Preliminary, comments welcome

The Cross-Country Incidence of the Global Crisis*

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Abstract

We revisit the question of whether the cross-country incidence and severity of the 2008-2009 financial crisis is systematically related to pre-crisis macroeconomic and financial factors, with a particular emphasis on cross-border financial linkages. We find that the pre-crisis level of development, buoyancy of economic activity and credit, external vulnerabilities, and openness to trade are helpful in understanding the intensity of the crisis. We find no evidence that higher financial integration contributed to the severity of the crisis—indeed, after controlling for the above-mentioned variables, more financially integrated economies experienced smaller output declines.

Keywords: financial crisis, current account, private credit, international financial integration.

JEL Classification: F31, F32

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I. INTRODUCTION

Our general goal in this paper is to understand the cross-country variation in the macroeconomic impact of the global financial crisis of 2008 and 2009. In particular, we aim to identify initial conditions that may help to explain the differential response of output and demand in different countries and regions to the global shock, with a special emphasis on financial factors, both domestic and cross-border. The standard narrative of the transmission of the global financial crisis emphasizes the role played by international financial linkages. The original shock in the US financial system led to disruption in the financial systems of several advanced European countries and others around the world. In turn, the disruption in the financial system gradually transmitted to the real economy, with the financial crisis inducing a contraction in economic activity and remarkable declines in international trade and international capital flows in late 2008 and early 2009.

While the scale of the crisis was clearly missed by most commentators, with the benefit of hindsight its transmission across countries seems easier to understand. The most affected countries—particularly those that had to rely on external support—had severe asset price bubbles, large financial sector exposures, and/or heavy reliance on external capital flows because of large current account deficits. Yet the empirical work by Rose and Spiegel (2009a, 2009b) indicates that it is very difficult to understand the cross-country variation in the depth of the crisis if we focus on variables measuring cross-border trade and financial linkages. More generally, these authors fail to find any pre-crisis variable that is a robust correlate of the decline in growth since the onset of the crisis, in contrast with the "impressionistic" view sketched above.

In our empirical work we revisit the question of whether the cross-country incidence and severity of the crisis is systematically related to pre-crisis macroeconomic and financial factors, and argue that the evidence supports at least in part the "impressionistic view" that pre-crisis variables are helpful in understanding the intensity of the crisis. We focus on the impact of the crisis on the level of economic activity, rather than on the cross-country variation in the scale of the decline in asset prices or financial flows. In addition to examining the differences in output growth across countries, we also examine the dynamics of consumption and, more broadly, total domestic demand. This is important, since much of the theoretical literature on international financial integration focuses on the possibilities provided by international capital markets for the de-linking of domestic expenditure and domestic production. Through ex-ante risk sharing, domestic wealth is diversified away from an exclusive reliance on domestic assets and part of the risk of domestic shocks is transferred to foreign investors. Through international borrowing and lending, domestic expenditure can be smoothed in the event of a domestic production shock, even if ex ante risk sharing is low or non-existent.

However, in the other direction, financial integration also means that domestic macroeconomic behavior can be affected even if there are no shocks to domestic production. First, the wealth of domestic agents is influenced by the impact of foreign asset price shocks both directly through the holding of foreign assets and indirectly through the international transmission of asset price shocks across borders (Krugman 2008, Devereux and Yetman 2009). Second, an international shift in the level of risk aversion will affect the cross-border lending and borrowing possibilities for domestic agents.

We may expect the relative importance of these factors to differ across countries in line with differences in the degree of international financial integration and the vulnerability of different countries to a shift in international credit conditions. In our empirical work, we seek to establish whether there are indeed links between such measures and the severity of the macroeconomic crisis.

In relation to output dynamics, we may also expect that the global credit crisis would most adversely affect production in those countries that were most reliant on credit during the pre-crisis period. In particular, it is plausible that those economies in which domestic private credit was growing strongly and which were experiencing net capital inflows during the pre-crisis period may have faced the greatest adjustment difficulties once the credit crisis hit. In particular, these economies would a greater adjustment challenge in dealing with the contraction in the supply of credit and the increase in the cost of credit.

In addition to such financial factors, the dramatic decline in world trade during late 2008 and early 2009 and the especially adverse impact of global uncertainty on the durables sector mean that part of the differential macroeconomic response to the crisis can likely be attributed to differences in national exposures to world trade and the relative size of the manufacturing sector. Accordingly, we explore the extent to which these real-side variables are correlated with the intensity of the crisis.

Our focus is on the cumulative shift in output, consumption and total domestic demand over 2008-2009, and how international financial integration has influenced macroeconomic behavior over this period—we do not attempt to trace out the higher-frequency transmission of the global crisis. Hence our study is complementary to the many recent contributions that have examined in detail the higher-frequency dynamics by which the international financial system propagated the initial shock in the US sub-prime market throughout the global system.

In terms of other related literature, the already cited contributions by Rose and Spiegel (2009a, 2009b) examine output growth in 2008 jointly with several asset market indicators, while Berglof et al (2009) examine projected output growth for 2009 for a large group of countries and output growth over the last quarter of 2008 and the first quarter of 2009 for a smaller group of Central and Eastern European countries. In contrast, we consider the

behavior of macroeconomic variables over a two year interval (2008 and 2009, where the 2009 data are based on projections as of October 2009) and include consumption and total domestic demand in addition to GDP. We think that a time period encompassing two years is likely to better capture the incidence of the crisis, particularly since we consider the largest possible sample of countries and the transmission of the crisis to many economies, particularly emerging and developing ones, took place gradually.

Our paper is organized as follows. In Section II we briefly discuss our conceptual framework. In section III we provide the key stylized facts associated with the 2008-2009 crisis in terms of the cross-country variation in the scale of the growth slowdown in output and the various components of domestic expenditure. In Section IV we investigate the covariates of the growth slowdown in a cross-country regression framework, with a particular emphasis on the role played by indicators of international financial integration. Section V concludes.

II. THE CRISIS: KEY CHANNELS OF TRANSMISSION

There is already an extensive literature detailing the development of the financial crisis (see, for example, Brunnermeier, 2009; CES Ifo, 2009). In this section we briefly sketch different crisis transmission channels and discuss which pre-crisis factors could help capture the intensity of these channels.

The first channel of transmission was exposure to U.S. assets backed by sub-prime mortgages. [1] A cross-country measure of sub-prime exposure could be obtained from the U.S. Treasury survey of U.S. portfolio liabilities as of end-June 2007 (just before the inception of the crisis). This survey reports the amount of U.S.-issued private mortgage-backed securities held by foreign residents on a country-by-country basis. As discussed in Milesi-Ferretti (2009), these data show the relatively high exposure was in several advanced European countries with large banking systems (such, as for example, France, Germany, Switzerland, and the United Kingdom) whose financial institutions were severely affected by the sub-prime shock. However, it is difficult to make use of these data for a more systematic cross-country analysis, primarily because the residence of the financial entities holding these securities is not necessarily a good proxy for their ultimate exposure: for example, the largest holder of these securities was by far the Cayman Islands. An alternative (albeit less precise) measure of exposure would be the size of cross-border bank positions.

A second channel of international financial transmission was a global increase in risk aversion, itself related to two factors:

[1] Empirical work by Acharya et al. (2009) documents how banks more exposed to these assets experienced larger losses.

a. The realization of the extent of systematic under-pricing of risk in previous years (including in lending to "risky countries"). The dramatic change in risk perceptions and tolerance would hit hardest those countries with large current account deficits, large net external liabilities, or large gross liabilities with currency and maturity mismatches.

b. The prevalence of real estate and asset price bubbles. This channel would suggest that variables such as the growth in domestic credit, as well as measures of growth in asset prices, may be correlated with subsequent declines in output growth and demand.

A third, related channel of transmission operated through the reliance on those financial systems that got hit hardest by the crisis. The most obvious channel here would be through foreign banks pulling back funds and curtailing credit. Given that the banking systems of advanced economies were those disproportionately affected by the crisis, net liabilities to BIS-reporting countries could proxy for the intensity of this channel. More generally, borrowing countries suffered also through the dependence on external bond financing, because financial intermediaries, such as hedge funds, which were important investors in portfolio instruments were forced to reduce leverage because of withdrawals. Measures of gross and net external debt liabilities would be possible measures capturing the intensity of this channel (the latter measure would take into account the possibility of using foreign exchange reserves to offset loss of access to external financing).

Finally, a key channel of transmission was through the global collapse in trade, and particularly in demand for durable and investment goods, driven by uncertainty, credit woes etc. Because manufactured goods are more "cyclical", their producers are likely to suffer more. And of course openness to trade increases the exposure to external demand shocks. A related channel is the collapse in demand for commodities (oil prices plummeted) that hit the revenues of commodity exporters. However, we are looking at growth over 2008-09, a period during which, on average, oil prices and commodity prices in general were very strong. In any case, in our empirical analysis we investigate whether results are affected by the inclusion or exclusion of oil-exporting countries.

III. DESCRIBING THE CRISIS

We focus on crisis measures defined in terms of declines in economic activity (rather than as declines in asset prices). Specifically, we construct several measures of crisis intensity, based on the growth rates in output, domestic demand, and its components (private and public consumption, investment, exports, and imports). For output and demand growth, these crisis measures take two forms:

- the growth rate during 2008-2009;
- The change in the growth rate between 2008-2009 and the boom period 2005-2007.

Projected growth rates for the year 2009 are taken from the October 2009 World Economic Outlook. We use these data, together with data on a set of correlates dated prior to the onset of the crisis, to identify a number of stylized facts. We focus first on the geographical pattern of the crisis, and then turn to a characterization of pre-crisis variables in countries differentially affected by the global downturn. A simple statistic can convey the intensity of the crisis: for about 50 countries, the growth rate during 2008-2009 was at least 4 percentage points lower than during the period 1990-2007.

A. Change in growth rates

In order to characterize the geographical dimension of the crisis, we construct a global ranking for each of several macroeconomic crisis measures (changes in output growth, demand growth, private and public consumption growth, investment growth, export growth, and import growth) and then average the rankings. Different crisis measures are correlated, but not dramatically so. In particular:

- The correlation of changes in private consumption growth with changes in output growth is modest. However, the correlation rises significantly if we exclude oil exporters. A possible explanation is that in these countries the decline in oil output growth was significant given the world slowdown, but consumption levels remained high, also helped by the strong terms of trade.

- The correlation of export growth with GDP growth is relatively strong, but the correlation of export growth with domestic demand components is weak. Again, this is not very surprising, to the extent that export growth is primarily driven by the strength of demand in trading partners.

As documented in Table 1A, the crisis has a strong regional component: emerging Europe plus countries of the Commonwealth of Independent States (CIS) altogether account for 11 of the "top 20" crisis countries. [2] The second highest total (4 countries) is for Latin America (Argentina, Dominican Republic, Mexico, and Venezuela), followed by advanced economies (3 countries: Iceland, Ireland, and Spain). The top panel of Table 2 provides more systematic evidence of the significant regional differences in the incidence of the crisis, with emerging Europe, CIS, and industrial economies experiencing the sharpest declines in growth, while these declines were more modest in Africa and the Middle East.

The top panel of Table 3 provides a list of the most severely affected countries, highlighting how the Baltic countries, the Ukraine, and Iceland were affected particularly severely. Some individual country patterns prima facie suggest the importance of cross-border linkages. For example, Mexico is among the "top 20" countries in terms of output and demand declines,

[2] Berglof et al (2009) focus on the factors explaining the incidence of the crisis on the region.

with the swine flu epidemic and linkages to the U.S. economy likely playing a crucial role. Also, Hong Kong and Sweden experienced significant declines in output and demand. Both countries are large exporters and were hit hard by the global contraction in trade; in addition, financial linkages may have again played a role, in light of the crucial importance of the financial sector for Hong Kong and the exposure of the Swedish banking system to Baltic countries.

B. Growth levels

Measures of the crisis based on changes in growth rates can single out countries that experienced significant output declines, but where growth remained positive, and miss others that were growing more slowly in the period 2004-2007 but then experienced a severe recession. A major difference between a rank analysis of changes in growth rates and growth levels during the crisis period is the heavy presence of industrial countries among the countries with the lowest growth levels during 2008-09. Indeed, industrial countries and countries in emerging Europe account for 18 of the top 20 and 27 of the top 30 crisis countries when ranked by the 2008-2009 growth rate (Table 1B). There are two reasons for this: one is the "industrial country nature" of the crisis, and the second is the fact that average growth rates in industrial countries, while high, were lower pre-crisis in comparison to growth rates for emerging markets, and hence overall growth declines were not necessarily as large (Table 2).

Among individual countries, those that experienced the most severe crisis are the Baltics, Ukraine, and Iceland (Table 3, bottom panel), followed by Italy, Hungary, Mexico, and Japan. Again, this evidence *prima facie* suggests a variety of mechanisms at play: Italy and Japan were not severely affected by sub-prime spillovers, but Italy was facing growth woes before the crisis, and Italian banks have large exposures to CEE countries. On the other hand, Japan was also growing more slowly and, as a large exporter of manufactured goods, suffered from the collapse in investment across the globe. It is also interesting to note that the 3 countries among the 30 that have experienced the most severe crisis that are not emerging European or industrial countries are Mexico, El Salvador, and Taiwan, suggesting the importance of linkages to the United States as well as of trade.

Finally, it is worth pointing out that some commodity exporters (which experienced big declines in output growth, and hence rank high among crisis countries using the change in growth measure), did not experience the most severe recessions: among those are Latin American countries such as Argentina and Venezuela as well as CIS countries such as Russia, Armenia, and Kazakhstan.[3]

[3] These findings clearly depend on the chosen definition of the crisis period (2008-2009). In these countries, growth until mid-2008 was sustained by record-high oil and commodity prices.

C. Pre-crisis variables and crisis outcome

Having established some initial stylized facts on the geographical incidence of the crisis, we turn now to a characterization of real and financial indicators in countries that were most severely affected by the crisis. We focus on 3 crisis measures related to output, private consumption, and total domestic demand. Our threshold to identify countries most severely affected by the crisis is a decline in the growth rate of at least 4 percentage points relative to the period 2004-2007, as well as a negative growth rate during 2008-2009. For the entire sample, there are over 40 countries that satisfy this definition for output and demand (around 25 percent of the sample), and over 30 for private consumption growth (around 20 percent of the sample). [4] We then select a threshold that singles out the same number of countries in the sample whose growth performance has instead been strongest and compare the mean and median values of several macroeconomic and financial variables across the two samples. We should note that on the basis of the chosen threshold the United States does not stand out as one of the countries most severely affected by the global crisis—the U.S. suffered a severe crisis according to the decline in domestic demand growth definition, but not according to the decline in output growth or consumption growth definition.[5]

Our core group of macroeconomic and financial variables includes GDP per capita, the current account balance in the run-up to the crisis (average over the period 2004-2007), the level and growth rate of private credit in the run-up to the crisis (2004-2007), and a series of variables related to gross and net external exposure of countries as of end-2007, such as the level of financial openness, the net position vis-à-vis BIS-reporting banks, and the net foreign asset position.

The results for the change in output and demand growth are presented in Table 4, which reports the difference in median values and mean values across the 'severe crisis" and "less severe crisis" samples, as well as the t statistic for the test of whether the difference in mean values is statistically different from zero. One striking result is the much higher level of very large difference in GDP per capita between the countries more severely affected by the crisis and those least affected. Indeed, there are no low-income countries (defined as countries with GDP per capita below $1,000 in 2007) that experienced a severe GDP crisis, and only one that experienced a demand crisis. Among other notable differences between the two samples,

[4] The decline in private consumption is generally more modest than the decline in output and demand, while the decline in investment is larger.

[5] This may help explain the finding of Rose and Spiegel (2009b) who fail to uncover any statistically significant link between bilateral trade and financial linkages with the United States and the intensity of the crisis. We also experimented with a variety of controls for bilateral financial and trade linkages vis-à-vis the United States in our statistical analysis, but find little evidence of a statistically significant relation between these linkages and the intensity of the crisis.

countries experiencing a more severe crisis tend to have a larger share of manufacturing in GDP, higher levels of the ratio of private credit to GDP, and a higher growth rate of private credit over GDP for the period 2004-2007. It is more difficult to identify clear stylized facts from the set of international financial variables, because of the importance of financial center outliers that have a very strong influence on mean values. For example, the mean difference in the financial openness ratio between the two samples is over 800 percent of GDP, skewed by the presence of Luxembourg among the crisis countries. [6]

We therefore performed a second set of mean and median comparisons between the countries most and least affected by the crisis on a reduced sample which excludes both low-income countries (those with GDP per capita below 1000 dollars in 2007) and financial centers, defined as countries with a financial openness ratio in 2007 that exceeds 800 percent, plus a selected group of small countries that are international banking centers or with significant offshore activity.[7]

The results are presented in Table 5, again for output and demand crises (the results for private consumption crises are virtually identical to those for demand crises). Differences in the share of manufacturing, private credit level and growth rate, and GDP per capita still persist, but in addition a number of variables related to net external vulnerabilities (the current account balance in the pre-crisis period, the net external position, the net position vis-à-vis BIS banks, and the net debt position) show significant differences between the two samples, with the countries more severely affected characterized by higher current account deficits and net external liabilities. These differences are also economically significant: for demand crisis countries, the current account balance was worse on average by close to 10 percentage points of GDP, with a median difference of 6 percentage points of GDP. And for output crisis countries, the pre-crisis growth rate in credit exceeded the one for the least affected countries by 17 percentage points.

Given the financial nature of the crisis, it is also interesting to ask how financial centers fared relative to other countries. 50 percent of them were among the "severe crisis" countries (according to both the output and demand definition)—more than double the ratio of the rest of the countries in the sample. A more formal comparison shows that financial centers had significantly lower output and demand growth during the crisis relative to all other countries; the mean decline in output and demand growth was also larger, but not significant at the 95 percent confidence level.

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[6] At end-2007, the sum of financial assets and liabilities in Luxembourg was over 200 times GDP.

[7] The first group includes Bahrain, Belgium, Cyprus, Iceland, Ireland, Liberia, Luxembourg, Malta, the Netherlands, Hong Kong S.A.R., Singapore, Switzerland, and the United Kingdom. The second includes Belize, Mauritius, Panama, Samoa, Seychelles, St. Vincent and the Grenadines, and Vanuatu.

In Figure 1-3 we provide some visual evidence of the strong correlation between the decline in output and demand growth and variables such as GDP per capita, the growth rate in private credit, and the 2007 current account balance.

In sum, these results lend support to the notion that the recent financial crisis affected advanced economies particularly severely, and that countries with a high share of manufacturing in GDP, high credit growth rates, high current account deficits, and net external liabilities—particularly in the form of debt—were among those experiencing higher output and demand declines. Of course some of these variables are correlated: for example, richer countries are also more financial developed, and have higher ratios of credit to GDP. We therefore turn now to multivariate econometric analysis to investigate which pre-crisis variables show statistically significant conditional correlations with output and demand declines.

IV. CROSS-COUNTRY EVIDENCE

We investigate the covariates of the output slowdown by estimating specifications with the format

$$\Delta\widehat{Y}_i = \alpha + \beta_1 * R_i + \beta_2 * F_i + \beta_3 * Z_i + \varepsilon_i$$

where $\Delta\widehat{Y}_i$ is the difference between average GDP growth in 2008-09 and 2004-07 ($\Delta\widehat{Y}_i = \widehat{Y}_{i0809} - \widehat{Y}_{i0407}$), the vector R_i consists of real-side variables, F_i of financial-side variables and Z_i of general control variables. Note that we do not include any regressors that are based on 2008-2009 realizations; rather, our goal is to identify 'initial conditions' that help to explain the slowdown during this period.

The real-side variables are the level of trade openness in 2007, the manufacturing share in GDP in 2007, and an oil dummy that scores 1 for oil producers and 0 otherwise. The first two variables are included since the global transmission of the global recession was clearly intermediated through a significant contraction in world trade and an especially large decline in the manufacturing sector. An oil dummy is also included to take into account the impact of the shift in oil prices on economic activity levels in oil-exporting nations. (We will also report results for a subsample that excludes the oil-exporting group.)

We consider both domestic and international financial variables. In relation to the former, we include the growth rate of private credit over 2004-2007. This is included in view of the potential structural vulnerabilities generated by rapid credit growth during the pre-crisis period. In relation to the international financial variables, we consider both net and gross measures. We include the 2007 value for the current account balance, since the increase in risk aversion during the crisis plausibly had a differential impact on deficit countries relative

to surplus countries.[8] In particular, output may be disrupted a sudden stop or reversal in capital flows on countries operating with large deficit positions.

We also explore the contribution of measures of gross international financial integration. As an aggregate summary indicator of international financial integration, we consider the gross scale of the international balance sheet measured at the end of 2007, as captured by the indicator $IFI = (FA + FL) / GDP$. This measure has been widely used in previous empirical research.[9] The advantage of this variable is the level of cross-border investment positions represents an important financial transmission mechanism. A country's direct exposure to a decline in asset values in a given market varies in proportion to the scale of its holdings in that market. Similarly, disruption in a particular credit market has the most direct impact on the biggest issuers of liabilities in that market. However, a larger international balance sheet may also provide valuable diversification in the event of instability in the domestic financial system. A country is less exposed to declines in domestic asset values to the extent that it has issued claims on domestic assets to foreign investors and reduced domestic holdings in favor of a more internationally diversified asset portfolio. Accordingly, it is not clear on an ex-ante basis whether a larger international balance sheet should be associated with a greater or lesser exposure to the global crisis. We enter this variable in log form, in view of the skewed nature of the cross-sectional distribution of this variable, with a small number of international financial centers showing very large values for this variable.[10]

Finally, we include the level of GDP per capita and the "excess" growth rate of GDP over 2004-2007 (that is, average output growth during 2004-2007 relative to the 1990-2007 average growth rate) as general control variables. The level of GDP per capita is included since financial development indicators are correlated with the overall level of development, such that it is potentially important to differentiate between financial factors and the general level of development. The excess growth rate is included, since above-trend growth during the pre-crisis period may be a signal of "overheating" in an economy.

We report results for the full sample of countries; in addition, we also estimate the specifications for subsamples that exclude the oil exporters, low-income countries (using a threshold of $1000 for 2007 GDP per capita), and small financial centers. The rationales of excluding low-income countries are data-quality issues, as well as the fact that low-income countries rely more heavily on official forms of international finance and are less exposed to

[8] We also experimented with the inclusion of the net foreign asset position. However, this variable is highly correlated with the 2007 current account balance and did not provide any extra explanatory power.

[9] Recent examples include Kose et al (2009a, 2009b).

[10] Furthermore, we exclude Luxembourg from all the regressions, given the very extreme level of IFI for this country.

private-sector financial flows. The rationale for excluding small financial centers is the fact that variables related to financial openness and, in some cases, net foreign assets take extreme values, complicating statistical inference.

Table 6 displays the results for the output slowdown. Column (1) reports results for the fill sample; column (2) for a sample excluding oil exporters; column (3) for a sample excluding low-income countries; and column (4) for a sample excluding both low-income countries and financial centers. In relation to the full sample results, column (1) of Table 1 broadly confirms the results of the analysis presented in the previous section. Namely, the decline in growth performance was larger in countries with higher income per capita, high pre-crisis credit growth, high pre-crisis output growth relative to trend, current account deficits, high trade openness, and a high share of manufacturing output. Interestingly, higher international financial integration is positively correlated with the change in output growth, in contrast with the notion that financial globalization "per se" was detrimental to output performance. Instead, this finding is consistent with an interpretation by which the positive diversification properties of a large international balance sheet provided some insulation against the downturn. Overall, the explanatory power of the regression reported in column (1) is quite good, with an adjusted R2 of 0.45.

Results are generally robust to changes in sample specification (columns 2-4). The main exception is that the coefficient on the size of the manufacturing sector is no longer individually significant, and the significance of the current account balance declines, even if the absolute magnitude of the coefficient on the current account balance doubles in size relative to column (1). In terms of the specific sub-samples, oil exporters had similar growth declines when compared to other countries, but a significantly higher current account balance. It is worth noting that the collinearity between credit growth and the current account balance increases when low-income countries are excluded.

In Table 7 we present a similar set of regressions to explain the decline in the growth rate of domestic demand. Overall, results are similar to those presented in Table 6, and the fit of the regressions is improved relative to Table 6 (in the first three samples the regression explains over 50 percent of the variance in the change in demand growth). The coefficient on the current account balance is now considerably higher and always strongly significant—countries with large current account deficits in the pre-crisis period experienced sharper declines in domestic demand. Holding other variables constant, a current account deficit larger by 4 percentage points of GDP is associated with a decline in demand growth which is 1 percentage point larger—an economically significant effect. Similarly, the coefficient on private credit growth is higher: higher pre-crisis credit growth is associated with a stronger demand slowdown during the crisis.

In sum, the empirical results emphasize the "advanced economies nature" of the crisis, as well as the importance for explaining the decline in output and demand growth rates of

various measures of buoyancy of economic activity pre-crisis (credit growth rates, growth rate relative to trend), external vulnerabilities (larger current account deficits), and exposure to trade and production of traded goods.

While the decline in output and demand growth are certainly key indicators of the impact of the crisis, the theoretical literature also heavily emphasizes that international financial integration may facilitate international risk sharing, with domestic consumption insulated from the country-specific component of domestic GDP fluctuations. On the other hand, financial integration also implies that domestic consumption will be affected by international wealth shocks even if domestic GDP is unaffected. In addition to the risk sharing dimension, it is also important to take into account that an increase in risk aversion and a tightening of lending standards were central features of the global credit crisis. Accordingly, it is plausible that there has been a shift in the ability to borrow, with a requirement that deficit countries rebuild the value of their net external positions.

For these reasons, we also run a second set of regressions where the dependent variable is the growth rate of consumption over 2008-2009. In particular, we examine how measures of international financial integration and creditworthiness affect the relation between output growth and consumption growth during the crisis period.

Our general specification can be written as

$$\hat{C}_i = \alpha + \beta \hat{Y}_i + \sigma IFI_i + \theta IFI_i * \hat{Y}_i + \chi VULN_i + \varepsilon_i$$

where $\hat{C}_i$ is the consumption growth rate over 2008-2009, $\hat{Y}_i$ is the output growth rate, IFI_i is a measure of international financial integration and $VULN_i$ are measures of net financial vulnerability. In relation to financial vulnerability, we consider two main measures of exposure to credit markets: the current account balance in 2007 (in percent of GDP) and the growth rate of private credit during the 2004-2007 pre-crisis period.

We include the output growth rate, since a natural benchmark under limited financial integration is that consumption growth should be influenced by output growth. For international financial integration, we use a dummy variable that takes the value of 1 if the sum of external financial assets and liabilities is over 150 percent of GDP and the country is not a large net debtor. [11]We estimate whether IFI and VULN measures directly matter for consumption growth. In addition, we interact the IFI measure with the output growth rate in order to assess whether higher integration reduces or amplifies the sensitivity of domestic

[11] We use a threshold of -50 percent of GDP for the net external position, so as to avoid counting as highly financially integrated countries that have large net external liabilities as a ratio of GDP.

consumption growth to domestic output growth. To the extent that a high level of international financial integration means that foreign investors share domestic output risk, we would expect consumption growth to be less sensitive to GDP fluctuations. If access to credit and the cost of credit disproportionately deteriorated for countries running current account deficits and that experienced rapid credit growth during 2004-2007, we would expect to observe lower consumption growth in these countries.

The results for the consumption growth regressions are presented in Table 8.[12] As in Tables 6 and 7, we report results for four cuts of the data, with the full sample included in columns (1), oil exporters excluded in column (2), low-income countries excluded in column (3), and low-income countries and financial centers excluded in column (4).

Overall, results clearly point to a very strong correlation between consumption growth and domestic GDP growth, consistent with a globally-incomplete level of international financial integration. We also find little evidence that this link is weaker in more financially integrated countries. For the sample that excludes oil exporters, we find evidence that the slowdown in private consumption growth was larger in countries with higher private credit growth. The size and significance of the coefficient on private credit growth drops significantly when financial centers are excluded—these countries had on average high private credit growth and significant declines in private consumption. For the sample excluding low-income countries and financial centers (column 4) a larger pre-crisis current account deficit is significantly associated with lower private consumption growth.

Finally, the existence of financial frictions means that wealth shocks may also affect other types of domestic demand (investment, inventories, and the government sector). For instance, the state of corporate balance sheets may affect investment decisions. In addition, tax revenues and funding costs for public debt may be adversely affected by a decline in wealth. Accordingly, we also run a third set of regressions that adopt the same format as for the consumption equations but with the growth rate in total domestic demand as the dependent variable

$$\hat{D}_i = \alpha + \beta \hat{Y}_i + \sigma IFI_i + \theta IFI_i * \hat{Y}_i + \chi VULN_i + + \varepsilon_i$$

where $\hat{D}_i$ is the growth rate of total domestic demand over 2008-2009.

[12] We also ran the 'perfect risk sharing' equation by which the cross-country variation in consumption growth should be proportionate to real exchange rate dynamics: however, the pattern is that faster consumption growth is associated with real appreciation, in violation of the benchmark hypothesis.

These results are reported in Table 9, which has the same format as Table 8. Again, there is a very strong correlation between demand growth and GDP growth, and little evidence that the link is affected by international financial integration. Instead, we find strong evidence that larger pre-crisis current account deficits and high growth rates in private credit are associated with a larger decline in domestic demand, holding GDP growth constant. This finding is consistent with a tightening of credit constraints on current account deficit countries and on countries that experienced fast credit growth, leading to a correction in net external borrowing during the crisis period.

V. CONCLUDING REMARKS

Our goal in this paper has been to establish the extent to which various pre-crisis measures help explain the cross-country variation in the macroeconomic incidence of the crisis. Real-side variables such as trade openness and the manufacturing share are correlated with the output and demand declines, consistently with the higher cyclicality of manufactured goods and the dramatic decline in international trade that took place during the crisis. Also, the evidence points to a strong link between pre-crisis domestic financial factors (fast private credit growth) and external imbalances (current account deficits) on the one hand and the decline in the growth rate of output and especially domestic demand during the crisis on the other hand. The "advanced economies nature" of the crisis is highlighted by the negative correlation between GDP per capita and the decline in output growth. It is also intriguing that a greater level of financial development is associated with a smaller growth slowdown.

One limitation of our approach is that it does not establish the mechanisms by which these variables may have affected macroeconomic outcomes. For instance, it clearly matters whether and how these variables affected macroeconomic policy responses during the crisis. Moreover, it would be also informative to gain a more precise understanding of the channels by which shifts in international capital market conditions affected access to credit and the cost of credit. Finally, explaining the dramatic decline in world trade during the crisis is another important challenge.

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Table 1. The geographical impact of the crisis (I)*

A. Changes in growth (2008-09 minus 2005-2007)

Country group →	Emerg. Europe	CIS	Emerg. Asia	Emg. West. Hem.	Carib.	Africa	Industr.	Middle East
Crisis intensity ↓								
Worst 20	8	3	1	4	0	1	3	0
Worst 30	12	3	3	4	0	2	5	1
best 20	0	0	4	3	0	9	0	4
best 30	0	0	4	4	0	16	0	6

B. Growth rates 2008-09

Country group →	Emerg. Europe	CIS	Emerg. Asia	Emg. West. Hem.	Carib.	Africa	Industr.	Middle East
Crisis intensity ↓								
Worst 20	7	0	1	1	0	0	11	0
Worst 30	11	0	1	2	0	0	16	0
best 20	0	1	5	1	0	7	0	6
best 30	0	2	5	4	0	12	0	7

* The table lists the number of countries among the most affected and least affected by the crisis. The crisis measure is obtained by constructing a global ranking for each of several crisis measures (output growth, demand growth, private and public consumption growth, investment growth, export growth, import growth) and averaging the rankings.

Table 2. The Geographical Impact of the Crisis (II)

Average change in growth rates

	Output	Demand	Priv. cons.	Pub. Cons.	Invest.	Exports	Imports
Emerging Europe	-8.2	-11.3	-9.4	-2.2	-20.9	-14.0	-18.7
CIS	-7.5	-8.8	-11.3	-2.0	-6.4	-10.4	-6.9
Industrial	-4.6	-5.3	-3.6	0.3	-13.9	-11.8	-14.1
Caribbean	-4.3	-3.1	-2.8	-3.0	-4.3	-9.0	-5.6
Western Hem.	-4.0	-5.0	-4.1	-1.0	-9.6	-6.9	-10.5
Emerging Asia	-3.1	-4.3	-1.7	-0.7	-10.6	-9.5	-9.9
Africa	-2.0	-0.9	0.3	0.1	1.1	-5.6	-2.5
Middle East	-1.6	-1.8	-0.8	-2.8	-3.7	-6.3	-5.1

Average growth rates

	Output	Demand	Priv. cons.	Pub. Cons.	Invest.	Exports	Imports
Emerging Europe	-1.7	-3.2	-1.9	0.8	-8.4	-4.4	-6.9
Industrial	-1.4	-1.9	-0.7	2.6	-8.3	-6.1	-7.5
Caribbean	0.2	-1.8	-1.6	-4.1	-0.8	6.4	-4.3
Western Hem.	1.9	2.3	2.5	4.5	1.3	-0.8	0.6
Emerging Asia	3.0	4.0	5.5	7.0	-0.2	-2.3	0.8
CIS	3.2	2.6	-2.0	7.6	9.6	-2.5	6.8
Africa	3.4	5.3	5.7	5.2	9.8	-0.2	4.9
Middle East	4.5	5.7	7.0	4.4	6.5	2.1	7.2

Table 3. "Top 5" crisis countries

Changes in growth rates (2008-2009 minus 2005-2007)

	Latvia	Armenia	Estonia	Lithuania	Azerbaijan
GDP growth	-22.5	-18.7	-17.8	-16.6	-16.5
	Latvia	Ukraine	Estonia	Lithuania	Iceland
Total demand growth	-30.9	-24.7	-24.2	-23.0	-22.9
	Latvia	Ukraine	Estonia	Lithuania	Iceland
Private cons. growth	-34.1	-22.8	-21.2	-20.2	-19.7
	Iceland	Lithuania	Ukraine	Armenia	Venezuela
Investment growth	-50.9	-43.9	-40.9	-39.8	-39.5
	Angola	Cambodia	Cape Verde	Togo	Namibia
Export growth	-34.5	-26.3	-25.6	-24.3	-23.6
	Latvia	Iceland	Venezuela	Russia	Estonia
Import growth	-37.7	-37.0	-34.9	-32.3	-32.0

Growth rates (2008-09)

	Latvia	Estonia	Lithuania	Ukraine	Zimbabwe
GDP growth	-11.6	-8.9	-8.4	-6.3	-5.6
	Latvia	Iceland	Lithuania	Estonia	Ukraine
Total demand growth	-17.7	-14.9	-12.8	-12.6	-9.8
	Latvia	Iceland	Estonia	Bahrain	Kazakhstan
Priv. cons. growth	-18.5	-12.5	-10.6	-10.0	-8.9
	Iceland	Lithuania	Guinea	Ireland	Maldives
Investment growth	-37.5	-32.6	-28.1	-24.1	-23.8
	PNG	Cambodia	Cent. Afr. Rep.	Eritrea	Togo
Export growth	-24.2	-16.3	-15.8	-15.6	-14.6
	Iceland	Latvia	Estonia	Yemen	Spain
Import growth	-24.6	-21.4	-17.2	-13.8	-13.3

Source: World Economic Outlook, October 2009.

Table 4. Severe crisis and stronger growth countries: full sample

	Median difference	Mean difference	t-test
	Change in output growth		
Change in output growth	6.6	8.2	**12.0**
Change in total demand growth	6.7	9.8	**6.3**
GDP per capita	-12,845	-20,243	**-5.2**
mean CA 2004-07	0.9	1.9	0.8
Openness	-28%	-39%	**-2.8**
Share of manufacturing GDP	-8.6	-6.6	**-4.3**
Priv. credit/GDP	-61%	-59%	**-5.7**
growth in priv. cr. /GDP	-13%	-19%	**-3.6**
Financial openness	-1.7	-8.5	-1.5
Debt/GDP (gross)	-68.2	-367.0	-1.6
NFA/GDP	-2.6	0.9	0.0
Net debt/GDP	8.1	-67.8	-0.9
BIS net /GDP	20.2	21.7	0.8
Trade with US/GDP	0.3	-1.3	-0.8
Growth in 04-07 relative to 1990-07	-0.1	-0.8	**-2.0**
	Change in demand growth		
Change in output growth	5.5	5.4	**6.3**
Change in total demand growth	7.7	12.3	**10.4**
GDP per capita	-15,049	-16,757	**-4.2**
mean CA 2004-07	2.8	4.2	1.9
Openness	-0.2	-0.2	-1.7
Share of manufacturing GDP	-7.2	-5.1	**-3.2**
Priv. credit/GDP	-64%	-63%	**-5.5**
growth in priv. cr. /GDP	-15%	-23%	**-4.2**
Financial openness	-1.2	-8.1	-1.4
Debt/GDP (gross)	-43.2	-380.1	-1.6
NFA/GDP	6.0	12.1	0.7
Net debt/GDP	22.2	-53.9	-0.8
BIS net /GDP	25.6	57.8	**3.3**
Trade with US/GDP	1.4	0.1	0.1
Growth in 04-07 relative to 1990-07	0.2	-0.2	-0.3

Note: The first two columns report the difference between the median and the mean of a sample including the countries least affected by the crisis and those most affected. The third column reports a t test for the hypothesis that the sample means are equal.

Table 5. Severe crisis and stronger growth countries:
sample excluding low-income countries and financial centers

	Median difference	Mean difference	t-test
	Change in output growth		
Change in output growth	5.7	7.5	**8.5**
Change in total demand growth	4.6	8.4	**4.8**
GDP per capita	-9,523	-10,044	**-2.5**
mean CA 2004-07	1.9	7.0	**2.2**
Openness	-18%	-10%	-1.1
Share of manufacturing GDP	-9.7	-6.5	**-3.2**
Priv. credit/GDP	-34%	-34%	**-3.6**
growth in priv. cr. /GDP	-13%	-17%	**-4.2**
Financial openness	-1.1	-0.6	-1.8
Debt/GDP (gross)	-42.9	-14.7	-0.6
NFA/GDP	10.9	41.7	1.7
Net debt/GDP	30.0	50.0	**2.1**
BIS net /GDP	21.1	35.4	**5.0**
Trade with US/GDP	1.9	1.5	0.7
Growth in 04-07 rel. to 1990-07	-0.2	-0.7	-1.6
	Change in demand growth		
Change in output growth	4.0	4.6	**4.6**
Change in total demand growth	6.3	10.3	**7.4**
GDP per capita	-9,656	-7,694	**-1.9**
mean CA 2004-07	6.3	9.8	**3.8**
Openness	0.0	0.0	-0.2
Share of manufacturing GDP	-6.2	-5.0	**-2.5**
Priv. credit/GDP	-35%	-37%	**-3.4**
growth in priv. cr. /GDP	-12%	-15%	**-3.8**
Financial openness	-0.6	-0.4	-1.5
Debt/GDP (gross)	-23.9	-7.1	-0.4
NFA/GDP	19.9	45.8	**2.7**
Net debt/GDP	33.1	45.1	**3.6**
BIS net /GDP	23.3	30.9	**4.2**
Trade with US/GDP	2.0	-0.6	-0.2
Growth in 04-07 rel. to 1990-07	0.0	-0.2	-0.3

Note: The first two columns report the difference between the median and the mean of a sample including the countries least affected by the crisis and those most affected. The third column reports a t test for the hypothesis that the sample means are equal.

Table 6. Explaining The Decline in Output Growth

	(1)	(2)	(3)	(4)
	All countries	Excl. oil exporters	Excl. low income	Excl. low income and fin. ctrs
Trade openness	-0.02***	-0.02***	-0.02***	-0.02*
	[0.01]	[0.01]	[0.01]	[0.01]
Manuf. Share	-0.09**	-0.06	-0.06	-0.05
	[0.04]	[0.04]	[0.05]	[0.05]
Oil dummy	-0.27		0.47	0.73
	[0.90]		[1.12]	[1.23]
CA/GDP	0.05**	0.06**	0.05*	0.04
	[0.02]	[0.03]	[0.03]	[0.03]
Priv. credit growth	-4.67***	-4.66***	-5.03***	-6.79**
	[1.53]	[1.57]	[1.72]	[2.68]
Log GDP per capita	-1.25***	-1.50***	-1.62***	-1.60***
	[0.26]	[0.28]	[0.44]	[0.53]
Growth gap	-0.77***	-0.87***	-0.89***	-0.86***
	[0.12]	[0.15]	[0.15]	[0.18]
Log (financial openness)	1.26**	1.65***	1.90**	2.10**
	[0.56]	[0.60]	[0.73]	[1.02]
Constant	5.04**	5.24**	4.96*	3.41
	[2.04]	[2.15]	[2.86]	[3.64]
Observations	145	125	111	94
R-squared	0.453	0.468	0.428	0.400

Note: Dependent variable is the change in output growth between 2008-2009 and 2005-2007. *,**, *** denote significance at 10, 5 and 1 percent levels respectively. OLS estimation. **Trade openness** is the sum of exports and imports divided by GDP. The **manufacturing share** is the ratio of manufacturing output to GDP. **CA/GDP** is the ratio of the 2007 current account balance to GDP. **Private credit growth** is the change in the ratio to GDP of private credit by banks and other financial institutions between 2003 and 2007. **GDP per capita** is nominal GDP in US dollars in 2007. The **growth gap** is the difference in output growth rates between 2005-2007 and 1990-2007. **Financial openness** is the sum of external financial assets and liabilities assets divided by GDP. All ratios and growth rates are multiplied by 100.

Table 7. Explaining the Decline in Demand Growth

	(1)	(2)	(3)	(4)
	All countries	Excl. oil exporters	Excl. low income	Excl. low income and fin. ctrs
Trade openness	-0.02**	-0.03***	-0.02*	-0.01
	[0.01]	[0.01]	[0.01]	[0.02]
Manuf. Share	-0.12**	-0.05	-0.11	-0.12
	[0.06]	[0.06]	[0.07]	[0.09]
Oil dummy	-1.39		-2.93	-3.10
	[1.44]		[1.99]	[2.14]
CA/GDP	0.23***	0.25***	0.29***	0.30***
	[0.05]	[0.06]	[0.06]	[0.07]
Priv. credit growth	-9.13***	-9.10***	-7.79***	-7.19
	[2.43]	[2.36]	[2.94]	[4.59]
Log GDP per capita	-1.75***	-2.06***	-1.92***	-1.97**
	[0.39]	[0.39]	[0.70]	[0.84]
Growth gap	-0.68***	-0.78***	-0.56***	-0.52***
	[0.12]	[0.14]	[0.16]	[0.17]
Log (financial openness)	1.87**	2.50***	1.85	2.06
	[0.86]	[0.84]	[1.21]	[1.77]
Constant	7.27**	6.24**	8.49*	6.88
	[3.04]	[2.99]	[4.48]	[5.67]
Observations	129	111	95	81
R-squared	0.554	0.598	0.533	0.479

Note: Dependent variable is the change in growth in total domestic demand between 2008-2009 and 2005-2007. *,**, *** denote significance at 10, 5 and 1 percent levels respectively. OLS estimation. **Trade openness** is the sum of exports and imports divided by GDP. The **manufacturing share** is the ratio of manufacturing output to GDP. **CA/GDP** is the ratio of the 2007 current account balance to GDP. **Private credit growth** is the change in the ratio to GDP of private credit by banks and other financial institutions between 2003 and 2007. **GDP per capita** is nominal GDP in US dollars in 2007. The **growth gap** is the difference in domestic demand growth rates between 2005-2007 and 1990-2007. **Financial openness** is the sum of external financial assets and liabilities assets divided by GDP. All ratios and growth rates are multiplied by 100.

Table 8. Consumption Growth (2008-2009)

VARIABLES	(1) All countries	(2) Excl. oil exporters	(3) Excl. low income	(4) Excl. low income and fin. ctrs
GDP growth 2008-09	1.06***	0.99***	1.05***	1.14***
	[0.12]	[0.11]	[0.15]	[0.16]
Financial integration dummy	0.39	1.13	-0.29	-0.92
	[0.96]	[0.94]	[1.03]	[1.08]
GDP growth*fin. integr. dummy	0.28	-0.42	0.26	0.20
	[0.26]	[0.38]	[0.27]	[0.27]
Oil dummy	1.67		1.34	0.19
	[1.23]		[1.45]	[1.44]
CA/GDP	0.05	-0.04	0.07	0.15***
	[0.04]	[0.05]	[0.05]	[0.06]
Growth in private credit	-2.70	-5.27***	-3.17	0.82
	[2.04]	[1.95]	[2.19]	[3.40]
Constant	0.88	0.59	1.50**	1.18*
	[0.60]	[0.55]	[0.66]	[0.67]
Observations	130	112	95	81
R-squared	0.586	0.560	0.626	0.682

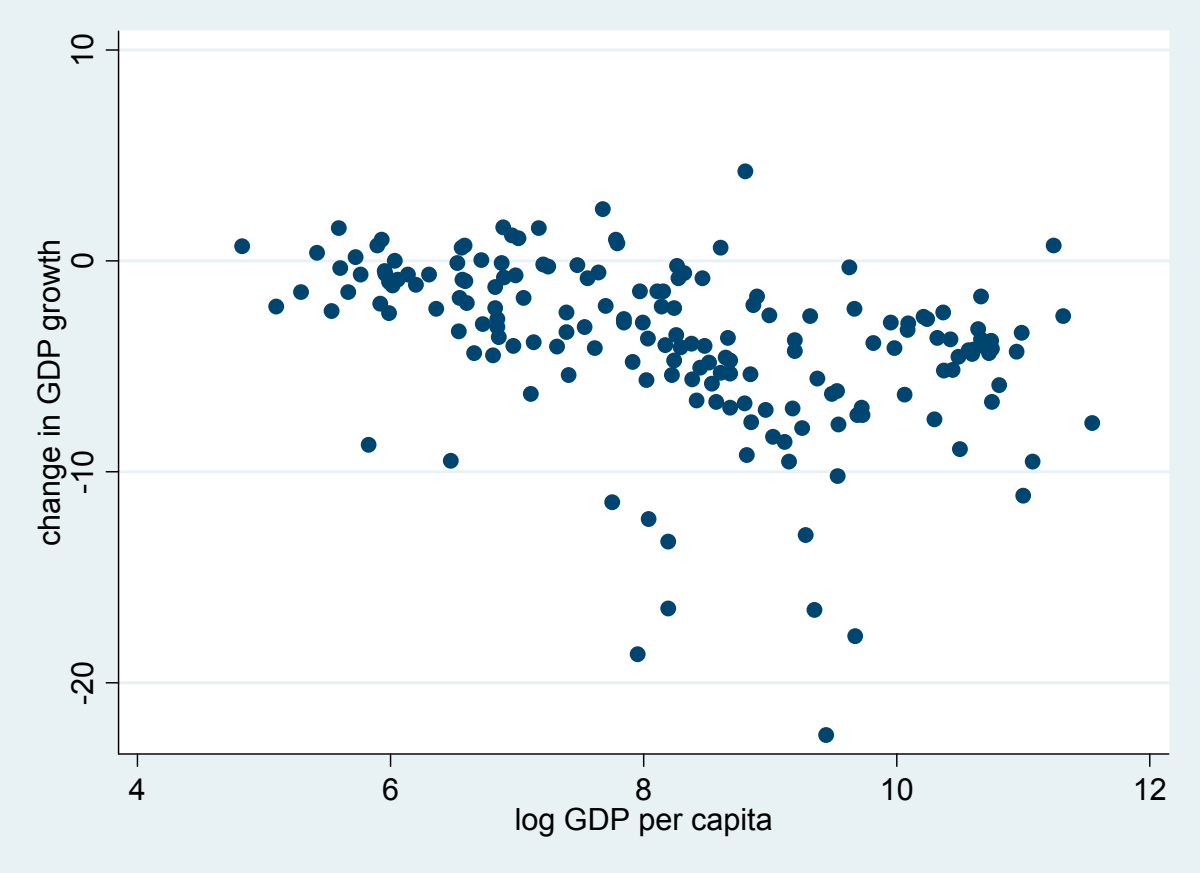
Note: Dependent variable is the average growth in private consumption over 2008-2009. *,**, *** denote significance at 10, 5 and 1 percent levels respectively. OLS estimation. **GDP growth 08-09** is the average growth rate of real GDP over 2008-09. The **financial integration dummy** takes the value of 1 if the sum of external assets and liabilities is at least 150 percent of GDP and the net external position is not worse than 50 percent of GDP. **CA/GDP** is the ratio of the 2007 current account balance to GDP. **Private credit growth** is the change in the ratio to GDP of private credit by banks and other financial institutions between 2003 and 2007. All ratios and growth rates are multiplied by 100.

Table 9. Total Domestic Demand Growth (2008-09)

VARIABLES	(1) All countries	(2) Excl. oil exporters	(3) Excl. low income	(4) Excl. low income and fin. ctrs
GDP growth 2008-09	1.13***	1.10***	1.17***	1.21***
	[0.08]	[0.07]	[0.11]	[0.12]
Financial integration dummy	-0.57	-0.35	-0.55	-1.04
	[0.65]	[0.64]	[0.73]	[0.83]
GDP growth*fin. integr. dummy	0.10	-0.12	0.06	0.06
	[0.17]	[0.26]	[0.19]	[0.21]
Oil dummy	-0.08		-0.46	-0.84
	[0.83]		[1.03]	[1.11]
CA/GDP	0.13***	0.12***	0.14***	0.18***
	[0.03]	[0.03]	[0.04]	[0.04]
Growth in private credit	-3.70***	-4.52***	-2.81*	1.62
	[1.38]	[1.32]	[1.56]	[2.63]
Constant	1.01**	1.01***	0.87*	0.58
	[0.40]	[0.38]	[0.47]	[0.52]
Observations	131	113	96	82
R-squared	0.785	0.803	0.793	0.782

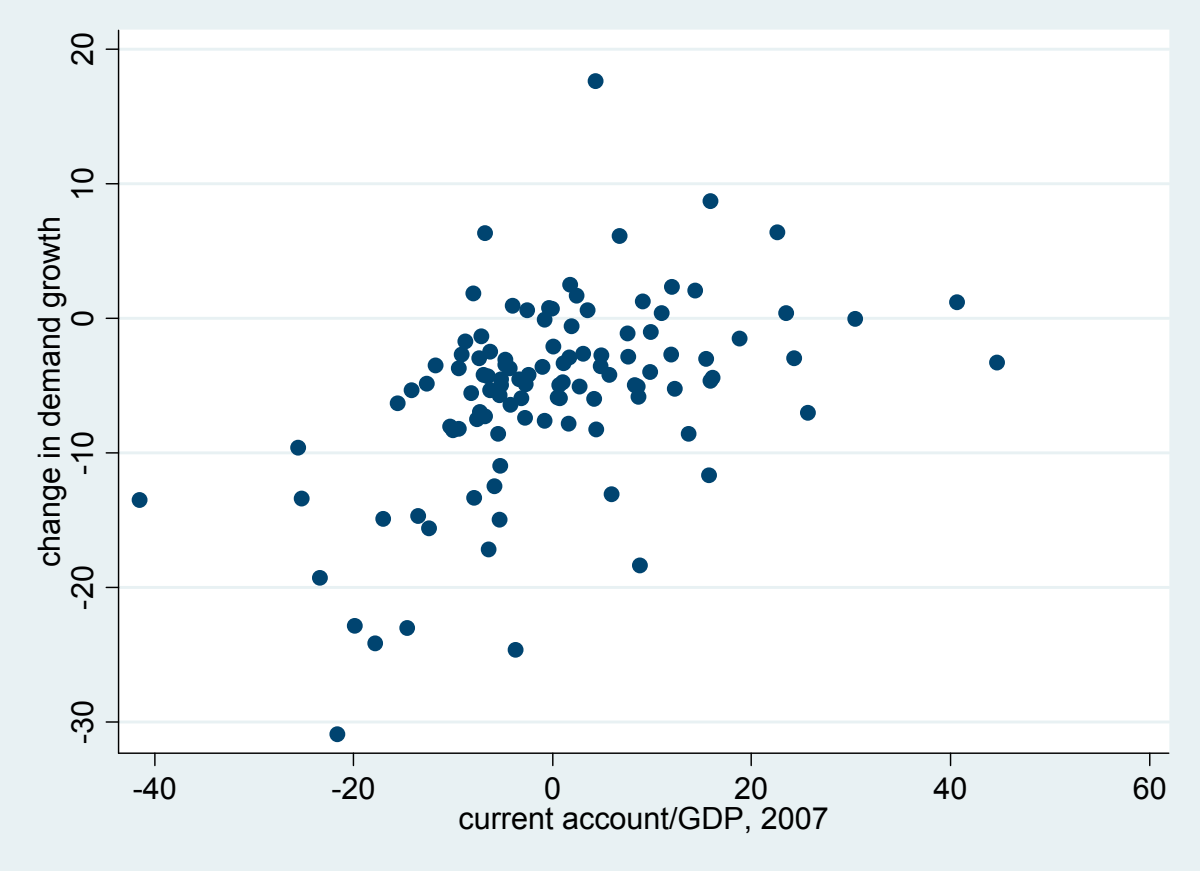
Note: Dependent variable is the average growth in total domestic demand over 2008-2009. *,**, *** denote significance at 10, 5 and 1 percent levels respectively. OLS estimation. **GDP growth 08-09** is the average growth rate of real GDP over 2008-09. **Financial openness** is the sum of external financial assets and liabilities assets divided by GDP. **CA/GDP** is the ratio of the 2007 current account balance to GDP. **Private credit growth** is the change in the ratio to GDP of private credit by banks and other financial institutions between 2003 and 2007. All ratios and growth rates are multiplied by 100.

Figure 1. Change in GDP growth and GDP per capita



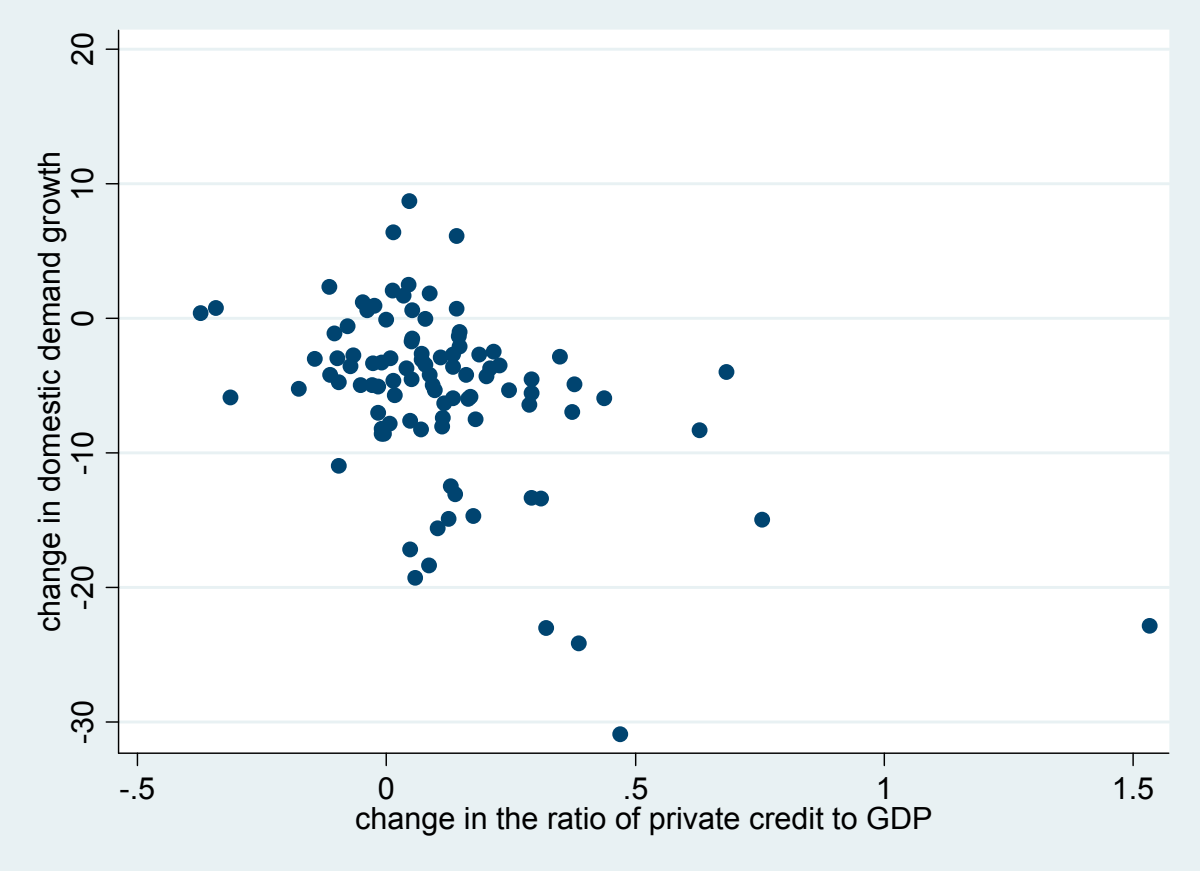
Note: Horizontal axis: log nominal GDP per capita in US dollars (2007). Vertical axis: change in GDP growth between 2008-2009 and 2005-2007. Whole sample. The correlation coefficient equals -0.39.

Figure 2. Decline in demand growth and current account balance



Note: Horizontal axis: 2007 current account balance in percent of GDP. Vertical axis: change in total domestic demand growth between 2008-2009 and 2005-2007. Sample excludes low-income countries. Correlation coefficient equals 0.47.

Figure 3. Decline in demand growth and growth in private credit



Note: Horizontal axis: change in the ratio of private credit to GDP, 2003-2007. Vertical axis: change in total domestic demand growth between 2008-2009 and 2005-2007. Sample excludes low-income countries. Correlation coefficient equals -0.46.