpected growth shortfall was smaller than 5 percentage points. (Looking at growth rates themselves, or at deviations of growth rates from trend, gives a very similar ordering.)

Figure 2 motivates the question we take up in this paper, namely, whether one can explain the diverse pattern of growth across emerging market countries during the crisis. The larger goal is an obvious one: to better understand the role and the nature of trade and financial channels in the transmission of shocks in the global economy.

We focus on emerging market countries. We leave out low-income countries, not on the basis of their economic characteristics, but because they typically lack the quarterly data we think are needed for an informed analysis of the impact effects of the crisis. We focus only on the acute phase of the crisis, namely, 2008Q4 and 2009Q1. Looking at later quarters, which

in most countries are characterized by positive growth and recovery, would be useful, including for understanding what happened in the acute phase. But for reasons of data and scope, we leave this to further research.[2]

We start in section I by presenting a simple model. It is clear that emerging market countries were affected primarily by external shocks, mainly through two channels. The first was a sharp decrease in their exports and, in the case of commodity producers, a sharp drop in their terms of trade. The second was a sharp decrease in net capital flows. Countries were exposed in various ways: some were very open to trade, others not; some had large short-term external debts or large current account deficits, or both, others not; some had large foreign currency debts, others not. They also reacted in different ways, most relying on some fiscal expansion and some monetary easing, some using reserves to maintain the exchange rate, others instead letting it adjust. The model we provide is little more than a placeholder, but it offers a useful framework for discussing the various channels and the potential role of policy, and for organizing the empirical work.

We then turn to the empirical evidence, which we analyze through econometrics, in section II, as well as case studies. We start with simple cross-country specifications, linking unexpected growth over the two quarters to various trade and financial variables. With at most 29 observations in each regression, econometrics can tell us only so much. But the role of both channels, trade and financial, comes out clearly. The most significantly robust variable is short-term external debt, suggesting a central role for the financial channel. Trade variables also clearly matter, although the relationship is not as tight as one might have expected. Starting from this simple specification, we explore a number of issues, such as the role of reserves. Surprisingly, we find little econometric evidence in support of the hypothesis that high reserves limited the decline in output in the crisis.

We turn finally in section III to case studies, looking at Latvia, Russia, and Chile. Latvia was primarily affected by a financial shock, Chile mostly by a sharp decrease in the terms of trade, and Russia by both strong financial and terms of trade shocks. Latvia and Russia suffered large declines in

2. Other studies that attempt to explain differences across countries in the impact of the crisis include Lane and Milesi-Ferretti (2009), Giannone and others (2009), Berkmen and others (2009), and Rose and Spiegel (2009a, 2009b). These studies typically use annual data, either for 2008 alone or for 2008 and 2009, and a larger sample of countries than we do. For differences across emerging European countries, see Bakker and Gulde (2009) and Berglof, Korniyenko, and Zettlemeyer (2009). A parallel and larger effort within the IMF (2010), with more of a focus on policy implications, is currently being conducted. We relate our results to the various published studies below.

output. The effect on Chile was milder. Together, the country studies provide a better understanding of the ways in which initial conditions, together with the specific structure of the domestic financial sector, the specific nature of the capital flows, and the specific policy actions, shaped the effects of the crisis in each country.

I. A Model

To organize our thoughts, we start with a standard short-run, open economy model, modified, however, in two important ways. First, to capture the effects of shifts in capital flows, we allow for imperfect capital mobility. Second, we allow for potentially contractionary effects of a depreciation stemming from exposure to foreign currency debt.

The model is shamelessly ad hoc, static, and with little role for expectations.[3] Our excuse for its ad hoc nature is that the micro foundations for all the complex mechanisms we want to capture are not yet available, and even if available would make for a complicated model. Our excuse for the lack of dynamics is that we focus on the effects of the shocks immediately upon impact, rather than on their dynamic effects. Our excuse for ignoring expectations is that the direct effect of lower exports and lower capital flows probably dominated expectational effects, but this excuse is admittedly poor; as we will show, an initial quasi peg on the exchange rate, coupled with anticipations of a future depreciation, initially aggravated capital outflows in Russia in the fall of 2008, making the crisis worse.

The model is composed of two relationships, one characterizing balance of payments equilibrium, and the other goods market equilibrium.

I.A. Balance of Payments Equilibrium

Balance of payments equilibrium requires that the trade deficit be financed either by net capital flows or by a change in reserves. Taking capital flows first, we consider three different interest rates:

—the policy (riskless) interest rate, denoted by r (given our focus on the short run, we assume constant domestic and foreign price levels, and thus zero domestic and foreign inflation, and so we make no distinction between nominal and real interest rates)

—the interest rate at which domestic borrowers (firms, people, and the government; we make no distinction among them in the model) can

3. A model in the same spirit as ours, but with more explicit micro foundations and a narrower scope, is developed in Céspedes, Chang, and Velasco (2004).

borrow, denoted by $\hat{r}$. Assume that $\hat{r} = r + x$, where x is the risk premium required by domestic lenders. Think of the United States as the foreign country, and thus of the dollar as the foreign currency. We assume that the exchange rate is expected to be constant, so $\hat{r}$ is also the domestic dollar interest rate.[4]

—the U.S. dollar interest rate, that is, the rate at which foreign investors can lend to foreign borrowers abroad, denoted r^*. $\hat{r} - r^*$ is usually referred to as the EMBI (emerging markets bond index) spread.

Assume that all foreign borrowing is in dollars, so that foreign investors can choose between foreign and domestic dollar-denominated assets. Let D be debt vis-à-vis the rest of the world, expressed in dollars. Assume then that net capital inflows (capital inflows minus capital outflows and interest payments on the debt), expressed in dollars and denoted by F, are given by

$$F = F\left[\hat{r} - r^* - (1+\theta)x, D\right], \delta F/\delta\left[\hat{r} - r^* - (1+\theta)x\right] > 0,$$
$$\delta F/\delta D < 0, \theta > 0.$$

Net capital inflows thus depend on the EMBI spread, adjusted for a risk premium. The assumption that θ is positive captures the home bias of foreign investors, who are assumed to be the marginal investors.[5] When risk increases, foreign investors, if they are to maintain the same level of capital flows, require a larger increase in the premium than domestic investors.

Net capital inflows also depend, negatively, on foreign debt. To think about the dependence of F on D, assume, for example, that a proportion a of the debt is short-term debt (that is, debt due this period) and that the rollover rate is given by b. Then, in the absence of other inflows, net capital flows are given by $-[a(1 - b) + \hat{r}]D$. Thus the higher the debt, or the higher the proportion of short-term debt, or the lower the rollover rate, the larger net capital outflows will be.

4. If the exchange rate were expected to change, then the domestic dollar rate would be given by $\hat{r}$ plus expected depreciation. This, in turn, would introduce a dependence of net flows, considered below, on the expected change in the exchange rate.

5. As the country studies will show, the increase in capital outflows by foreigners was sometimes offset by a symmetric increase in capital inflows by domestic residents (such as in Chile), and sometimes instead reinforced by an increase in capital outflows by domestic residents (such as in Russia). The case where the increase in capital outflows was more than offset by the increase in capital inflows can be captured in our model by assuming a negative value for θ. A more thorough analysis would require explicitly introducing gross flows by domestic and foreign investors separately, each group with its own perception of risks at home and abroad.

Using the relationship between $\hat{r}$ and r, net capital flows are given by

$$F = F\left(r - r^* - \theta x, D\right). \tag{1}$$

For a given policy rate and a given dollar interest rate, an increase in perceived risk or an increase in home bias reduces net capital flows.

We turn next to net exports. We normalize both the domestic and the foreign price levels, which we have assumed to be constant, to equal 1. Let e be the nominal exchange rate, defined as the price of domestic currency in dollars or, equivalently, given our normalization, the price of domestic goods in terms of U.S. goods. An increase in e then represents a (nominal and real) appreciation. Assume that net exports, in terms of domestic goods, are given by

$$NX = NX\left(e, Y, Y^*\right), \delta NX/\delta Y < 0, \delta NX/\delta Y^* > 0.$$

A decrease in domestic economic activity leads to a decrease in imports and an improvement in net exports; a decrease in foreign activity leads to a decrease in exports and thus a decrease in net exports. Although the Marshall-Lerner (ML) condition is likely to hold over the medium run, it may well not hold over the short run (again, we are looking at the quarter of the shock and the quarter just following the shock)[6]; thus we do not assign either a positive or a negative sign to the effect of a depreciation on net exports.

In a number of commodity-exporting countries, the adverse trade effects of the crisis took the form of a large decrease in commodity prices rather than a sharp decrease in exports; for our purposes, these shocks have similar effects. Thus we do not introduce terms of trade shocks formally in the model.

Let R be the level of foreign reserves, expressed in dollars, or equivalently, in terms of foreign goods. The balance of payments equilibrium condition is thus given by

$$F\left(r - r^* - \theta x, D\right) + eNX\left(e, Y, Y^*\right) = \Delta R. \tag{2}$$

6. The Marshall-Lerner condition holds that, given domestic and foreign output, a depreciation improves the trade balance. Some analytical results on the short-run effects of an exchange rate change on the trade balance are given in von Furstenberg (2003).

This implies that a trade deficit must be financed either through net capital inflows or through a decrease in reserves.

I.B. Goods Market Equilibrium

Assume that equilibrium in the goods market is given by

$$Y = A\left(Y, r + x, D/e\right) + G + NX\left(e, Y, Y^*\right), \tag{3}$$

where A is domestic private demand and G is government spending. A depends positively on income Y, negatively on the domestic borrowing rate $r + x$, and negatively on foreign debt expressed in terms of domestic goods D/e. This last term captures foreign currency exposure and balance sheet effects: the higher the foreign debt (which we have assumed to be dollar debt), the larger the increase in the real value of debt from a depreciation, and the stronger the adverse effect on output.

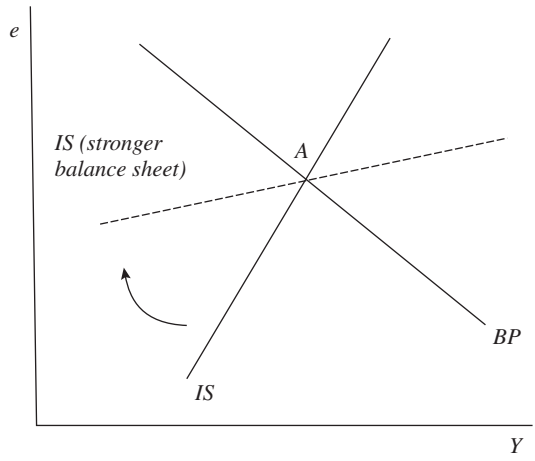
Note that the net effect of the exchange rate on demand is ambiguous. A depreciation may or may not increase net exports, depending on whether the ML condition holds. A depreciation decreases domestic demand, through balance sheet effects. If the ML condition holds and the balance sheet effect is weak, the net effect of a depreciation is to increase demand. But if the ML condition fails, or if it holds but is dominated by the balance sheet effect, the net effect of a depreciation is to decrease demand. A depreciation is then contractionary.

I.C. Equilibrium and the Effects of Adverse Financial and Trade Shocks

It is easiest to characterize the equilibrium graphically in the exchange rate–output space (figure 3). There are three possible configurations, depending on whether the ML condition is satisfied (this determines the slope of the balance of payments curve, BP), and whether, even if the ML condition is satisfied, the net effect of a depreciation is expansionary or contractionary (this determines the slope of the goods market curve, IS). We draw the BP and IS curves in figure 3 under the assumptions that the ML condition is satisfied but that the net effect of a depreciation is contractionary. We discuss the implications of the other cases below.

For given exogenous variables, the balance of payments equation implies a negative relationship between the exchange rate e and output Y. As capital flows depend neither on e nor on Y, for unchanged reserves ($\Delta R = 0$) the BP relationship implies that the trade balance must remain constant. Under the assumption that the ML condition is satisfied, the BP curve is downward sloping: an increase in output, which leads to a deterio-

Figure 3. Output and the Exchange Rate in Equilibrium



Source: Authors' model described in the text.

ration of the trade balance, must be offset by a depreciation, which improves the trade balance.[7]

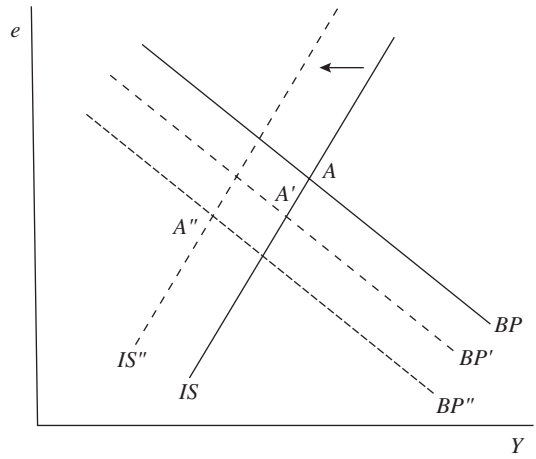
For given exogenous variables, the goods market equilibrium equation implies a positive relationship between the exchange rate e and output Y. Under our assumption that the positive effect of a depreciation on net exports is dominated by the adverse balance sheet effect on private domestic demand, a depreciation leads to a decrease in output. The IS curve is thus upward sloping. The larger the foreign debt, the stronger the balance sheet effect and the stronger the adverse effect of a depreciation on output, and thus the flatter the IS curve.

Equilibrium is given by point A in figure 3. Having characterized the equilibrium, we can now look at the effects of different shocks and the role of policy.

One can think of countries during the crisis as being affected through two main channels: a financial channel, either through an increase in the financial home bias of foreign investors θ, or through an increase in perceived risk x, or both; and a trade channel, through a sharp decrease in foreign output Y^*, and thus a decrease in exports. We consider each of these in turn.

7. Differentiation is carried out around a zero initial trade balance.

Figure 4. Effects of Financial Shocks on Output and the Exchange Rate



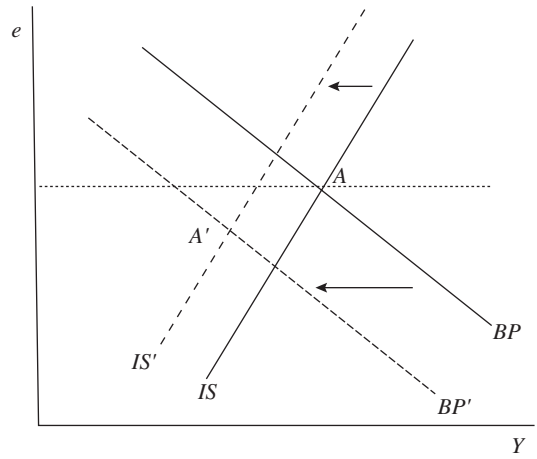
Source: Authors' model described in the text.

Consider first an *increase in home bias.* This was clearly a central factor in the crisis, as the need for liquidity led many investors and financial institutions in advanced economies to reduce their foreign lending. The effect of an increase in θ is shown in figure 4. For a given policy rate and unchanged reserves, net capital flows decrease, and so must the trade balance. This requires a decrease in output at a given exchange rate, and so the BP curve shifts to the left. The IS curve remains unchanged, and so the new equilibrium is at point A′. The currency depreciates (the exchange rate, as we have defined it, falls), and output decreases. The stronger the balance sheet effect, the flatter the IS curve, and thus the larger the decrease in output.

Consider next an *increase in perceived risk,* surely another important factor in the crisis.[8] Indeed, in many cases it is difficult to distinguish how much of the outflow was due to increased home bias and how much was due to an increase in perceived risk. The analysis is very similar in either case, with one difference: whereas an increase in home bias directly affects only net capital flows, an increase in perceived risk directly affects both net capital flows and domestic demand. A higher risk premium increases the domestic borrowing rate, leading to a decrease in domestic demand and, through that channel, a decrease in output. Thus both the IS and the

8. See, for example, Kannan and Köhler-Geib (2009).

Figure 5. Effects of a Trade Shock on Output and the Exchange Rate



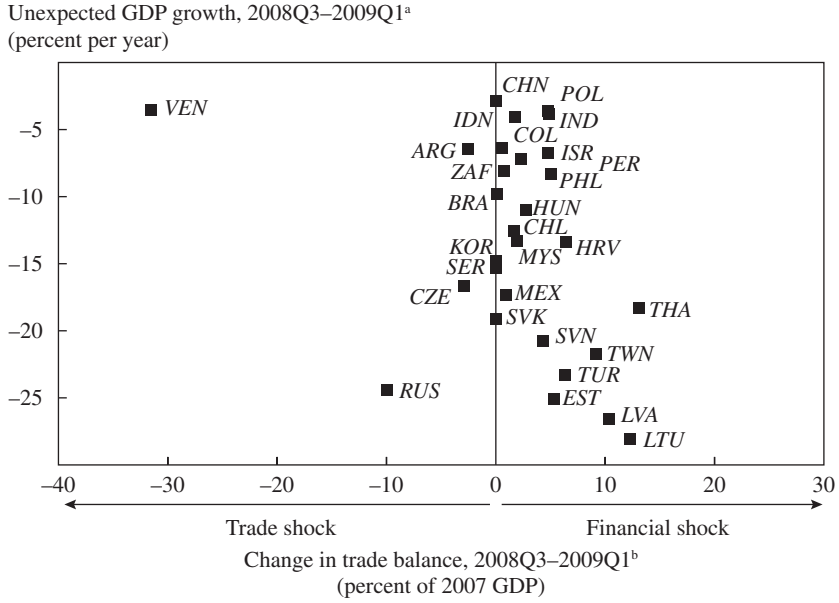
Source: Authors' model described in the text.

BP curves shift to the left, and the equilibrium moves from point A to point A″. Output unambiguously decreases, and the exchange rate may rise or fall. The higher the level of debt, the flatter the IS curve, and the larger the decrease in output.

Finally, consider an adverse trade shock, in the form of a *decrease in foreign output.* Again, sharp decreases in exports (and, for commodity producers, large adverse terms of trade shocks) were a central factor in the crisis. Under our stark assumption that net capital flows do not depend on the exchange rate and, at this stage, the maintained assumption of unchanged policy settings, the BP relationship implies that net capital flows must remain the same, and so, by implication, must net exports. At a given exchange rate, this requires a decrease in imports, and thus a decrease in output. The BP curve shifts to the left. The IS curve also shifts, and it is easy to verify that, for a given exchange rate, it shifts by less than the BP curve. In figure 5 the equilibrium moves from point A to point A′. Output is lower, and the exchange rate falls. Here again, the higher the debt level, the flatter the IS curve, and the larger the adverse effect of the trade shock on output.

Note that in this model both types of financial shock—an increase in home bias and an increase in risk or uncertainty—force an improvement in the trade balance. Under our assumptions and in the absence of any policy reaction, our model implies that trade shocks have no effect on the trade

Figure 6. Change in the Trade Balance and Unexpected GDP Growth in Emerging Market Countries



Sources: IMF, Global Data Source and *World Economic Outlook*; Eurostat.
a. Defined as in figure 2.
b. Seasonally adjusted, annualized change.

balance. More realistically, if we think that part of the trade deficit is financed through reserve decumulation, trade shocks do lead to a deterioration of the trade balance. This suggests a simple examination of the data, looking at the distribution of trade balance changes across countries. This is done in figure 6, which plots unexpected GDP growth over 2008Q3–2009Q1 against the change in the trade balance as a percentage of 2007 GDP. As crude as it is, the figure suggests a dominant role for financial shocks in most countries, in particular in some of the Baltic countries, with trade shocks playing an important role in Venezuela and Russia (in both cases more through terms of trade effects than through a sharp drop in net exports).

We have so far looked at only one of the equilibrium configurations. Next we briefly describe the other two.

Consider the case where the ML condition holds, so that a depreciation improves the trade balance, and the balance sheet effects are weak, so that a

depreciation is expansionary.[9] In this case an increase in home bias actually *increases output.* The reason is simple: absent a policy reaction, lower capital flows force a depreciation, and the depreciation increases demand and output. This is a very standard result, but one that seems at odds with reality, probably because lower capital flows affect demand through channels other than the exchange rate. Indeed, if the adverse capital flows also reflect in part an increase in perceived risk, the effect on output becomes ambiguous: the favorable effects of the depreciation may be more than offset by the adverse effect of higher borrowing rates on domestic demand. Trade shocks, just as in the case examined above, lead to a decrease in output.

Consider finally the case where the ML condition does not hold, so that a devaluation leads to a deterioration of the trade balance, and the balance sheet effects are strong, so that a devaluation is contractionary.[10] In this case all the previous results hold, but the decrease in output and the depreciation effects are even stronger. Adverse shocks can lead to very large adverse effects on output, and very large depreciations. Indeed, a further condition, one that puts bounds on the size of the balance sheet effect and the violation of the ML condition, is needed to get reasonable comparative statics.[11]

I.D. The Role and the Complexity of Policies

The analysis so far has assumed unchanged policies. In reality, one of the characteristics of this crisis was the active use of monetary and fiscal policies. Our model allows us to think about the effects of interest rate and exchange rate policies—that is, of using the policy interest rate, or reserve decumulation, or both—and of fiscal policy. A full taxonomy of the effects of each policy in each of the configurations is beyond the scope of this paper. The main insights, and in particular a sense of the complexity of the situation confronting policymakers in this environment, can, however, be given easily.[12]

9. In this case both the IS curve and the BP curve are downward sloping. The IS curve is necessarily the steeper of the two.

10. In this case both the IS curve and the BP curve slope upward.

11. That condition (which is always satisfied if the ML condition holds) is the following: $NX_e < [(A_D D/e^2)NX_Y]/(1 - A_Y)$, where A is domestic private demand and NX is net exports. Graphically, with the exchange rate plotted on the vertical axis and output on the horizontal axis, this requires that the slope of the (upward-sloping) IS curve be less than that of the (upward-sloping) BP curve.

12. Much of this complexity will not surprise those familiar with the earlier Latin American and Asian crises.

Return to the case of an increase in perceived risk, which, in the absence of a policy response, leads to a decrease in net capital flows, a depreciation, and, we shall assume, a decrease in output (which we argued is the most likely outcome). One policy option is to increase the policy interest rate, thus reducing capital outflows but also adversely affecting domestic demand. If the elasticity of flows to the domestic dollar interest rate is small, which appears to be the case in financial crises, the net effect is likely to decrease rather than increase output. If reserves are available, using them to offset the decrease in capital flows, while sterilizing so as to leave the policy rate unchanged, can avoid the depreciation. If a depreciation would be contractionary, this is a good thing. But the direct effect of higher perceived risk on the domestic borrowing rate, and thus on domestic demand, remains, and so output still declines. Thus, to maintain output, sterilized intervention must be combined with expansionary fiscal policy.

Consider next a decrease in foreign output, which, in the absence of a policy response, leads to a depreciation at home and a decrease in domestic output. An increase in the policy rate, to the extent that it increases net capital flows, allows for a smaller depreciation and thus less adverse balance sheet effects. But a smaller depreciation also leads to lower net exports, and a higher policy rate leads to lower domestic demand. The net effect of these three forces may well be a larger decrease in output. To the extent that reserves are available, sterilized intervention avoids the adverse effect of a higher policy rate on output, but the lower net exports may still lead to a decrease in output. In that case, to maintain output, sterilized intervention needs again to be used in conjunction with fiscal policy.

If the policy implications seem complicated, it is because they are. Whether, when faced with a given shock, a country is better off maintaining its exchange rate depends, among other factors, on the tools it uses—the policy rate or reserve decumulation—and the strength of the balance sheet effects it is trying to avoid, and thus the level of dollar-denominated liabilities.

In this context it is useful to note that foreign debt affects the adjustment in two ways. We have focused so far on the first, through balance sheet effects on spending. What matters there is the total amount of foreign currency–denominated debt. The second is through the effects of the foreign debt on the change in capital flows. What matters here is the amount of debt that needs to be refinanced in the short run. The effect then depends on whether, for a given financial shock—be it an increase in home bias or an increase in uncertainty—a higher initial debt leads to a larger decrease

in capital flows. Such a second, cross-derivative effect is indeed likely. Recall our earlier example, which showed how debt is likely to affect capital flows, and suppose that an increase in home bias leads investors to decrease the rollover rate. In this case the larger the debt, the larger will be the decrease in capital flows, and the more drastic the required trade balance adjustment. By a similar argument, the larger the current account deficit, and thus the larger the capital flows before the crisis, the larger the required trade balance adjustment.

To summarize: The model has shown how adverse financial and trade shocks are all likely to decrease output, while having different effects on the current account balance. Combinations of reserve decumulation and fiscal expansion can help reduce the decrease in output, but to what extent they can be used clearly depends on the initial level of reserves and on the fiscal room for maneuver. The model also suggests a number of interactions between initial conditions and the effects of the shocks on output. Larger foreign debt, in particular, both through its implications for net capital flows and through balance sheet effects, is likely to amplify the effects of the shocks. With the model and its implications as a rough guide, we now turn to the empirical evidence.

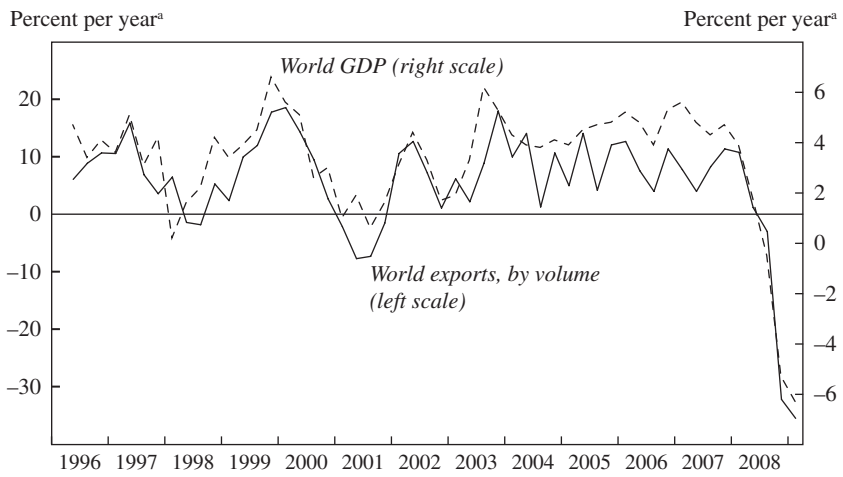
II. Econometric Evidence

The evidence points to two main shocks, to trade and to financial flows. Although our focus is on whether we can explain differences across countries, it is useful to start by looking at the global picture.

II.A. The Collapse of Global Trade and Capital Flows

Figure 7 plots growth in the volume of world exports alongside growth in world output from 1996Q1 to 2009Q2. It reveals in striking fashion the parallel collapse of both output and trade during the crisis, but also that their co-movement in the crisis is not unusual. This second observation has already been the subject of much controversy and substantial research. For the two quarters we are focusing on, growth of world output was −6 percent, and growth of world exports was −30 percent (both at annual rates), implying an elasticity of around 5. The question is whether this elasticity is unusually large, and if so, why. Historical evidence suggests that this elasticity has been increasing over time, from around 2 in the 1960s to close to 4 in the 2000s (using data up to 2005; Freund 2009, *World Economic Outlook* 2009). This suggests that the response of trade to output in this crisis was larger than expected, but not much larger.

Figure 7. Growth in World Output and World Trade, 1996–2009



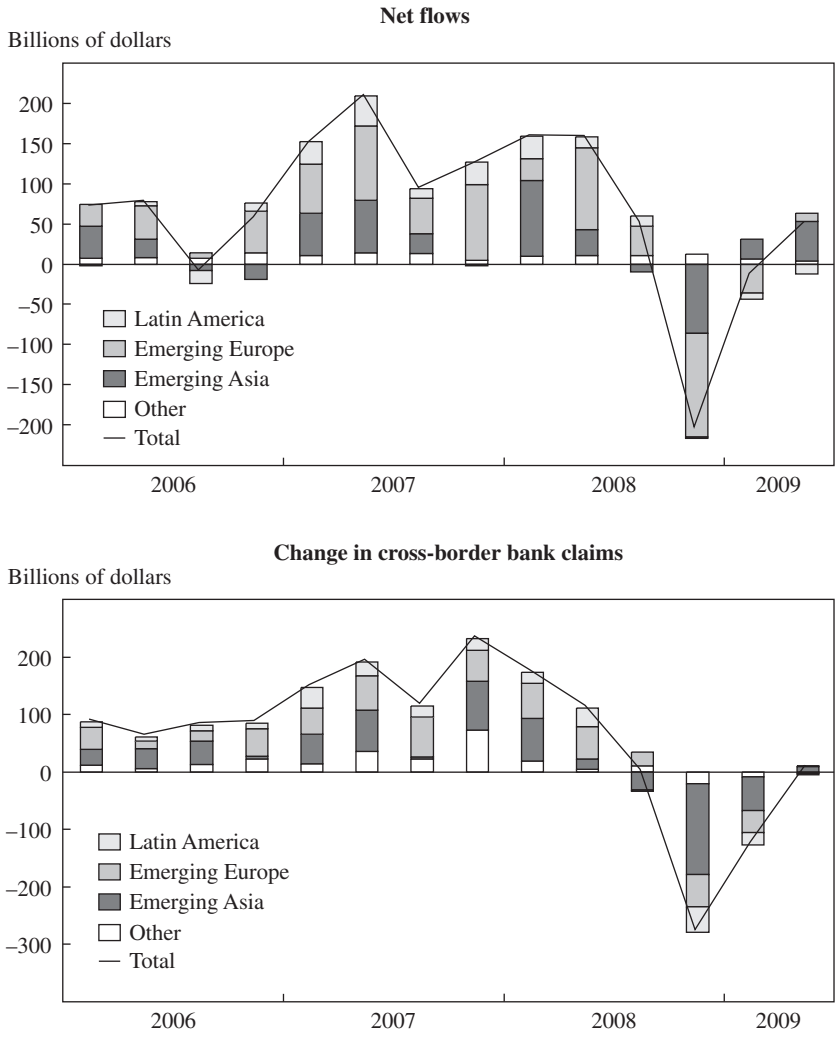
Sources: Netherlands CPB Trade Monitor; IMF, Global Data Source.
a. Quarter over quarter, at an annual rate.

Three main hypotheses for why the response was larger have been explored. The first invokes constraints on trade finance. The second involves composition effects: the large increase in uncertainty that characterized the crisis may have led to a larger decrease in durables consumption and in investment than in typical recessions. Because both of these components have a high import content, the effect on imports was larger for a given decrease in GDP. The third hypothesis relates to the presence of international production chains and the behavior of inventories. High uncertainty led firms to cut production and rely more on inventories of intermediate goods than in other recent recessions, leading to a larger decrease in imports.[13] We read the evidence as mostly supportive of the last two explanations.

The top panel of figure 8 plots net private capital flows, and the bottom panel the change in cross-border bank liabilities, for various regional subgroupings of emerging market countries, from 2006Q1 to 2009Q2. The figure documents the sharp downturn of net flows, from large and positive before the crisis to large and negative during the period we are focusing

13. On trade finance see Auboin (2009). On composition effects see Levchenko, Lewis, and Tesar (2009), Anderton and Tewolde (2010), and Yi, Bems, and Johnson (2009). On inventory adjustment see Alessandria, Kabosky, and Midrigan (2009).

Figure 8. Capital Flows to Emerging Market Countries, 2006–09[a]



Sources: IMF, Balance of Payments Statistics; Bank for International Settlements.
a. Excludes changes in reserves and IMF lending.

on. It also shows the sharp differences across regions, with the brunt of the decrease affecting emerging Europe, and to a lesser extent emerging Asia.

II.B. A Benchmark Specification: Growth, Trade, and Debt

Having documented the global pattern, we now turn to the heterogeneity of country outcomes. We focus on the same 29 emerging market countries as before. The sample is geographically diverse, covering parts of Central and Eastern Europe, emerging Asia, Latin America, and Africa.[14]

Our benchmark specification focuses on the relationship of unexpected growth (the forecast error for output growth during the semester composed of 2008Q4 and 2009Q1) to a simple trade variable and a simple financial variable. Using the unexpected component of growth allows us to separate out the impact of the crisis from domestic trends that were already in place leading up to 2008Q4.[15]

We consider two trade variables. The first captures trade exposure, defined as the export share of GDP (in percent) in 2007. More open economies are likely to be exposed to a larger trade shock. The second is unexpected partner growth, defined as the export-weighted average of actual growth in the country's trading partners, minus the corresponding forecast, scaled by the export share in GDP. For a given export share, the worse the output performance of the countries to which a country exports, the worse the trade shock.[16]

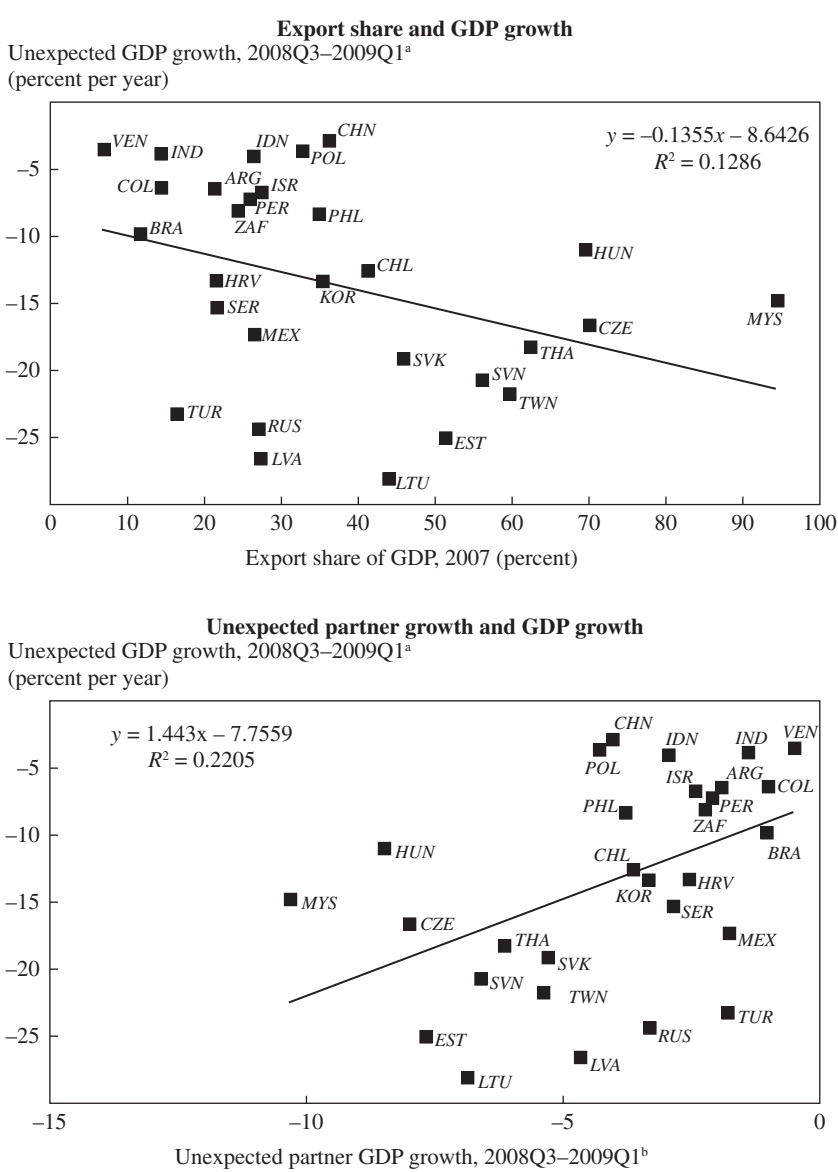
Figure 9 shows scatterplots of unexpected GDP growth against the export share (top panel) and against unexpected partner growth (bottom panel).

14. The sample is the union of all countries classified as "emerging and developing" in the *World Economic Outlook* (WEO) and those classified as either emerging markets or frontier markets in Standard & Poor's Emerging Markets Database (EMDB) for which we have quarterly GDP data and quarterly IMF forecasts of GDP.

15. We have also explored the relationship using two larger datasets. The first is a set of 33 emerging market countries for which quarterly data on GDP are available but forecasts are missing in some cases; in that exercise we used de-meaned growth as the dependent variable, constructed as growth minus mean growth over 1995–2007. The second is a set of 36 emerging market countries for which quarterly data on industrial production can be used to create an interpolated series for quarterly GDP. The results, available in an online appendix (www.brookings.edu/economics/bpea, under "Conferences and Papers"), are largely similar to those presented here.

16. A caveat: if exports to another country are part of a value chain, and thus later reexported, what matters is not so much the growth rate of the first importing country, but the growth rate of the eventual country of destination. That this is relevant is illustrated by the case of Taiwan, whose exports to China are largely reexported to other markets. The decrease in Taiwan's exports to China in 2008Q4 was 50 percent (at an annual rate), much larger than can be explained by the mild slowdown in growth in China during that quarter.

Figure 9. Unexpected GDP Growth, Export Share, and Unexpected Partner Growth in Emerging Market Countries, 2008Q3–2009Q1[a]



Sources: IMF, Global Data Source and *World Economic Outlook*; Eurostat. and authors' calculations.
a. Unexpected growth is defined as in figure 2.
b. Scaled by the export share of 2007 GDP; data are seasonally adjusted at an annual rate.

The fit with the export share is poor, but that with unexpected partner growth is stronger. A cross-country regression of the latter delivers an R^2 of 0.22 and implies that a decrease in unexpected partner growth by 1 percentage point is associated with a decrease in domestic unexpected growth of about 1.4 percentage points.[17]

We consider two financial variables, both of which aim at capturing financial exposure. The first is the ratio of short-term foreign debt to GDP in 2007. Short-term debt is defined as liabilities coming due in the following 12 months, including long-term debt with a remaining maturity of 1 year or less. The second is the ratio of the current account deficit to GDP for 2007. The rationale, from our model, is that the larger the initial short-term debt, or the larger the initial current account deficit, the larger the likely adverse effects of a financial shock.[18]

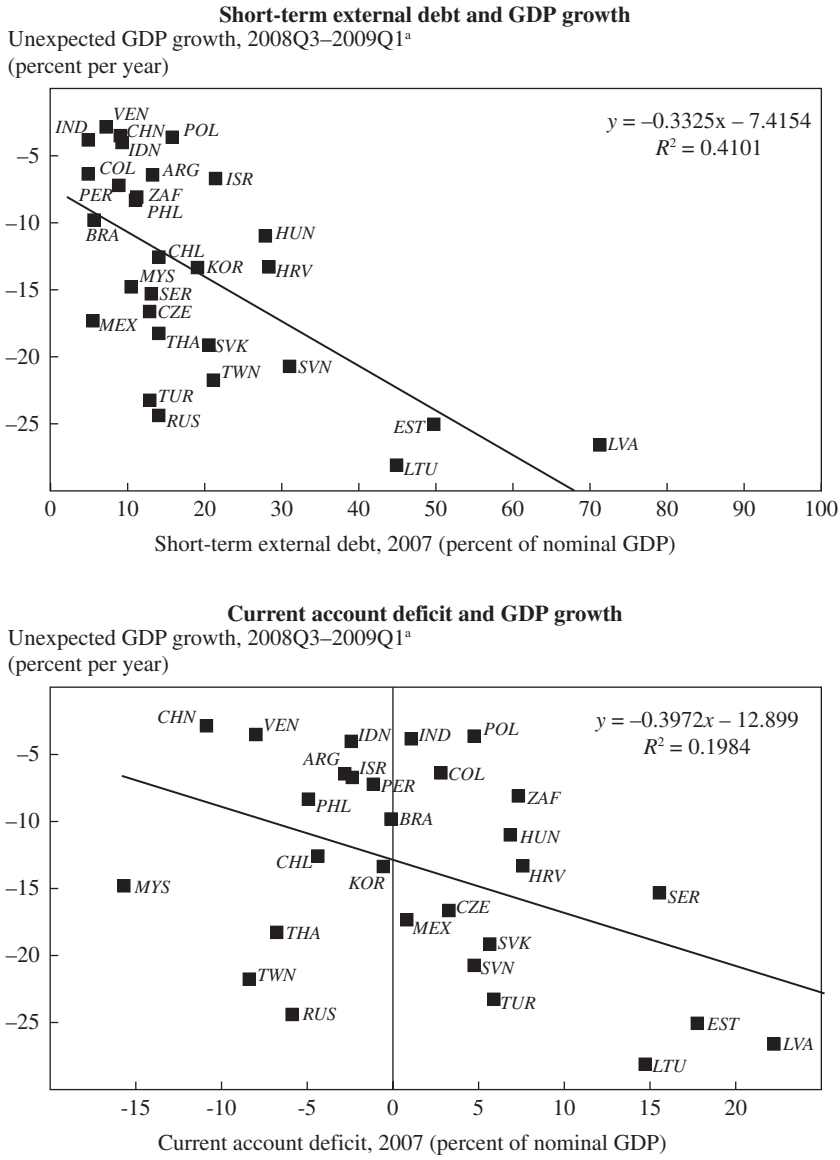
Figure 10 shows scatterplots of unexpected growth over 2008Q4–2009Q1 against short-term debt (top panel) and against the current account deficit (bottom panel), both in 2007. The relationship between short-term debt and unexpected growth is strong. A cross-country regression yields an R^2 of 0.41 and implies that an increase of 10 percentage points in the initial ratio of short-term debt to GDP decreases unexpected growth by 3.3 percentage points (at an annual rate; the relationship remains when the Baltic states are removed from the sample). There is also a relationship between unexpected growth and the initial current account deficit, but it is much weaker than that for short-term debt.

Bivariate scatterplots take us only so far. Table 1 shows the results of simple cross-country multivariate regressions in which unexpected growth is the dependent variable and one of the trade and one of the financial measures are independent variables. The export share, when included in the regression with short-term external debt (column 1-1), is signed as predicted but only weakly significant. Unexpected partner growth is also signed as predicted and significant in all regressions where it is included. Short-term debt is always strongly significant. When the current account deficit is introduced as the only "financial" variable, it has the predicted sign and is significant. When introduced in addition to short-term debt,

17. In our sample the means of unexpected growth, short-term debt to GDP, and unexpected partner growth, respectively, are −13.5 percent, 18 percent, and −4.2 percent, and the respective standard deviations are 7.8, 15, and 2.6.

18. Ideally, one would want to construct a variable conceptually symmetrical to that used for trade, namely, a weighted average of financial inflows into partner countries, using relative bilateral debt positions as weights and scaling by the ratio of foreign liabilities to GDP. Data on relative bilateral debt positions are not available, however.

Figure 10. Unexpected GDP Growth, Short-Term Debt, and the Current Account Deficit in Emerging Market Countries, 2008Q3–2009Q1



Sources: IMF, Global Data Source and *World Economic Outlook*; Eurostat; and authors' regressions.
a. Defined as in figure 2.

Table 1. Regressions Explaining Unexpected GDP Growth with Trade and Short-Term Debt[a]

	Regression				
Independent variable	*1-1*	*1-2*	*1-3*	*1-4*	*1-5*
Export share[b]	–0.09*				
	(0.04)				
Unexpected trading-partner growth[c]		0.73*	1.35***	0.84*	0.93**
		(0.38)	(0.40)	(0.42)	(0.37)
Short-term external debt[d]	–0.31***	–0.28***		–0.23**	
	(0.05)	(0.04)		(0.10)	
Current account deficit[e]			–0.37***	–0.11	
			(0.12)	(0.19)	
Short-term external debt + current account deficit[e]					–0.18***
					(0.03)
Constant	–4.67*	–5.46**	–7.51***	–5.82**	–6.13***
	(2.47)	(2.16)	(1.97)	(2.18)	(2.04)
No. of observations	29	29	29	29	29
Adjusted R^2	0.46	0.46	0.39	0.46	0.46

Source: Authors' regressions.

a. The dependent variable is GDP growth over 2008Q4 and 2009Q1, seasonally adjusted at an annual rate (SAAR), minus the April 2008 IMF forecast of GDP growth over the same period. Robust standard errors, corrected for heteroskedasticity, are in parentheses. Asterisks indicate statistical significance at the ***0.01, **0.05, or *0.1 level.

b. Nominal exports as a percent of nominal GDP in 2007.

c. Trade-weighted average of actual growth in trading partners over 2008Q4 and 2009Q1 minus corresponding forecast growth, SAAR, multiplied by the partner's export share of nominal 2007 GDP.

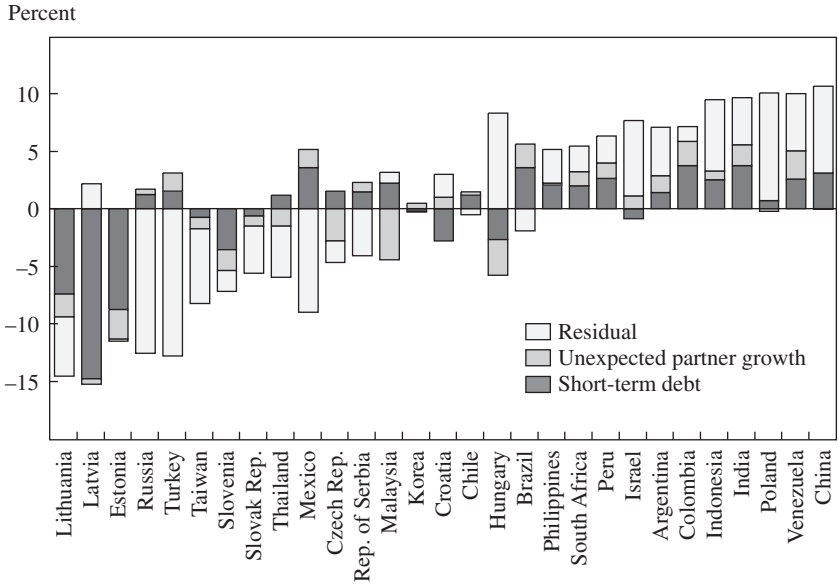
d. Debt with remaining maturity of less than 1 year in 2007, as a percent of 2007 nominal GDP.

e. As a percent of 2007 nominal GDP.

however, it is no longer significant. When the financial variable is the sum of short-term debt and the current account deficit (that is, the short-term financing requirement), the coefficient is less negative than that on short-term debt alone. The estimated constant (which should be zero if we assume that a country with no trade and no foreign debt would have been immune to the crisis) is negative and significant in all regressions. This suggests that some of the average unexpected output decline during the crisis is not explained by the right-hand-side variables.

Nevertheless, these baseline regressions suggest that trade and financial shocks can explain a good part of the heterogeneity in country outcomes. Using results from column 1-2 of table 1, figure 11 decomposes the variation across countries in unexpected growth (relative to the sample average)—similar to what is shown in figure 2—into variation explained by unexpected partner growth, variation explained by short-term debt, and the

Figure 11. Decomposition of GDP Growth in Emerging Market Countries, 2008Q3–2009Q1[a]



Sources: IMF, Global Data Source and *World Economic Outlook*; Eurostat; and authors' calculations
a. GDP semester growth is seasonally adjusted at an annual rate.

residual. Although, in general, countries with worse outcomes had larger debt (this is especially true of the Baltic states) and a larger decline in exports, it is clear that this regression leaves the outcome in some countries (Turkey and Russia, for example) largely unexplained.

In what follows we use the regression reported in column 1-2 of table 1, with unexpected partner growth and short-term debt as the explanatory variables, as our baseline. These results imply that an increase in the ratio of short-term debt to GDP of 10 percentage points leads to a decrease in unexpected GDP growth of 2.8 percentage points, and a decrease in unexpected partner growth of 1 percentage point leads to a decrease in unexpected GDP growth of 0.7 percentage point (much smaller than in the bivariate regression). The magnitude of the short-term debt effect appears to be consistent with that found in other studies.[19]

19. See, for example, Patillo, Poirson, and Ricci (2002). Their results are for the ratio of total debt, rather than just short-term debt, to GDP, and for actual rather than unexpected growth.

Next we explore alternative measures for both trade and financial variables, as well as the effects of institutions and policies. Given the small number of observations, one should be realistic about what can be learned. But as we shall show, some results are suggestive and interesting.

II.C. Alternative Trade Measures

We explored a number of alternative or additional trade measures. None emerges as strongly significant, and no specification obviously dominates our baseline regression.[20]

The trade variable we use in the baseline does not capture changes in the terms of trade. In many countries, however, the crisis was associated with a dramatic decline in the terms of trade. Oil prices, for example, dropped by 60 percent during the crisis semester relative to the previous semester. Thus we constructed a commodity terms of trade variable for each country, defined as the rate of change in the country's export-weighted commodity prices times the 2007 commodity export share in GDP, minus the rate of change in the country's import-weighted commodity prices times 2007 commodity imports as a percent of GDP. The variable ranges from −26 percent for Venezuela to +8 percent for Thailand; 11 countries experience a deterioration of their terms of trade by this measure, and 18 see an improvement.[21] When we add the variable to the baseline regression, its coefficient is close to zero and is not significant, and the coefficients on unexpected partner growth and on short-term debt are roughly unchanged.

The earlier discussion of the response of global trade to output suggests that the composition of exports may be relevant. And indeed, other work (Sommer 2009) has documented a striking relationship among a sample of *advanced* economies between the share of high- and medium-technology manufacturing in GDP and growth during the crisis. To test whether this was the case for our sample of emerging market countries, we constructed such a share for each country, relying on disaggregated data from the UN Industrial Development Organization. Again the coefficient is close to zero and not significant, and the other coefficients are little affected.

20. The full results from the set of alternative regressions described in this and the next subsection are available in the online appendix.

21. A better variable would be the unexpected change in the terms of trade. Unfortunately, forecasts of prices for all relevant commodities are not available. Given that most commodity prices follow a random walk, the use of the actual rather than the unexpected change in the terms of trade is unlikely to be a major issue.

Using the share of exports in GDP overstates the effect of the partner growth variable on demand if exports are part of a value chain, that is, if they are partly produced using imports as intermediate goods. One would like to measure the share of exports by the ratio of value added in exports to GDP, but the data are not available. Instead we constructed a proxy for this share by relying on the import content of exports for the 10 largest export industries (ranked by gross value) for each country, from the Global Trade Analysis Project. The adjustment is typically largest for the small countries of emerging Europe: for example, the export share is reduced by roughly half for Hungary.[22] The results of using this adjusted partner growth measure are similar to those in the baseline. As expected, the coefficient is somewhat larger than that obtained using the original share, but it is not significant, and the other coefficients are roughly unchanged.

The unexpected change in real exports is clearly the most direct measure of the trade shock. The reason for not using it in the baseline is that it is also likely to be partly endogenous, and thus subject to potential bias. We nevertheless ran a regression using the change in real exports (export forecasts do not exist, and therefore we used the actual change rather than the unexpected change). The results are largely similar to those using unexpected partner growth.[23]

II.D. Alternative Financial Measures

Our model suggests that both total foreign debt (through balance sheet effects) and short-term debt (through capital flows) should matter. We therefore explored a number of alternative measures for the financial variable.

We included total foreign liabilities as a percentage of GDP in 2007 as an additional explanatory variable in the baseline regression. This "financial openness" measure is not significant, and the coefficients on both short-term debt and trade are roughly unaffected. These results are consistent with those of Philip Lane and Gian Maria Milesi-Ferretti (2010).

22. This approach does not address another problem raised by value chains and discussed earlier in the context of Taiwan, namely, the fact that exports to another country may then be reexported and thus depend on growth in the ultimate rather than the initial importer country.

23. Taken literally, the coefficient on real exports, 0.43, can be interpreted as the domestic multiplier associated with real exports, whereas the coefficient on partner growth, 0.73, can be interpreted as the multiplier for real exports times the partner countries' average elasticity of imports to GDP.

A question that has been raised, in the context of emerging Europe in particular, is whether the composition of short-term debt, and especially the relative importance of bank debt, was an important factor in determining the effects of the crisis on output. Some have argued that given their problems at home, foreign banks were often one of the main sources of capital outflows. Others have argued that, to the contrary, banks played a stabilizing role in many countries. They point, for example, to the Vienna Initiative, in which a number of major Western banks have agreed to roll over their debt to a number of Central European economies. To explore this question, we decomposed short-term debt into that owed to foreign banks (that is, banks reporting to the Bank for International Settlements) and that owed to foreign nonbanks, both expressed as a ratio to GDP in 2007.[24] The coefficients on both types of debt are negative and significant. The coefficient on bank debt is less negative, suggesting that, other things equal, it was indeed an advantage to have a higher proportion of bank debt.

One might argue from the U.S. experience that the effects of the financial shock on other countries depended on the degree of regulation of their financial system. In a provocative paper, Domenico Giannone, Michele Lenza, and Lucrezia Reichlin (2009) have argued that, controlling for other factors, the "better" the regulation, at least as assessed by the Fraser Institute, the *worse* the output decline during the crisis.[25] Their result suggests that what was thought by some to be light, and thus good, regulation before the crisis turned out to make things worse doing the crisis. When we introduce this index as an additional regressor, it has the same sign as that found by Giannone and others but is not significant.

Finally, we explored the role of net capital (both bank and nonbank) flows directly as right-hand-side variables (instead of short-term debt). These are natural variables to use, but they cannot be taken as exogenous: worse shocks or worse institutions probably triggered larger net capital outflows. We therefore took an instrumental variables approach, using indexes

24. The decomposition is not clean. The numbers for total short-term debt include not only short-term debt instruments, but also longer-term debt maturing within the year. However, the numbers for foreign bank debt, which come from the Bank for International Settlements rather than the World Economic Outlook database, include only short-term debt instruments but not longer-term debt maturing within the year that is owed to foreign banks.

25. The index, which is part of an Index of Economic Freedom, is constructed from measures of the ownership of banks (the percentage of deposits held in privately owned banks), competition (the extent to which domestic banks face competition from foreign banks), extension of credit (the percentage of credit extended to the private sector), and the presence of interest rate controls. The highest value of the index for the countries in our sample is 9.6 for Lithuania, and the lowest is 6.1 for Brazil.

Table 2. Regressions Explaining Unexpected Growth with Reserves[a]

	Regression	
Independent variable	*2-1*	*2-2*
Unexpected trading-partner growth[b]	1.22***	0.53
	(0.43)	(0.44)
Ratio of reserves to short-term external debt, 2007[c]	2.68**	
	(1.15)	
Short-term external debt, as a percent of GDP, 2007[c]		–6.35***
		(1.62)
Reserves as a percent of GDP, 2007[c]		–0.24
		(1.51)
Constant	–21.61***	6.23
	(6.27)	(7.02)
No. of observations	29	29
Adjusted R^2	0.33	0.44

Source: Authors' regressions.

a. The dependent variable is GDP growth over 2008Q4 and 2009Q1, seasonally adjusted at an annual rate (SAAR), minus the April 2008 IMF forecast of GDP growth over the same period. Robust standard errors, corrected for heteroskedasticity, are in parentheses. Asterisks indicate statistical significance at the ***0.01, **0.05, or *0.1 level.

b. Trade-weighted average for the country's trading partners of projected GDP growth over 2008Q4 and 2009Q1 minus actual growth over the same period, SAAR, multiplied by the partner's export share of nominal 2007 GDP.

c. In logarithms.

of foreign bank access and of capital account convertibility (both indexes again from the Fraser Institute) as instruments, in addition to unexpected partner growth and short-term external debt. These plausibly affected growth during the crisis only through their effects on capital flows. The first-stage regressions suggest a strong negative effect of capital account convertibility on net flows: countries that were more open financially had larger net outflows. The second-stage regressions suggest that declines in net capital flows were indeed harmful to growth, more so for changes in bank flows. But these regressions were not robust to the specific choice of instruments.

II.E. The Role of Reserves

Many countries accumulated large reserves before the crisis, and one of the lessons many countries appear to have drawn from the crisis is that they may need even more. Our model indeed suggests that reserve decumulation can play a useful role in limiting the effects of trade and financial shocks on output.

Column 2-1 of table 2 shows that when unexpected partner growth is controlled for, the ratio of reserves to short-term debt is statistically and

economically significant. (For reasons that will be made clear below, the reserves variable is entered in logarithmic form.) The coefficient implies that a 50 percent increase in the ratio increases unexpected growth by 1.3 percentage points. This would suggest a relevant role for reserves. The question is, however, whether this effect comes from the denominator or the numerator, or both. To answer it, column 2-2 enters the log of the ratio of short-term debt to GDP and the log of the ratio of reserves to GDP separately. The results are reasonably clear: the coefficient on short-term debt is large and significant, and the coefficient on reserves is incorrectly signed and insignificant.

We have explored this result at some length, using different controls and conditioning or not on the exchange rate regime, and found it to be robust. Although in some specifications the coefficient has the predicted sign, it is typically insignificant and much smaller in absolute value than the coefficient on short-term debt. The econometric evidence is obviously crude and is not the last word, but it should force a reexamination of the issue.[26] Anecdotal evidence suggests that even when reserves were high, countries were reluctant to use them, for fear of using them too early, or that the use of reserves would be perceived as a signal of weakness, or that financial markets would consider the lower reserve levels inadequate.[27]

II.F. The Role of the Exchange Rate Regime

The question of whether, other things equal, countries with fixed exchange rates did better or worse in the crisis is clearly also an important one. Our model has shown that the theoretical answer is ambiguous, depending, for given shocks, on whether the ML condition is satisfied or violated, on the strength of balance sheet effects, and on the policies used to maintain the peg, namely, the combination of policy rate increases and reserve decumulation.

We look at the evidence by dividing countries into two groups according to whether they had a fixed or a more flexible exchange rate regime in 2008. We adopt the classification system used at the IMF, which is based on an assessment of de facto rather than de jure arrangements. Thus the defini-

26. The result is consistent with other studies such as Berkmen and others (2009). Trivedi and Ahmed (2010) also find that the level of reserves did not directly affect output, although larger reserves buffers resulted in a lower rise in country risk premiums and a smaller fall in exchange rates.

27. For more on the "fear of losing international reserves," see Aizenman (2009) and Aizenman and Sun (2009).

Table 3. Regressions Explaining Unexpected Growth with the Exchange Rate Regime[a]

	Regression	
Independent variable	*3-1*	*3-2*
Unexpected trading-partner growth[b]	0.83**	0.91**
	(0.38)	(0.38)
Short-term external debt[c]	–0.22**	–0.10
	(0.08)	(0.24)
Exchange rate regime dummy[d]	–2.72	–0.56
	(3.50)	(5.38)
Exchange rate regime dummy × short-term external debt		–0.14
		(0.26)
Constant	–5.29**	–6.56*
	(2.26)	(3.23)
No. of observations	29	29
Adjusted R^2	0.47	0.48

Source: Authors' regressions.

a. The dependent variable is GDP growth over 2008Q4 and 2009Q1, seasonally adjusted at an annual rate (SAAR), minus the April 2008 IMF forecast of GDP growth over the same period. Robust standard errors, corrected for heteroskedasticity, are in parentheses. Asterisks indicate statistical significance at the ***0.01, **0.05, or *0.1 level.

b. Trade-weighted average for the country's trading partners of projected GDP growth over 2008Q4 and 2009Q1 minus actual growth over the same period, SAAR, multiplied by the partner's export share of nominal 2007 GDP.

c. Debt with remaining maturity of less than 1 year in 2007, as a percent of 2007 nominal GDP.

d. Equals 1 if the country had a fixed exchange rate regime in 2008, and zero otherwise.

tion of fixed-rate regimes we use covers countries with no separate legal tender (including members of currency unions), currency boards, narrow horizontal bands, and de facto pegs. Russia's exchange rate regime, for example, was reclassified from a managed float to a (de facto) fixed rate in 2008, as it tried to stabilize the value of its currency through heavy intervention and use of its ample foreign exchange reserves. We constructed a dummy variable equal to 1 if the country had a fixed exchange rate regime in 2008, and zero otherwise.

Under this classification, countries with fixed exchange rates saw unexpected declines in real output by an average of 18.6 percent (14.6 percent if one excludes the Baltic states) during the crisis semester, compared with 11.3 percent for the group with more flexible exchange rates. Although this appears to be evidence against fixed rates, it does not control for the size of the shock. This is what we do in table 3, starting from our baseline specification. Column 3-1 adds the exchange rate regime as a regressor. The resulting coefficient is negative and insignificant. Its value implies that, controlling for trade and short-term debt, a country with a fixed-rate

regime had 2.7 percentage points lower growth. Our model also suggests adding an interaction term between foreign currency debt and the exchange rate. Although exploring the presence of interactions in samples of 29 observations is surely overambitious, column 3-2 introduces an interaction between the exchange rate and the ratio of short-term debt to GDP. The resulting coefficient is negative but insignificant. Taken at face value, it suggests that the adverse effects of short-term debt may have been stronger in countries with a fixed exchange rate.

We also explored the role of fiscal policy. Many countries, for example, India, reacted to the crisis with large fiscal stimuli. In most cases, however, given the decision and spending lags involved, their implementation started either at or after the end of the crisis semester. Nevertheless, we constructed a variable capturing the change in the cyclically adjusted primary fiscal balance from 2008 to 2009 as a ratio to GDP.[28] When added to the baseline regression, this variable was statistically insignificant over the initial period of the crisis. We leave it to further work to examine the effectiveness of fiscal stimulus over a longer period.

In summary, despite the limitations of a small sample, the econometrics suggest a number of conclusions. The most statistically and economically significant variable on a consistent basis is short-term foreign debt. There is some evidence that bank debt had less of an adverse effect than nonbank debt. Short-term debt does not appear to proxy for other variables. Trade, measured by trade-weighted growth in partner countries, also matters; its effect is economically but not always statistically significant. Alternative measures of trade, focusing on composition effects, do not appear to do better. Of the policy dimensions, the most interesting result is the weak role of reserves. Although the ratio of reserves to short-term debt is significant, its effect comes mostly from short-term debt rather than from reserves.

III. Country Studies

Econometrics cannot capture the richness and the complexity of the crisis in each country. Only studies of specific countries can give a sense of how the trade and the financial channels actually operated. For this reason, we turn next to case studies of three countries, Latvia, Russia, and Chile.

28. The use of an annual change is clearly not ideal. Quarterly data are available, however, for only a small number of countries in our sample.

Table 4. Latvia: Selected Macroeconomic Indicators, 2005–09

Indicator	*Average, 2005–07*	*2008 Q1*	*2008 Q2*	*2008 Q3*	*2008 Q4*	*2009 Q1*
GDP growth[a]	10.7	−10.2	−7.4	−6.1	−18.5	−38.4
Current account[b]	−19.0	−17.1	−15.6	−11.5	−7.4	−1.4
Consumer price inflation[c]	7.8	16.3	17.6	15.8	12.2	9.2
Real effective exchange rate[d]	94.8	109.2	112.8	112.4	113.8	120.3
Stock market capitalization[e]	1,829.0	1,814.2	1,828.4	1,480.0	1,166.4	1,051.6
Change in stock market capitalization[c]	32.3	9.5	−16.6	−38.4	−44.4	−40.3

Sources: IMF, Global Data Source and International Financial Statistics; Riga Stock Exchange.
a. Quarter over quarter, seasonally adjusted at an annual rate, percent.
b. Percent of GDP.
c. Year over year, percent.
d. CPI-based, 2000 = 100.
e. Millions of euros.

III.A. Latvia and the Role of Banks

No other country may be as emblematic of this crisis as Latvia. Output there declined at an annual rate of 18½ percent in 2008Q4 and of 38 percent in 2009Q1. (Table 4 provides some basic macroeconomic statistics for Latvia.) In contrast to most other countries, growth in Latvia is forecast to remain negative in 2010. The obvious question is why the output decline was so large.

In the case of Latvia, the right starting point is not the start of the crisis itself, but the boom that the economy experienced in the 2000s—before and after its accession to the European Union in 2004. GDP growth exceeded 6 percent each year from 2000 to 2007, reaching or exceeding 10 percent each year from 2005 to 2007. Inflation, low and stable until 2005, increased to 7 percent by 2006 and to 14 percent in 2007. Asset prices boomed. Stock market capitalization increased by 32 percent a year in nominal terms from 2005 to 2007. The evidence also suggests very large increases in housing prices: in Riga, housing prices increased by 367 percent from 2005 to 2007. The domestic currency, the lat, was pegged to the euro in 2005 (it had been pegged to the SDR previously), so that higher inflation led to a steady real appreciation.

The main cause of the boom was wider access to credit, largely through local subsidiaries of foreign banks, leading to very rapid domestic credit growth. From 2005 to 2007, annual domestic credit growth exceeded

50 percent, leading to high consumption and high investment, in particular residential investment. One result was steadily larger current account deficits, which in 2007 reached an astounding 24 percent of GDP. Capital inflows increasingly took the form of bank flows, from foreign parent banks to domestic subsidiaries. By the end of 2007, gross external debt had reached almost 135 percent of GDP, and short-term external debt was 58 percent of GDP. Foreign ownership of Latvia's banks, primarily by Nordic banks, was 60 percent. Foreign currency debt was 86 percent of the total. More than two-thirds of the loans were backed by real estate. Reserves were only 20 percent of GDP.

In short, Latvia was very much exposed to foreign financial shocks. A slowdown, however, preceded the crisis. By early 2007, signs of overheating and of an impending bust were starting to become apparent. House prices peaked in early 2007 and then started to decline sharply. In February, Standard & Poor's changed its outlook on Latvia from stable to negative. Growth decreased throughout the year and turned sharply negative in each of the first three quarters of 2008. Forecast growth for 2008Q4 and 2009Q1, from the April 2008 *World Economic Outlook,* was −1.5 percent at an annual rate. For the most part, it was the (un)natural end of a boom. Financial factors also played a role. Worried about the decrease in the value of real estate collateral and the likely increase in nonperforming loans, Swedish banks instructed their subsidiaries to decrease credit growth. The (reported) average rate charged by banks to domestic borrowers remained stable, however, until September 2008, suggesting that credit tightening played a limited role in the initial slowdown.

Until September, it appeared that Latvia was headed for a long period of stagnation, perhaps similar to that of Portugal after euro entry. The crisis, however, led to a dramatic decrease in output. Part of this was due to trade. But as figure 9 shows, the decline in GDP was much larger than could be explained by trade. The rest must be attributed to a combination of financial factors.

Despite problems at home, Nordic banks, for the most part, maintained their credit lines to their subsidiaries—but with a sharp deceleration from earlier high rates of credit growth. The reduced level of credit proved insufficient to finance Latvia's large current account deficit. Broad commitments by foreign banks to maintain credit lines were part of the IMF-supported program in December 2008.[29] But the same was not true of

29. These commitments were made more explicit later, in September 2009, through the so-called Vienna Initiative.

Table 5. Latvia: Current Account, Capital Flows, and Reserves, 2005–09
Millions of dollars

Indicator	*Average, 2005–07*	*2008 Q1*	*2008 Q2*	*2008 Q3*	*2008 Q4*	*2009 Q1*
Exports of goods and services[a]	10,524.9	3,843.4	4,265.1	4,341.7	3,507.5	2,816.6
Imports of goods and services[a]	−15,322.7	−5,313.4	−5,954.9	−5,745.2	−4,205.3	−2,853.9
Current account balance[b]	−4,312.8	−1,336.3	−1,397.7	−1,147.3	−610.7	77.1
Net bank flows	3,891.8	707.9	1,207.7	1,245.7	−1,230.4	−1,486.1
Net nonbank financial flows	1,369.0	1,276.2	4.1	−116.8	160.8	600.5
Financial account balance[c]	5,260.8	1,984.1	1,211.8	1,128.9	−1,069.6	−885.6
Exceptional financing from IMF and European Union					814.2	
Change in reserves[d]	966.8	446.3	110.9	−64.7	−979.2	−639.7

Source: IMF, International Financial Statistics.
a. Includes factor income flows.
b. Includes transfers.
c. Excludes changes in reserves and official (IMF) financing.
d. Differs from the sum of the current account balance, the financial account balance, and official financing due to errors and omissions (not shown).

domestic banks. One of them in particular, Parex, with assets equal to 20 percent of GDP and relying heavily on foreign depositors, suffered a run by foreign and then by domestic depositors. In November the Latvian treasury and the central bank stepped in, both to guarantee some of the debt and to provide liquidity. In the second semester, liquidity provision operations associated with Parex alone amounted to $1.1 billion, or more than 3 percent of GDP. Finally, worry about a possible devaluation led to a large-scale shift from lat to euro deposits by domestic residents.

The strategy of the central bank in reaction to these shocks was twofold: first, to avoid balance sheet effects and maintain the peg using reserves, and second, to provide liquidity to the financial system and maintain a low policy interest rate. The result was a large decrease in reserves. Table 5 reports Latvia's current account, financial account, and reserves during this period. (To keep these numbers in perspective, note that Latvian GDP was $33 billion in 2008.) Large net outflows from domestic banks led to large decreases in reserves, only partly compensated through exceptional financing from the European Union and the IMF. In the second half of 2008, the central bank lost roughly one-fourth of its initial reserves. However, the

current account achieved a sharp turnaround, from a deficit of $1.3 billion in 2008Q1 to a small surplus in 2009Q1, which limited further losses in reserves. This turnaround came from a sharp drop in imports, itself reflecting the sharp drop in domestic demand.

This drop in domestic demand raises an important puzzle. Given that the central bank was willing both to use reserves to maintain the exchange rate and to provide liquidity and maintain a low policy rate, why was the decrease in demand so dramatic? Why didn't the banks, which had relied on foreign credit, fully maintain credit by turning to the central bank for liquidity and to the foreign exchange market if they needed foreign currency? In other words, why wasn't sterilized intervention enough to prevent major effects on real activity? The answer is probably twofold.

First, as already noted, foreign banks gave instructions to their subsidiaries to reduce their domestic credit exposure. To the extent that the subsidiaries were limited in the amount of loans they could extend, they had no incentive to borrow at the policy (or at the interbank) rate. In other words, even generous liquidity provision by the central bank would not have led to greater extension of credit by the subsidiaries. In terms of our model, the shadow borrowing rate went up as credit was rationed. Second, doubts about the banks' solvency, coming from the initial shocks, the decrease in housing prices, and the associated decrease in the value of collateral, led, just as in the advanced economies, to a higher interbank rate and, in turn, to higher borrowing rates. The Rigibor, the Latvian equivalent of the LIBOR (London interbank offered rate), went up from 6 percent in August to 14 percent in December. The average rate on lat-denominated loans by banks went up from about 10 percent in August to almost 16 percent in December. In terms of our model, the crisis clearly increased x and thus $r + x$.

We draw two main lessons from the Latvian experience. The first concerns the complex role of banks in the transmission of financial shocks. On the one hand, foreign banks largely maintained their exposure, more so than other foreign investors and depositors. On the other, direct restrictions on credit limited the usefulness of liquidity provision by the central bank. The second, related, and more general lesson is that even when central banks are willing to use reserves and provide liquidity, the adverse output effects of capital outflows on credit and, in turn, on economic activity can still be very large.

III.B. Russia and the Role of Reserves

Aside from the Baltics, Russia is the country in our sample that suffered the largest output decline during the crisis. Although output declined by

Table 6. Russia: Selected Macroeconomic Indicators, 2005–09

Indicator	*Average, 2005–07*	*2008 Q1*	*2008 Q2*	*2008 Q3*	*2008 Q4*	*2009 Q1*
GDP growth[a]	7.9	9.6	5.1	–1.3	–8.8	–29.7
Current account[b]	8.9	7.3	6.4	7.1	3.5	0.9
Consumer price inflation[c]	10.5	12.9	14.8	15.0	13.8	13.8
Real effective exchange rate[d]	163.3	181.5	186.7	187.3	189.5	165.1
Stock market capitalization[e]	140.4	189.0	195.4	109.4	55.8	57.0
Change in stock market capitalization[c]	69.2	4.9	5.4	–39.2	–71.5	–69.9

Sources: IMF, Global Data Source and International Financial Statistics; Russian Trading System Stock Exchange.

a. Quarter over quarter, seasonally adjusted at an annual rate, percent.

b. Percent of GDP.

c. Year over year, percent.

d. CPI-based, 2000 = 100.

e. Billions of dollars.

only 9 percent at an annual rate in 2008Q4, it then declined by 30 percent in 2009Q1. The question, again, is why output fell so steeply.

To answer this question, one needs again to start long before the crisis. When the crisis came, the Russian economy had been booming for some time. Growth had averaged 7 percent per year from 2000 to 2007, and 8 percent from 2005 to 2007. (Table 6 gives basic macroeconomic numbers for 2005–07 and for each quarter from 2008Q1 to 2009Q1.) The boom was due in large part to the increase in the price of oil and the associated increase in oil export revenue, and the economy showed all the signs of a commodity price-led boom. In sharp contrast to the Baltics, however, Russia's boom was accompanied by large current account surpluses, running on average at 10 percent of GDP from 2000 to 2007 and at 8.9 percent of GDP from 2005 to 2007. Large fiscal surpluses reflected high oil revenues, and the public debt fell steadily. In 2007 the primary fiscal balance showed a surplus of 7.4 percent of GDP (the primary nonoil balance showed, however, a deficit of 3.3 percent of GDP), and the ratio of public debt to GDP fell below 10 percent. Oil revenue was partly allocated to two stabilization funds, to smooth the effects of fluctuating oil prices on spending. Inflation was high but stable at around 10 percent. Bank credit growth was extremely high, running at an annual rate of 40 percent from 2001 to 2007.

The current account surpluses, combined with large capital inflows, led to a large buildup of reserves. By December 2007, reserves (including the foreign asset positions of the two oil stabilization funds) had reached

$480 billion, equivalent to 36 percent of GDP. Total foreign debt was $464 billion, of which $114 billion reflected loans to banks, $42.6 billion foreign deposits in banks, and $210 billion loans to households and firms. Of this debt, $361 billion was denominated in foreign currency, and $100 billion was short-term debt.

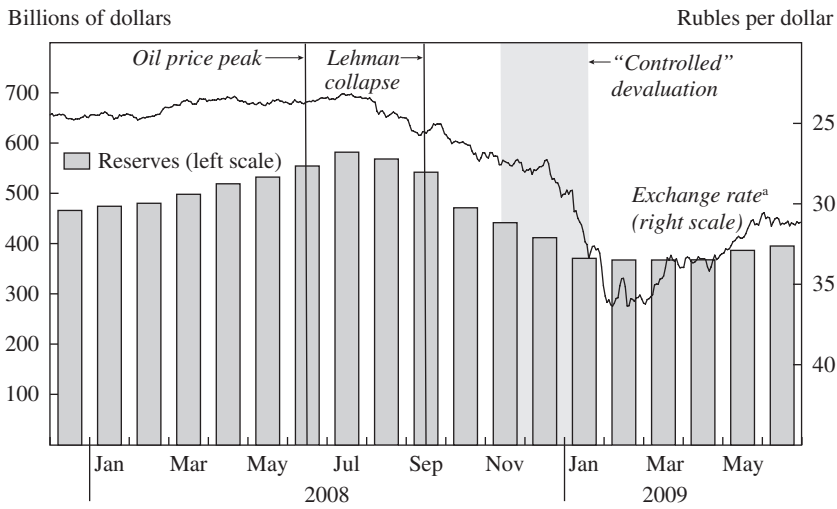
With a large current account surplus, a large fiscal surplus, a smoothing mechanism against oil price fluctuations, nearly no public debt, and a ratio of reserves to short-term debt equal to over 480 percent, one would have expected Russia to manage the crisis well. This was not the case.

The trade shock was severe. The dominant channel was not so much the decrease in export volumes as the decrease in oil prices, which fell from $138 per barrel in July 2008 to $44 per barrel in early 2009. The terms of trade for Russia's overall commodity exports, which accounted for a very large 22 percent of GDP, fell 36 percent during the crisis semester relative to the previous semester. The decline in our terms of trade variable was the third largest in our sample, exceeded by only Venezuela and Chile. The interesting question is whether, given the presence of stabilization funds, the terms of trade decrease had a large adverse effect on demand. Put another way, given that most of Russia's oil revenue goes to the state, was the decline in revenue reflected in fiscal tightening? The answer is not obvious. The increase in the fiscal deficit in 2008Q4 far exceeded the decrease in oil revenue. But this increase was followed by a sharp decrease in the deficit in 2009Q1, while oil revenue was decreasing further. This would suggest a positive effect on demand in 2008Q4 but a strongly adverse effect in 2009Q1, which could help explain the large decline in output in that quarter. What complicates the matter is that Russia typically experiences large fiscal deficits in the fourth quarter for seasonal reasons. Thus, the relevant question is whether the deficit was larger than expected, and this we cannot answer. A strong fiscal stimulus program was put in place in April 2009, too late to have an effect on the period under consideration.

The post-Lehman financial shock was not the first such shock experienced by Russia in 2008. The first, triggered by the war with Georgia, came in August: large portfolio withdrawals led to a 22 percent decline in the stock market from the start of the war in early August to just before the collapse of Lehman and gross outflows of $20 billion. The same happened after Lehman: the stock market declined by 17 percent in two days, after which the Russian authorities closed it for two days.

The initial reaction of the Russian central bank was twofold. First, it sought to use reserves to limit the size of the depreciation and avoid balance sheet effects. (Figure 12 shows the path of reserves and of the exchange

Figure 12. Russia: Reserves and the Exchange Rate



Sources: IMF, International Financial Statistics; Bloomberg L.P.
a. Daily data, inverted scale.

rate from December 2007 to June 2009.) The second was to provide ruble liquidity to banks, through a decrease in reserve requirements, the provision of uncollateralized loans to a larger set of banks, and the provision of $50 billion to the large state bank, VEB, to help firms repay their external debt. More exotic measures were taken as well, such as the allocation of roughly $5 billion from the National Reserve Fund to buy shares, in order to increase the value of the collateral (often their own shares) posted by firms.

Despite these measures, outflows continued at a rapid pace, and the Russian central bank steadily lost reserves: $25 billion in September, $72 billion in October, $29 billion in November, and $29 billion in December. (Table 7 reports the current account, the financial account, and reserves as averages for 2005–07 and for each quarter from 2008Q1 to 2009Q1.) Why were outflows so large? For the most part, because investors perceived that the rate of loss in reserves was too high to be sustained, and thus anticipated a larger depreciation to come. Domestic firms repaid their dollar loans. Domestic depositors shifted from ruble to dollar accounts; the share of foreign currency–denominated bank deposits increased from 14 percent in September to 27 percent in December. Domestic banks shifted from making domestic loans to buying dollar assets, in amounts beyond what was needed to hedge the change in the currency structure of

Table 7. Russia: Current Account, Capital Flows, and Reserves, 2005–09
Billions of dollars

Indicator	*Average, 2005–07*	*2008 Q1*	*2008 Q2*	*2008 Q3*	*2008 Q4*	*2009 Q1*
Exports of goods and services[a]	364.0	136.0	156.9	167.2	121.9	74.4
Imports of goods and services[a]	−276.5	−97.2	−130.6	−136.5	−112.2	−64.7
Current account balance[b]	85.4	38.0	26.2	29.7	8.5	9.3
Net bank flows	20.5	−11.3	22.1	−13.2	−51.4	0.5
Net nonbank financial flows	12.5	−14.2	12.8	3.5	−84.4	−32.7
Financial account balance[c]	33.0	−25.6	34.9	−9.8	−135.9	−32.2
Exceptional financing from IMF	−1.2					
Change in reserves[d]	71.4	6.4	64.2	15.0	−131.1	−30.5

Source: IMF, International Financial Statistics.
a. Includes factor income flows.
b. Includes transfers.
c. Excludes changes in reserves and official (IMF) financing.
d. Differs from the sum of the current account balance, the financial account balance, and official financing due to errors and omissions (not shown).

their liabilities. (In view of the expected depreciation, the demand for dollar loans was obviously low.) By mid-November the Russian central bank decided to widen the exchange rate band and allow for a faster depreciation. The ruble was devalued by about 20 percent in January 2009, largely ending the net outflows and reserve losses.

By then, however, it was too late to avoid an output decline. Despite the provision of liquidity, doubts about solvency had increased the interbank rate from 4 percent in July 2008 to 16 percent in January 2009. Over the same period, the shift by banks from domestic loans to dollar assets was reflected in an increase in the average interest rate charged to firms from 11 percent in July 2008 to 17 percent. Credit to households, which had grown by 3 percent monthly from January to September 2008, remained flat for the rest of the year and then decreased by 1 percent monthly from January 2009 on. Credit to firms, which had grown by 2.6 percent monthly from January to September 2008, actually increased further to 3.5 percent monthly from October to January, in some measure because of government pressure on state banks to increase credit, as well as a strong desire of firms to replace dollar debt with ruble debt. It then remained flat from January on, in part because firms began to repay debt they had assumed during the crisis, as the ruble began to appreciate.

In short, Russia was affected by two shocks, a terms of trade shock and a financial shock. One might have hoped that the existence of the stabilization funds for oil would limit the adverse effects on demand of the decrease

in oil prices. One might also have hoped that the initial high reserves and low debt positions would limit the effects of the financial shocks. This was not the case, and the story has an interesting twist: the problems did not come so much from capital outflows by foreign investors as from a shift by domestic residents—households, firms, and banks—out of ruble and into dollar assets. In this sense Russia may be the country that most corresponds to the case considered by Maurice Obstfeld, Alan Taylor, and Jay Shambaugh (2010), who argue that the variable to which reserves should be compared is not short-term debt, but rather total liquid assets held by domestic residents. At the start of the crisis, short-term debt in Russia was about $100 billion, but M2 was about $430 billion, much closer to the number for reserves. Given the ease with which domestic residents could shift into dollar assets, this may be why it was rational to expect a depreciation, and the equilibrium was self-fulfilling.

Russia's experience also exemplifies the dangers of pegging (or, more accurately, of sharply limiting the decline in the currency) when other actors expect the policy to come to an end and the currency to depreciate. One can question whether, ex ante, Russia's policy was mistaken. Ex ante, it was plausible that the crisis would come to an end sooner, that oil prices would recover, and that reserves would prove more than sufficient. Also (and this is the other side of the same coin), the controlled depreciation allowed firms to decrease their foreign currency exposure and thus suffer smaller balance sheet effects when the depreciation actually came. One can also ask whether a Federal Reserve swap line like those extended to Mexico, Korea, and Brazil would have allowed Russia to credibly maintain its exchange rate and reduce its capital outflows.

III.C. Chile and the Role of Institutions

Like Russia, Chile depends very much on commodity exports—in Chile's case, copper—and is financially open. Yet it suffered a relatively small decline in output: −10 percent in 2008Q4 and −4 percent in 2009Q1 (again at annual rates). The question this time is why the decline was so modest.

Chile entered the crisis in strong macroeconomic shape. From 2005 to 2007 growth was steady, averaging 4.5 percent per year. This performance reflected in part Chile's strong dependence on copper—copper exports were 23 percent of GDP in 2007—and the doubling of the price of copper between 2005 and 2007. Strong copper exports led to large trade and current account surpluses. Inflation was stable, at least until 2008 when it started to increase, leading to a steady increase in the policy interest rate

Table 8. Chile: Selected Macroeconomic Indicators, 2005–09

Indicator	*Average, 2005–07*	*2008 Q1*	*2008 Q2*	*2008 Q3*	*2008 Q4*	*2009 Q1*
GDP growth[a]	4.5	6.7	6.5	–1.4	–9.8	–4.3
Current account[b]	3.5	0.5	0.4	–4.5	–5.7	0.0
Consumer price inflation[c]	3.6	8.0	9.0	9.3	8.5	5.9
Real effective exchange rate[d]	93.8	102.9	100.3	94.0	85.2	91.4
Stock market capitalization[e]	178.0	241.4	200.8	177.7	132.7	149.7
Change in stock market capitalization[c]	21.1	15.1	–15.7	–22.8	–41.3	–38.0

Sources: IMF, Global Data Source and International Financial Statistics; Santiago Stock Exchange.
a. Quarter over quarter, seasonally adjusted at an annual rate, percent.
b. Percent of GDP.
c. Year over year, percent.
d. CPI-based, 2000 = 100.
e. Billions of dollars.

from 5 percent in January to 8.15 percent in September. (Table 8 gives some basic macroeconomic numbers for Chile.)

The country's balance sheets, both public and private, were strong. The effects of copper prices on the fiscal balance, and thus on aggregate demand, were smoothed by a fiscal rule setting annual spending in line with medium-term revenue, including copper revenue, under a conservative copper price assumption. The surplus was accumulated in a stabilization fund, which by 2007 had accumulated $15 billion. (GDP that year was $164 billion.) Public debt, including debt of public enterprises, was a low 24 percent of GDP. For 2007 the primary balance showed a surplus of 8.8 percent of GDP, 0.2 percent excluding mining. Private foreign debt, owed mostly by individuals and firms rather than banks, was $56 billion. The banking sector was heavily regulated and strong, reflecting lessons learned in earlier banking crises. Subsidiaries of foreign banks accounted for roughly half of total bank assets. Central bank reserves were $24 billion, roughly 75 percent of the country's short-term debt. (Beginning in April 2008, in the face of higher global risk, the central bank had started a reserve accumulation program. By the time the program ended in September, it had accumulated $5.75 billion.)

The main effect of the crisis was through the trade channel. The crisis was associated with a decrease in exports but also, and more important, with a sharp decline in the price of copper. The decline in our terms of trade measure for Chile was the second largest of the countries in our sample (after Venezuela), and only marginally larger than Russia's. Given the country's fiscal rule, the effect on disposable income and demand was lim-

Table 9. Chile: Current Account, Capital Flows, and Reserves, 2005–09
Billions of dollars

Indicator	*Average, 2005–07*	*2008 Q1*	*2008 Q2*	*2008 Q3*	*2008 Q4*	*2009 Q1*
Exports of goods and services[a]	67.9	23.5	22.7	20.7	16.4	15.1
Imports of goods and services[a]	–65.4	–22.6	–23.9	–24.3	–19.0	–14.5
Current account balance[b]	5.3	1.5	0.1	–2.9	–2.1	0.9
Net bank flows	0.2	1.6	1.2	0.1	–1.1	–2.1
Net nonbank financial flows	–4.1	–1.1	1.0	7.5	2.8	2.9
Financial account balance[c]	–3.9	0.5	2.2	7.6	1.7	0.8
Change in reserves[d]	1.2	0.4	2.4	4.6	–0.9	0.5

Sources: IMF, International Financial Statistics.
a. Includes factor income flows.
b. Includes transfers.
c. Excludes changes in reserves and official (IMF) financing.
d. Differs from the sum of the current account balance, the financial account balance, and official financing due to errors and omissions (not shown).

ited, however; instead the decrease showed up in a sharp decline in accumulations of the stabilization fund, from $3 billion in 2008Q1 to $1 billion in 2008Q4. In 2009Q1 the government put in place an additional fiscal stimulus program of $4 billion; financing needs increased further later in the year by another $4 billion.

On the financial side, what is most striking is that net capital flows actually remained positive in both 2008Q4 and 2009Q1. (Table 9 reports the current account, the financial account, and reserves as averages for 2005–07 and for each quarter from 2008Q1 to 2009Q1.) Thus, despite a sharp decrease in the current account balance, the decrease in reserves was small—$1 billion in 2008Q4, followed by an increase of $0.5 billion in 2009Q1—and associated with a moderate depreciation: the real exchange rate index fell from 100 in 2008Q2 to 85 in 2008Q4 and then recovered to 91 in 2009Q1.

This behavior of reserves and the exchange rate was probably due to two main factors. The first was the central bank's decision to allow the exchange rate to adjust rather than to use the policy interest rate or to rely on reserve decumulation. Only in January 2009, after inflation had substantially declined, was the policy rate lowered, by almost 500 basis points between January and March 2009. Starting at the end of September, the central bank made some dollar liquidity available to banks, but at a fairly large spread (300 basis points initially) over LIBOR.

The second factor was the behavior of gross capital flows. Gross outflows were only marginally higher during the two quarters of the crisis

than before. Interestingly, gross inflows increased even more. These inflows came not only from the repatriation of funds by pension funds but also, indeed to a larger extent, from domestic firms and households. This is in sharp contrast to what happened, for example, in Russia, where capital outflows by foreign investors led to capital outflows by domestic residents. How much was due to the decision to let the peso depreciate (in contrast with Russia, which tried to maintain a peg despite the anticipation by investors of a future devaluation) and how much was due to the perception of Chile as a relatively safe financial haven is difficult to assess. The result, in any case, was only a small loss in reserves and a moderate depreciation.

Nevertheless, the trade shocks and the financial crisis had some effect on the real economy. The stock market fell by almost 15 percent from September to December, a small decrease relative to other emerging market countries. And although the interbank rate rose little relative to the policy rate, there was an increase in lending rates of roughly 4 percentage points from September to December, at a time when, in addition, inflation was falling, implying a larger increase in real interest rates.

The overall result was a decrease in demand and in output, but on a more limited scale than in many other countries. The fiscal rule, the framework for smoothing the effect of copper revenue, a strong financial sector, limited foreign currency exposure, and the decision early on to let the peso depreciate probably all played a role in the outcome.

IV. Conclusions

One can read the three preceding sections as first building the bone structure and progressively adding the flesh. The model presented in section I has allowed us to identify and analyze the effects of the main two shocks that affected emerging market countries during the crisis: a sharp decrease in exports (together with a sharp decrease in the terms of trade for commodity producers), and a sharp increase in capital outflows. It showed the dependence of the unexpected output losses on initial conditions, in particular on foreign debt. It showed the complexity of the decisions policymakers faced in this environment, and the effects of using the policy interest rate, the exchange rate, reserve decumulation, and fiscal policy.

The econometrics in section II provided a first pass at the data. Despite the limitations inherent in using a cross-sectional dataset with only 29 observations, our empirical analysis yielded strong evidence that both the trade and the financial channel played important roles. The differing effects of the shocks across countries, coming from different trade and financial

exposures and the differing growth performances of countries' trading partners, explain much of the heterogeneity of growth performances during the crisis. When it comes to policy, our most interesting findings are two "nonresults." Countries with fixed exchange rate regimes fared, on average, much worse. However, when we control for other factors, in particular short-term debt, the direct effect of fixed exchange rates largely disappears. This finding is consistent with the ambiguous effect of exchange rates in our model: the outcome depends on the strength of expenditure switching and balance sheet effects. We did not find compelling econometric evidence that international reserves were important buffers in the crisis.

The case studies give a better sense of the many factors that shaped the effects of the crisis in each country, which cannot be captured by econometrics alone. The comparison between Russia and Chile is perhaps the most interesting. Both countries are large commodity producers, and both were hit by a large adverse trade shock. Both were financially open. Russia had larger reserves relative to its short-term debt than Chile. Yet Chile was much less affected by the crisis than Russia. The proximate reasons for Chile's relative success are probably twofold. First, Chile used its fiscal stabilization mechanisms more effectively than Russia did. Second, whereas Chile experienced small capital outflows by foreigners and more than offsetting capital inflows by domestic residents, Russia suffered large capital outflows by both foreigners and domestic residents. The deeper reasons for these differences in capital flows are probably the greater confidence in the macrofinancial structure in Chile than in Russia, and Chile's decision early on to let its currency depreciate, which compares favorably with Russia's initial decision, eventually abandoned, to maintain the parity, giving rise to speculative outflows.

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Comments and Discussion

COMMENT BY

KRISTIN J. FORBES This paper by Olivier Blanchard, Mitali Das, and Hamid Faruqee asks a well-defined and extremely important question: how did the recent crisis affect emerging markets in late 2008 and early 2009? The answer has critical policy implications both for emerging markets and for the international financial institutions. To answer this question, the paper begins with an intuitive model that clearly lays out the main channels by which the crisis could affect emerging markets, and the effects of different policy responses. Then it reports a series of regressions to test the role of various channels in explaining the spread of the crisis, focusing on the role of trade versus that of finance and the impact of macroeconomic policies. The paper closes with several case studies, which provide important detail on the cross-country regression results—and show the challenges in generalizing about emerging market experiences during the crisis.

This paper should be required reading for anyone attempting to understand how emerging markets were affected during the peak of the crisis. It is straightforward to read and understand and does an excellent job of articulating a model to frame the issues and then evaluating the predictions of the model through cross-country analysis and more in-depth country studies. Both approaches clearly benefit from the authors' mix of academic knowledge and real-world experience. The regression analysis carefully tests a variety of alternative hypotheses and measures, and the results are surprisingly strong given the limited degrees of freedom available. The most robust findings are that the crisis spread to emerging markets through both the trade and the financial channels, but with a more important role for finance, as measured by countries' exposure to short-term external debt. This result is logical and supports anecdotal evidence gathered during the crisis as well as the more detailed analysis in the case studies. The results

also suggest that neither exchange rates nor reserve accumulation had much of a direct effect in determining how the crisis affected emerging markets. These results have important policy implications.

The authors have also done an impressive job in addressing many of the concerns that were raised when they presented a draft of this paper at the Brookings Papers conference. My comments will therefore focus on only four issues: the dependent variable, the sample size, omitted variables, and the assumptions about capital flows. These issues are not new to the authors—indeed, they are very candid about the limitations of their data and analysis.

Let me begin by highlighting one important innovation that was already present in the conference version and has been further improved in this version. The earlier version did not focus on explaining growth in emerging markets during the whole of 2008 or 2009, although this is the standard measure used in other, related papers and would have been straightforward to measure. Instead it attempted to explain the difference between growth during the peak semester of the crisis (2008Q4 and 2009Q1) and trend growth (average growth from 1995 through 2007).

This measure of the dependent variable was better than that used in other work, not only because it focused on the change in growth versus the trend, but also because it focused on growth during the peak of the crisis rather than over an entire year. Growth in many countries was strong both at the start of 2008 and at the end of 2009, so that focusing on annual growth could have missed the full impact of the crisis. This measure, however, still had the shortcoming of overstating the impact of the crisis on countries that were already expected to have slower growth in 2008Q4 or 2009Q1 for reasons unrelated to the crisis. (For example, annual growth in Latvia was already expected to slow from a trend rate of 8.8 percent from 2000 to 2007 to 3.6 percent in 2008, before any effect of the crisis, according to IMF data.) The published version of the paper adjusts for this by focusing on "unexpected growth"—the forecast error for output growth during the 2008Q4–2009Q1 semester—instead of growth versus trend. This choice of measure should more accurately capture how the crisis changed growth in these countries, which is the key variable of interest.

One challenge resulting from this choice of measure of the growth shock, however, is that the available data are limited. Quarterly growth data are not available for many emerging markets and other developing countries, and several of the remaining countries lack the necessary forecast data, so the main regressions have a maximum of 29 observations. Many emerging markets are omitted from the sample, such as Bahrain,

Table 1. Regressions Explaining GDP Growth in Emerging Market Countries[a]

Independent variable	Full sample: Errors not clustered	Full sample: Errors clustered by region[b]	Sample omits Eastern Europe[c]	Sample omits Estonia, Latvia, and Lithuania
Unexpected growth in partner countries	0.732*	0.732**	0.783	0.659*
	(0.374)	(0.184)	(0.454)	(0.371)
Short-term external debt	–0.279**	–0.279**	–0.463	–0.265*
	(0.044)	(0.041)	(0.322)	(0.135)
No. of observations	29	29	19	26
Adjusted R^2	0.46	0.46	0.24	0.21

Source: Author's regressions.

a. The dependent variable is unexpected GDP growth in 2008Q4 and 2009Q1, defined as the difference between actual growth and the International Monetary Fund's April 2008 forecast; all growth rates are annualized. Except where stated otherwise, the sample consists of the 29 countries included in the main regressions in Blanchard, Das, and Faruqee (this volume). Numbers in parentheses are standard errors. Asterisks indicate statistical significance at the *10 percent and the **5 percent level.

b. Regions are Eastern Europe, Asia, Latin America, and other.

c. The omitted countries are Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Serbia, Slovak Republic, and Slovenia.

Bangladesh, Bolivia, Botswana, the Dominican Republic, Ecuador, Egypt, El Salvador, Jamaica, Jordan, Kazakhstan, Kuwait, Morocco, Pakistan, Romania, Singapore, Uruguay, and Vietnam. Moreover, the sample is dominated by countries in Eastern Europe—just over one-third of the sample is from this region. In comparison, more traditional emerging market samples that do not rely on quarterly data generally have less than 20 percent of the sample from Eastern Europe. Moreover, this unbalanced sample is not random, because the overrepresentation of Eastern Europe results from requirements on EU members to report quarterly data.

The authors are candid about this shortcoming with the sample size and careful not to ask too much of the data, given the limited degrees of freedom. Nonetheless, the small sample raises questions about whether the results are driven by outliers or by patterns in Eastern Europe or other small groups of countries that may not apply to the full set of countries. My table 1 reports several tests to see whether this is important. I focus on the main regression results in column 1-2 of the authors' table 1, in which the trade channel is measured by unexpected growth in trading partners and the financial channel by short-term external debt. The first column in my table replicates the results in the paper. The second column clusters errors by region—which, one could argue, is the preferred method of estimation. This increases the significance of the trade variable, and the financial variable remains significant. The next column then drops Eastern

Europe from the sample. The coefficients on both the trade and the financial variables are now insignificant. This suggests that patterns in Eastern Europe may be driving the results, but because the sample size is now so small, it may be too much to expect statistically significant results. To maintain a larger sample and some representation of Eastern Europe, the last column drops just three countries—Estonia, Latvia, and Lithuania—that appear to be outliers when residuals are plotted. Now the coefficients on partner growth and short-term debt are both borderline significant (at the 10 percent level), suggesting that these three countries in Eastern Europe may be important in driving the results.

This series of results suggests that it may be worth expanding the sample size to ensure that the results are not driven by a small subset of countries or by the specific characteristics of Eastern Europe. Of course, this is much easier said than done. One solution would be to continue using quarterly growth data, but to add countries that are traditionally classified as developed even though they share some characteristics with countries in the emerging market sample. For example, why not include Greece, Iceland, Italy, Portugal, and Spain? Income per capita in each of these countries is about the same as in Israel, Slovenia, or Taiwan—all of which are in the sample and are generally classified as emerging markets. The challenge in including these Western European countries may be political, in the sense that they might not appreciate being classified as "emerging markets"—especially by a group of authors from the International Monetary Fund.

A related issue to consider when interpreting the results is the possibility of omitted variables. The literature on contagion suggests a number of other mechanisms by which the crisis could have affected emerging markets (see Claessens, Dornbusch, and Park 2001). For example, the paper interprets the significant negative coefficient on short-term debt as showing the importance of the financial channel in spreading the crisis. But is there an omitted variable, correlated with short-term debt, that actually drives this relationship? For example, are countries that are riskier and more vulnerable more likely to have higher short-term debt ratios? Probably. And wouldn't these more risky and vulnerable countries be more likely to experience a large growth slowdown during the crisis as risk aversion increases—independent of their share of short-term debt? Similarly, other work on contagion has discussed how trade can spread crises through different effects, for example by affecting import demand and competitiveness (see Forbes 2004). The paper tests its measures of the trade channel individually, but it should test them simultaneously along with the various

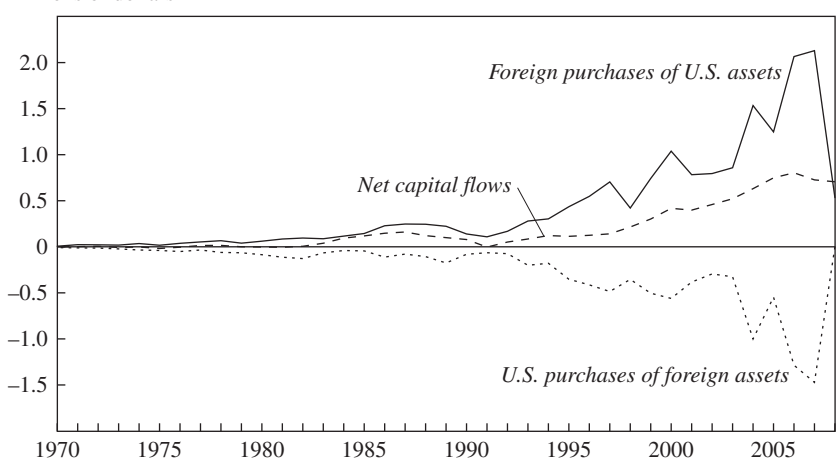
financial measures. Of course, the challenge in controlling for many of these factors simultaneously is again the small sample size, which again underscores the importance of extending the sample to more countries.

My final comment relates to the authors' model and its relationship to the empirical results. In the model, net capital inflows depend on the EMBI spread adjusted for a risk premium and home bias. A key assumption is that an increase in perceived risk or an increase in home bias causes investors and financial institutions in developed countries to reduce their foreign lending and thereby reduce net capital flows to emerging markets. This assumption is critical for the analysis. The reduction in net capital flows that results from an increase in home bias (assuming a given policy rate and unchanged reserves) reduces the trade balance, causes the home currency to depreciate, and lowers output. The model yields similar results if there is an increase in risk aversion: net capital flows and output again decline, although the effect on the exchange rate is ambiguous.

But how valid is the assumption that when the crisis hits, the result is necessarily to reduce net capital flows? This has been the standard assumption in a large literature on "sudden stops," which argues that during crises, capital flows to emerging markets suddenly cease (see Calvo 1998). But there has been little formal testing of this hypothesis. The authors deserve credit for at least mentioning that this assumption may not hold in all cases, although they leave exploring the ramifications for the model and the empirical analysis for future work. Moreover, the case study on Chile provides a clear example of an emerging market where this assumption does not hold—a great example of the benefits of doing detailed case studies.

But is this pattern of increasing rather than decreasing net capital inflows unique to the Chilean experience, or is it a broader phenomenon? My figure 1 shows gross capital inflows and outflows and the resulting net capital flows for the United States during the crisis. (I focus on the United States because data distinguishing gross flows by domestic from those by foreign investors are readily available.) The figure shows that gross capital inflows from foreigners fell in late 2008. At the same time, however, gross capital outflows by domestic investors were negative, suggesting that they brought home large amounts of capital previously invested abroad. As a result, net capital flows into the United States actually increased during this period. Granted, the United States is not an ideal comparator, as it is a developed country with large and liquid capital markets, which may have become relatively more attractive to investors during the crisis. The example does show, however, that changes in investment by domestic residents

Figure 1. United States: Capital Inflows and Outflows, 1970–2008



Source: Bureau of Economic Analysis.

can easily overwhelm changes by foreigners and lead to a net increase instead of a net decrease in capital flows during a crisis.

Do any countries other than the United States and Chile exhibit this pattern? As a rough test, I examine a group of 101 countries to see whether net capital flows in 2008Q4 were larger or smaller than in 2007Q4.[1] Table 2 shows that in the full sample, net capital flows increased in 45 countries but decreased in 56. Many of the countries in which capital inflows increased, however, are developed countries. The last row of the table therefore looks at the patterns for emerging markets only; it shows that emerging markets were more likely to see a decrease in net capital flows than an increase during the crisis. This "sudden stop" is apparent in many of the major emerging markets, including Argentina, Brazil, Peru, Poland, Russia, South Africa, and Turkey. But the table also shows that the pattern of increasing instead of decreasing net capital inflows is not unique to Chile among developing countries. In fact, even many countries in the authors' sample—including Colombia, the Czech Republic, Israel, Mexico, and Thailand—experienced a net increase in net capital flows in 2008Q4 over 2007Q4, contradicting their model's key assumption.

1. The sample includes all countries for which data were available. I focus only on the fourth quarter because, as of this writing, data for 2009Q1 are not as widely available, and only by comparing similar quarters can one control for seasonal effects that can significantly affect capital flows.

Table 2. Countries in Which Net Capital Flows Increased or Decreased from 2007Q4 to 2008Q4

	No. of countries	
Sample	*Increase*	*Decrease*
Full sample	45	56
Developed countries	14	7
Emerging markets	31	49

Source: International Monetary Fund, International Financial Statistics.

Given that this key assumption of the model does not appear to hold for a number of countries, many of its key predictions might not apply to this subset of countries. For example, for countries with net capital inflows during the peak of the crisis, the financial channel would not be expected to have as large an effect. To test this, it would be straightforward to repeat the main regression analysis but split the sample into two groups: those with net capital inflows (or at least not large outflows), and those with large net capital outflows. Given the small sample size, this would certainly be pushing the degrees of freedom, but it could show very different effects of the crisis for these two subsamples of emerging markets.

To conclude, this paper addresses a very important question: how did the crisis spread to emerging markets? It does an excellent job of laying out the key issues and testing several different hypotheses. It takes pains to evaluate several different theories but is challenged by the very stark limitations of the data—especially the small sample size, which makes it difficult to control for various effects and relationships simultaneously. Nonetheless, the empirical results seem fairly robust, especially given the limitations of the exercise, suggesting that financial mechanisms were likely the most important factor in transmitting the crisis to emerging markets during late 2008 and early 2009. Although this paper may not be the last word on the issue, it presents convincing evidence on how the crisis spread and should provide an excellent resource for anyone seeking to understand why a crisis that started in the U.S. subprime housing market had such virulent effects in emerging markets around the world.

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COMMENT BY

LINDA L. TESAR[1] The U.S. recession that began in late 2007 had significant spillover effects on the rest of the globe. This paper by Olivier Blanchard, Mitali Das, and Hamid Faruqee studies the impact of the U.S. financial crisis and the accompanying economic contraction on 29 emerging market countries in South America, the Middle East, Eastern Europe, and Asia. As figure 2 of the paper shows, the contraction experienced by emerging markets over the interval 2008Q4–2009Q1 was far from uniform. Lithuania, Latvia, Estonia, and Russia experienced "unexpected" economic growth rates (the difference between actual growth and the April 2008 IMF forecast) on the order of negative 25 percent, while Poland, Venezuela, and China experienced only mild declines. The objective of this paper is to explain the heterogeneity in these negative growth rates. In particular, the paper seeks to isolate which of two channels of transmission—openness to trade and openness to capital flows—is the more significant in accounting for cross-country differences in growth rates during the crisis.

This is a thought-provoking paper on an important and timely issue. It is well written and clear in its objective and in presenting its findings. The paper begins with a simple model of a small, open economy that trades with the rest of the world and has access to international credit markets. The model is a highly stylized IS-LM framework—one that abstracts from dynamics, expectations, and uncertainty—that the authors use to perform simple comparative static exercises. In this framework, a decrease in demand for a country's exports or a shift away from its assets will contract the aggregate budget constraint and, conditional on endogenous shifts in the exchange rate or adjustments in fiscal policy, will lead to a contraction in output.

The model motivates the regressions that are the core of the paper. In essence, the authors run a horserace between various measures of openness

1. I thank the authors for making the data used in their paper readily available, and my student Logan Lewis for his help in analyzing the data.

in the current and the capital accounts on the cross section of unexpected GDP growth rates in emerging markets during the two quarters of interest. The overall conclusion is that both channels played a role in global transmission, although the financial channel dominates in terms of statistical significance and magnitude. Using the authors' data, I was able to verify that the core results are robust to changes in the specification of right-hand-side variables, sample selection, and other factors. My comments therefore focus largely on the interpretation of the results and whether the takeaway from this paper is really as straightforward as the authors suggest.

THE THOUGHT EXPERIMENT. The premise of the paper is that emerging markets were the victims of a collapse in global demand for their goods and for their financial assets. The shock that hit emerging markets is assumed to be both external to the countries in the sample and common to all of them. The baseline regression implied by this thought experiment is a simple one: the dependent variable is unexpected growth in GDP in each country, and the independent variables include measures of each country's "exposure" to the shock: for example, trade as a share of GDP as a measure of the trade channel, and exposure to short-term debt for the financial channel. Other right-hand-side variables are tested, and in general, the financial variables come in significant and dominate the trade variables.

Of course, to conclude that the financial channel beats the trade channel, or even that the financial channel results are economically meaningful, one has to impose the all-else-equal assumption. As is clear even in this simple open economy model, the transformation of a fall in foreign demand for a country's exports or its assets into a contraction in output depends on a number of auxiliary assumptions about the structure of the economy. If countries differ in the strength of their financial institutions, in the degree of adjustment in goods prices or the exchange rate, or in elasticities of substitution between home and foreign goods and between home and foreign assets, to list just a few possibilities, the coefficients on the "trade" and the "finance" effects will differ across countries. In addition, there may be endogenous policy responses to the shock, which would mitigate its effects. Indeed, the bigger the exposure to the shock, the more likely other variables such as prices will adjust, and the more likely governments will react. What is effectively being estimated is the *net* effect of the shock on output, which results from a complicated mix of structural differences across countries and heterogeneous policy responses to shocks.

One could, in principle, control for some of these differences in order to isolate the "pure" trade and finance channels. The authors are well aware of the nature of the problem, and in a sense the model itself exposes the

various pitfalls in the regression analysis. Some controls are added to the regressions to try to address the issue, but one can only do so much in a regression with 29 observations. Therefore, the results should be viewed as a set of correlations between changes in output and external balances and not as a set of causal relationships.

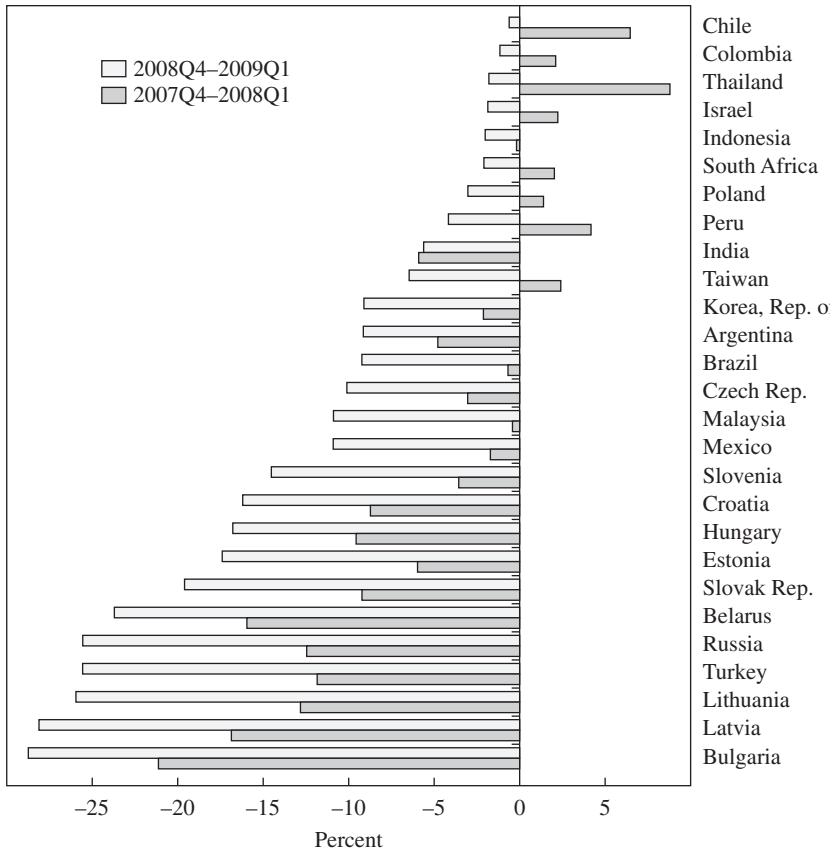
AN ALTERNATIVE INTERPRETATION. An alternative to the emerging-markets-as-victims scenario is that emerging markets, to a greater or lesser degree, rode the same credit boom that fueled the U.S. crisis. Low global interest rates, innovations in the banking sector, and rising real estate prices resulted in an easing of credit and a boom in both private and public expenditure in many countries. In this scenario the contraction in the second half of 2008 was triggered not so much by a collapse in global demand as by the global realization that the party was coming to an end.

The paper's description of the sequence of events in Latvia in 2007 and 2008 casts doubt on the emerging-markets-as-victims hypothesis. The case study of the Latvian crisis notes that "the right starting point is not the start of the crisis itself, but the boom that the economy experienced in the 2000s." Stock prices and real estate prices in Latvia soared in the mid-2000s, and despite rising domestic goods and services prices, the country maintained its peg to the euro. Access to credit, with real estate as collateral, resulted in high rates of consumption and investment growth. By early 2007, the paper notes, "signs of overheating and of an impending bust were starting to become apparent." In early 2008 GDP growth turned negative and asset prices began to fall—all of this well before the external shocks of mid-2008.

Perhaps not surprisingly, the Latvian financial sector increasingly had to shift to shorter lines of credit. Figure 10 of the paper shows that Latvia had the highest ratio of short-term external debt to GDP of any emerging market in the sample in 2007. This raises an important issue for the regression analysis. It is well known that as credit conditions tighten and risk assessments deteriorate, countries may become unable to borrow at long maturities. Short-term debt is then no longer an exogenous variable revealing a country's exposure to external credit market conditions, but an endogenous measure of its own creditworthiness. It is not clear then whether the correct specification is a regression of output growth on short-term debt or the other way around. Again, absent a more complete structural model and the imposition of plausible identifying assumptions, the best one can do is conclude that the two variables are correlated.

The Latvian case also suggests that in order to separate the "victim of external shocks" scenario from the "we got into the same trouble ourselves"

Figure 1. GDP Growth in 27 Emerging Market Countries, 2007Q4–2008Q1 and 2008Q4–2009Q1



Source: Author's calculations using International Monetary Fund data.

scenario, one can either use more country-specific information about the dynamics leading up to the contraction, or look carefully at the timing of the output collapse, or both. The collection of more country-specific information is beyond the scope of this paper, and certainly beyond the scope of this discussion. However, it is fairly easy to look at the patterns in output in the period preceding that studied in the paper.

I show in figure 1 GDP growth rates for 27 emerging market countries over two intervals: 2007Q4–2008Q1 and 2008Q4–2009Q1, the former being the semester one year before that on which the paper focuses,

and the latter the crisis semester itself. The countries are ranked by their growth in GDP in the latter period, calculated using GDP volume data from the IMF. This differs a little from the dependent variable in the paper, which is the estimated deviation from the April 2008 IMF forecast. However, the variable used in the regressions and the GDP growth rates calculated here have a correlation coefficient of 0.73, so the message here should not be affected by the use of slightly different data. (The results of the basic regressions in the paper can also be replicated quite closely using GDP volume data rather than the deviations-from-forecast series.)

The figure suggests that the cross section of growth rates in the second semester of 2007 is highly correlated with the cross section of growth rates in 2008. In fact, the two sets of growth rates have a correlation coefficient of 0.93. This means that the countries with weak economic performance in the last half of 2008, after experiencing the "external shock," were the same set of countries with weak performance in the last half of 2007, before the shock. Growth rates across the board were certainly lower in the latter half of 2008 than in the latter half of 2007. But what the paper seeks to explain is the cross-sectional distribution of GDP growth—why some countries fared so much worse than others—not why some countries have persistently low growth rates. If this distribution is the same before and after the shock, then it appears that one should be looking for longer-run reasons for differences in growth rates across countries and not the differential impact of a shock specific to the end of 2008.

Indeed, when the baseline regression is run including the growth rate for the second semester of 2007 as a control, both the trade and the financial variables lose their significance. Depending on the specification, some appear with the opposite sign. I am not suggesting that this is the most appropriate test—a test symmetric to those in the paper would use the deviation of growth in 2007 from the forecast, and there are serious problems of endogeneity in my regression. However, the fact that the regression is not robust to including growth in 2007, together with the very high persistence of growth rates, casts doubt on the empirical evidence that either the trade or the financial channel is the primary explanation for the cross-sectional distribution of growth in emerging markets in the latter half of 2008.

Now, setting the empirical evidence in this paper aside, do I believe that emerging markets were affected by their openness to global markets? Absolutely. But I also believe that those economies benefited from access to those markets in the period leading up to the crisis. The challenge remains what it was in the aftermath of previous emerging market crises: to develop models capable of explaining the dynamics before, during, and after the

crisis, and then, through the lens of those models, propose policy tools that can help countries manage their exposure, in good times and in bad.

GENERAL DISCUSSION George von Furstenberg raised three points. First, with respect to the specification of the risk premium, severe positive shocks to that premium were experienced by essentially all countries whether or not they had a collapsing housing bubble. Second, he was surprised that the authors were agnostic about whether the Marshall-Lerner condition holds in the long term for developing countries that generally are obliged to price their exports to market. Third, he thought the paper needed a better proxy for indebtedness effects.

Richard Cooper was troubled that the authors' sample was too small to allow for some necessary distinctions. He suggested thinking more aggressively about expanding the list of countries, to include, for example, smaller countries like Costa Rica. Given the constraint imposed by the need for quarterly GDP figures, he wondered whether the list could be enlarged by looking at industrial production for those countries that typically report monthly or quarterly industrial production data. From the estimated relationship between GDP and industrial production for the countries that have both sets of data, one could then simulate quarterly GDP data for those that do not.

Cooper also would have liked to see the paper distinguish between the impact of trade shocks that initially fall on the government—the case for most oil-exporting countries, as well as Russia and Chile, two of the three countries examined in the case studies—and that of shocks that initially fall on the private sector. He agreed with the authors' position on the Marshall-Lerner condition. Although von Furstenberg's point was valid, if a country has a large external debt denominated in foreign currency, then, starting from a current account deficit, it is very easy to imagine circumstances in which the Marshall-Lerner condition would not be met. Hence, the authors' agnosticism is warranted.

Susan Collins agreed with Cooper that there are often situations, especially in the short run, in which the prerequisites for the Marshall-Lerner condition are not satisfied. She encouraged the authors to devote more attention to the extent to which having accumulated reserves helped, given that their usefulness is currently such a huge issue in the literature and the policy debate. She also noted that for a variety of reasons it is important to think about the role of domestic investors. In the paper's case

studies, domestic investors obviously mattered in both Russia and Chile, but in different ways. In the older literature on capital flight from developing countries, before there was a lot of investment by the foreign private sector, domestic investors were seen as the main source of net capital outflows. Not only are domestic investors important, but their role can differ across countries. Because they know the domestic economy better, foreign investors may look to their behavior when deciding whether to enter, stay, or leave.

Kathryn Dominguez agreed with Kristin Forbes that the paper needed to do more to take initial conditions into account. One way to do this might be to examine what the model would have expected for the emerging market countries in the sample when the financial crisis initially hit the developed countries. In the authors' regressions, both initial conditions and the crisis show up as significant factors in the results. As a consequence, countries whose initial conditions were poor and made worse by the crisis are indistinguishable from other countries that were doing well before the crisis but were hit particularly hard by it. These effects should be separated out.

Gregory Mankiw agreed with Forbes that the dataset ought to be expanded to include some developed countries whose income per capita is comparable to those of the richer emerging markets. Beyond that, he suggested including France, Italy, and some other higher-income countries as well. The important question is why the developed countries fared differently in the crisis from emerging market countries, and it seemed natural to at least make the comparison. Indeed, a future Brookings Paper might take the methodology one step further and apply it to U.S. states, whose performance in the crisis was also heterogeneous.

Alan Blinder noted that both discussants had raised the issue of timing, as had Dominguez. He thought it would be interesting to know whether the countries in the authors' sample had already decoupled before the fourth quarter of 2008. The paper gave the impression that there was decoupling, but that it ended with the shock; it would be interesting to see to what extent there was actually "coupling" before the shock. He also suggested exploring whether countries' level of external debt interacted with—and whether their outcomes differed depending on—the nature of the exchange rate regime. Finally, it would also be interesting to know whether the foreign currency composition of countries' debt on the eve of the crisis looked different than it had several years before, and whether countries differed in this respect. This might show to what extent countries had learned the

lesson of 1997, which demonstrated the horrific wealth effects possible from issuing debt denominated in foreign currencies.

David Romer noted that although the case studies were interesting in themselves, they lacked a strong link to the rest of the paper. They provided interesting detail on the mechanism by which the shock was transmitted, and they suggested potentially important variables that had not been considered previously and for which good measures were lacking. The case studies might also provide evidence about whether the relationships found in the paper's regressions reflected omitted variables or causal effects. For example, Latvia is an influential observation in the short-term debt analysis, but the case study of that country suggested that its high short-term debt was really a symptom of an unsustainable boom. If Latvia's short-term debt had been lower while everything else remained the same, its outcome might have been closer to what the regression predicted. To some extent, short-term debt seemed to be proxying for other things.

Robert Gordon endorsed Richard Cooper's suggestion of expanding the sample by using quarterly interpolations for countries that publish only annual data. He recalled that his own very first paper had used quarterly data generated using the Chow-Lin method of interpolation, which is still the best technique available and automatically aligns quarterly estimates with annual figures. But any number of methods for interpolating monthly or quarterly data could be used, and indeed one could use different interpolators for different countries.

Valerie Ramey added that in the early postwar period the Economics and Statistics Administration, the predecessor agency of the Bureau of Economic Analysis, had published quarterly nominal GDP data going back to 1939, whereas the currently available data go back only to 1947. She had come across the earlier data and figured out how to create deflators to link them with a plausible series of quarterly real GDP. Her results lined up almost exactly with Gordon's interpolated quarterly real GDP series, especially at the important turning points around the beginning of World War II. If one could successfully do interpolations for the United States going back that far, it should also be possible for more recent low-frequency data from other countries, and the sample could probably be doubled.

Justin Wolfers asked Kristin Forbes whether her discussion implied that she thought that the paper's findings were not very robust. After all, the authors had rerun the regressions in different ways, testing for robustness and stability, and the coefficients had rarely moved by more than half of a standard error. What did change was their statistical significance. Forbes

responded that the sample was so small that significance does vary depending on whether one includes or excludes one or two countries, or whether one includes or excludes an additional control, but she thought that with the addition of more countries, the robustness and the results would probably hold up.

Christopher Sims was skeptical of the short-term debt variable, which he saw as basically an endogenous variable that may not be that useful. Both short-term debt and reserves ought to be thought of as endogenous, and the authors' case study of Chile showed that what really matters is the credibility of monetary and fiscal policy. A country with a credible monetary and fiscal regime can borrow if it runs out of reserves; less credible countries cannot. He read the regression results as showing that the regression coefficient on the short-term debt variable did fall when Latvia was taken out of the sample, demonstrating that it was not just the statistical significance that changed.