

NBER WORKING PAPER SERIES

MANAGING FINANCIAL GLOBALIZATION:
INSIGHTS FROM THE RECENT LITERATURE

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Working Paper 24330
<http://www.nber.org/papers/w24330>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2018

This paper surveys the recent literature on the effects of financial globalization on developing countries and draws on several research papers that I have coauthored. I would like to thank Qingyuan Du, Jeffrey Frankel, Xuehui Han, Ayhan Kose, Jun Nie, Esward Prasad, Kenneth Rogoff, Hui Tong, and Jing Zhou for their research collaboration. I have learned a lot from them. I also thank Kristin Forbes and participants of the Conference on Globalization, Development, Economic and Financial Stability in Tokyo, December 2017, for very helpful comments. The paper is commissioned by the Asian Development Bank Institute. Any errors in the paper are entirely my own responsibility. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

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Managing Financial Globalization: Insights from the Recent Literature
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NBER Working Paper No. 24330
February 2018
JEL No. F2,G15

ABSTRACT

This paper seeks to draw lessons for developing countries based on a survey of the recent literature on financial globalization. First, while capital account openness holds promises (by potentially lowering cost of capital, promoting risk sharing, and providing disciplines on policies), it does not always work out that way in the data. Distortions in the domestic financial market, international capital market, domestic labor market, and domestic public governance can all make financial globalization less beneficial for developing countries. Second, developing countries may seek to avoid the effects of foreign monetary policy shocks. The empirical pattern appears to be somewhere between a trilemma and a dilemma. While nominal exchange rate flexibility provides some policy autonomy but not consistently, capital flow management can confer additional insulation against foreign monetary shocks.

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1. Introduction

Cross-border capital flows have risen substantially relative to world GDP. They could provide new opportunities for developing countries to improve efficiency, increase investment, and reduce risks; but they could also be a source of economic instability and a magnifier of distortions. This paper seeks to draw lessons for developing countries based on a survey of the recent literature on financial globalization. We will focus on the following two questions. First, when do developing countries fail to benefit from greater capital account openness? Second, what effective ways are there for developing countries to protect themselves from undesirable foreign monetary policy shocks?

In neoclassical models of open economies, reducing or removing frictions on cross-border capital flows can have two main benefits for developing countries. First, it tends to equalize the costs of capital across countries. Since a typical developing country is relatively capital-scarce (i.e., with a low capital to labor ratio), its cost of capital tends to go down as the cost of moving capital across national borders goes down. For example, using firm-level data in Chile before, during, and after its capital control era of 1991–98 (known as *encaje*), Forbes (2007) finds that the cost of capital becomes higher for smaller traded firms during the capital control period. Interestingly, larger firms do not appear to suffer more liquidity constraints during the capital control era, possibly because they can tap into domestic savings more easily. Another piece of evidence that capital controls raise the cost of doing business comes from Wei and Zhang (2007). They point out that once capital controls are in place, authorities have to worry about firms using mis-invoicing of exports or imports to evade the control. This will likely result in more monitoring of cross-border transactions even of legitimate goods trade and a greater reporting requirement for exporters and importers at the customs. In other words, more capital controls likely mean a higher cost of conducting international trade. Using panel data on disaggregated trade and capital controls, Wei and Zhang (2007) estimate that an increase in the restrictions on FX transactions by one standard deviation in the sample has the same negative effect on trade as an increase in tariff of 11 percentage points. In other words, the cost of capital controls could be sizable.

If capital account openness lowers the cost of capital, it can in principle spur more investment, especially by small firms, improving economic efficiency, and raising output and potentially economic growth. Empirically, Bekaert, Harvey, and Lundblad (2005 and 2011) report that a surge in physical investment tends to follow the removing of barriers to international equity market investment. This can be viewed as evidence in support of the notion that greater financial globalization improves economic efficiency.

Second, reducing the frictions in relation to international capital mobility can enhance the ability of domestic and foreign households to share risks (Cole and Obstfeld 1991). In other words, with more cross-holding of assets across national borders, domestic consumption should become less sensitive to fluctuations in domestic output. Greater risk sharing by households per se improves economic welfare. Because domestic GDP growth is more volatile in developing countries than in rich countries, the benefits of risk sharing are in principle more important for developing countries. Moreover, greater risk sharing could allow firms to invest more, potentially raising economic efficiency as well.

Compared to documenting the cost of capital controls, evidence on improved risk sharing is elusive, especially for developing countries (Bai and Zhang 2009). That is, the sensitivity of consumption to output fluctuation does not appear to decline much even though the ratio of cross-border capital flows to GDP – a common measure of de facto exposure to financial globalization – has increased. Levy Yeyati and Williams (2016), however, propose measuring a country's exposure to financial globalization by the ratio of its cross-border assets and liabilities to its economy-wide assets and liabilities, and find that an important reason for not seeing an improvement in risk sharing in Latin American countries is that the exposure to financial globalization has in fact not changed much in recent decades.

There is a third potential benefit of financial globalization coming from the political economy literature. With freer capital mobility, a government's ability to make bad choices may be more constrained. As a consequence, the economic outcomes are better than otherwise (Tytell and Wei 2004; Cai and Treisman 2005; Blouin, Ghosal, and Mukand 2017). In principle, the policy discipline effect applies to developed as well as developing countries. To the extent that macroeconomic policies are unconditionally more likely to deviate from the optimum, this policy

discipline effect should be more important for developing countries as well. The empirical record on the existence and strength of the policy discipline effect is mixed. For example, Tytell and Wei (2004) find supportive evidence that greater exposure to financial globalization helps countries to stay away from bad monetary policies (e.g., high inflation) but no comparable evidence on fiscal policies.

To summarize, there are case studies on costs of capital controls (see a nice survey by Forbes (2007a)). On the other hand, systematic empirical support at the macroeconomic level turns out to be more elusive. In particular, after surveying a large body of empirical work Kose et al. (2004, 2009) conclude that it is hard to find a robustly positive effect of financial globalization on economic growth in developing countries.

Another aspect of financial globalization is the transmission of monetary policy shocks, especially those from advanced countries (the United States in particular) to developing countries. For example, when the United States raises its interest rate (as dictated by its domestic need), developing countries often have to decide whether to follow suit. Following the policy move by the United States may not be the right thing to do. Indeed, for this reason, foreign monetary shocks are often a key risk for emerging market economies and other developing countries. An important question is what the roles of the nominal exchange rate regime and capital flow management are in a country's resilience to foreign monetary shocks.

In this paper, we survey the literature on two topics. First, what are the conditions under which greater capital account openness could lead to desirable economic outcomes? Second, what does it take for a country to have a buffer against foreign monetary shocks?

2. Why Do Developing Countries Fail to Benefit from Financial Globalization?

The literature has explored four broad reasons for why developing countries may not benefit from financial globalization: (a) distortions in the domestic financial market, (b) distortions in the international capital market, (c) distortions in the domestic labor market, and (d) weakness in domestic governance institutions. I will discuss each in turn and suggest some possible links

among them at the end of this section. Some of the discussions draw from working papers in the last three years, which have not been synthesized in previous survey articles that I am aware of.

2.1 Distortions in the domestic financial market

A distorted domestic financial system could make an open capital account less desirable. Before the capital account is opened, if the distorted financial system channels domestic savings towards less efficient firms or sectors, additional finance from a more open capital account could simply exacerbate the misallocation of resources (Eichengreen and Leblang, 2003). Somewhat surprisingly, while the logic of the argument is plausible, there is a relative lack of formal theories that articulate this link

If additional capital inflows simply magnify the existing distortions in the domestic financial system, an open capital account could fuel asset price bubbles and raise the likelihood of domestic financial crisis. There is a relatively large literature on how the volatility of international capital flows could interact with domestic financial crises (Kaminsky and Reinhart, 1999; Frankel and Wei, 2005).

One source of distortions in the domestic financial market could be the poor quality of domestic institutions, which could drive down domestic returns on savings in a developing country even when the country has very little capital (Ju and Wei 2010 and 2011). In that case, capital account openness would simply let domestic savings leave the country, producing the seemingly paradoxical pattern of capital flowing from poor to rich countries. Corporate insiders could expropriate outside investors for private benefits. State rulers (and bureaucrats) may also take actions to improve their personal welfare by reducing returns to corporate investors. Without effective institutions constraining these “twin agency problems,” the benefits of financial globalization may be limited (Stultz 2005). In addition, these agency problems might also nudge the composition of cross-border capital inflows to consist of less foreign direct investment (Wei 2000a and 2000b) and more volatile types of capital flow (Wei 2001), and shorten the maturity of external debt (Wei and Zhou 2017).

2.2 Distortions in the international capital market

We start with two features of the international capital market that the literature emphasizes as relevant. First, a typical developing country often faces an aggregate borrowing constraint from the international capital market. Second, international capital flows can exhibit “sudden stops,” that is, a period of abundant capital from rich countries can be followed, often suddenly, by a period of capital flow reversal. A rise in the US interest rate, for example, could trigger such a reversal.

When an individual private sector agent (firm or household) borrows from abroad, its action tightens the borrowing constraint of the other agents in the economy, especially during a time of “global capital reversal.” If the effect of one agent’s borrowing on other agents is not taken into account by the borrowing agent, there is externality in the borrowing behavior. If the aggregate borrowing constraint is more of a problem in the international capital market than in the domestic capital market, then the externality is unique or at least more severe for international borrowing by developing countries.

Therefore, the private sector may borrow too much in “good times” relative to social optimum. This “overborrowing” problem becomes a problem when the value of the country’s collateral depends on the prices: In the event of a “global capital flow reversal” or “sudden stops” of international capital flows, falling asset prices (a tighter borrowing constraint) and shrinking ability to obtain financing feed on each other, producing a larger loss in output than would be the case otherwise (Jeanne and Korinek, 2010).

Since the “overborrowing” problem arises because the social cost of borrowing is higher than the private cost faced by individual borrowers, a possible correction of this “overborrowing” is a tax on borrowing that raises the cost of private borrowing (Jeanne and Korinek, 2010). Restrictions on the ability of the private sector to borrow from the international capital market can be interpreted as a tax. Banning borrowing altogether is an extreme form of tax whose rate is infinity, which is likely to be an overkill.

A recent paper by Zhou (2017) introduces debt maturity considerations into the overborrowing problem. She argues that overborrowing is more severe at short maturities than at

longer maturities because borrowing at longer maturities has a (desirable) hedging featuring that offsets part of its social cost. By this logic, the optimal tax structure on capital flows would also need to have a higher rate on short-term borrowing. Furthermore, she argues, somewhat counterintuitively, that the optimal tax rate on short-term borrowing needs to go up during a crisis (or “sudden stop”) period.

Perhaps as a consequence of “overborrowing,” the literature also finds that the composition of a developing country’s external liability matters for both the likelihood and the severity of a crisis. In particular, those countries that relied relatively more on external debt financing relative to FDI before the global financial crisis of 2008 found that their firms had a more severe liquidity shortage during the crisis (Tong and Wei 2010).

A high share of foreign currency-denominated debt in total liabilities is also found to be a predictor of a future balance-of-payments crisis. The apparent inability to issue local currency debt has been dubbed as the “original sin” by Eichengreen and Hausmann (1999). If foreign currency debt adds to a country’s vulnerability to a foreign currency debt crisis or a balance-of-payments crisis, it would seem plausible that a tax on borrowing in foreign currency could improve the national welfare by reducing the chance of a future financial crisis.

Du and Schreger (2013) and Du, Pflueger, and Schreger (2015) notice a rise in the share of local currency share of external debt for at least 14 major emerging market economies. Therefore, perhaps the “original sin” problem is not that exogenous or “original,” and improvement is possible.

[In the aftermath of the Asian financial crisis in the late 1990s, the Asian Development Bank set out to help its developing member economies to improve their capacity to borrow in their own local currencies but still from foreign investors. For this to happen, one missing piece is the existing bond rating agencies that were willing to rate local currency debt issued by these countries. It turns out that major international rating agencies were not eager to take on this task. Out of necessity, the ADB worked with some member countries to set up a rating agency on their own. Both the local currency bond markets in Thailand, the Republic of Korea, and the People’s Republic of China and the rating agency turn out to be doing well. Eventually, the ADB sold its share in the rating agency for a profit. The ADB’s action appears to be addressing a missing

market. Why the rating market was missing could benefit from more careful research. In this example, the public policy action was not a tax on capital flows, but actively promoted a missing piece to create a well-functioning market.]

2.3 Distortions in the domestic labor market

Du, Nie, and Wei (2017) propose a possible third channel for failing developing countries to benefit from capital account liberalization, namely labor market rigidity. Labor market rigidity could come from tense labor-capital relations or overregulation of the local labor market. It tends to make it expensive for firms to hire or fire workers.

In their theory, in order to focus on the implications of local labor market rigidity (cost of hiring workers in our model), they deliberately assume away both distortions in the domestic financial market and distortions in the international capital market. In other words, there is no overborrowing by private sector agents, no sudden stops in international capital flows, and no distortions in the cost of capital for some firms relative to others. There are also no corruption or other institutional problems.

Du, Nie, and Wei (2017) find that labor market institutions are more important for developing countries than for developed countries. For developing countries, labor market reforms and capital account openness are complements: With a flexible labor market, a more open capital account implies more employment (lower unemployment); but with a rigid labor market, more capital account openness leads to the opposite result. The intuition is, for developing countries, a rigid labor market deters firm entry, which lowers demand for capital. Once the capital account is opened, part of the domestic savings leaves the country for a better return abroad. The increased cost of capital at home further reduces employment.

For developed countries, domestic employment is always higher with an open capital account. In other words, in terms of the extent of domestic labor market rigidity, a developed country is always better off with an open capital account. The empirical work shows that these predictions are consistent with the data. Perhaps the simplest way to summarize the key results is two pairs of graphs from Du, Nie, and Wei (2017).

2.4 Weakness in domestic public governance

The discussion so far has emphasized overborrowing and sudden reversals of capital flows as features exogenous to developing countries. One is tempted to conclude that capital flow management policies should be deployed to nudge the composition of external liabilities away from debt financing and towards attracting more inward foreign direct investment.

It is important to point out that what seems to be a feature of the international capital market may have its root inside the developing countries.

There are some “fundamental” reasons for why the composition of external liabilities varies by country. Wei (2000a and 2000b) documents that countries with more severe corruption systematically attract less FDI. Gelos and Wei (2005) show that countries with weaker public governance in the form of more opacity tend to attract less equity investment from international institutional investors (mutual funds, pension funds, and hedge funds) as well. Because corruption reduces FDI more than debt financing, Wei (2001) shows that bad public governance often results in a structure of external liabilities that is relatively heavy in external debt and relatively light in FDI, which is precisely the liability structure that Tong and Wei (2010) show was associated with a worse liquidity crunch during the global financial crisis. Using both firm-level and cross-country data, Wei and Zhou (2017) show that weaker public governance tends to simultaneously reduce the share of external equity financing in total investment and the share of long-term debt in total debt financing. This set of papers suggests that, while capital controls might nudge the structure of developing countries’ external liabilities to be less heavy in debt, especially in short-term debt, and more in FDI and other forms of equity financing, more fundamental reforms to strengthen the rule of law and protection of investors would do the same. More importantly, as Wei and Zhou (2017) imply, these fundamental institutional reforms would improve the capital structure of domestic firms inside these countries as well as the external liabilities, while capital controls can at most alter the external capital compositions.

Similarly, Engel and Park (2017) trace the problem of “original sin” – the inability of most developing countries to borrow in the international capital market in their own currencies – to a particular institutional problem: the inability of the government of the borrowing countries to commit to not expropriating foreign debt holders by devaluing local currency debt. In that case,

institutional reforms that improve a government's commitment to not expropriating foreign debt holders might address the root problem more effectively.

If the sources of overborrowing, excessive reliance on debt relative to equity financing, and excessive reliance on foreign currency borrowing, are partly caused by corruption, inability to commit, and other governance problems, then the countries that are most in need of capital controls are also most vulnerable to seeing rent-seeking activities attached to the capital controls, further raising the social cost of maintaining such controls. In the end, understanding the source of "undesirable" capital structure also has a bearing on the desirability of capital controls.

It is worth noting that some of the distortions in the domestic financial market in resource misallocation can also be traced to corruption and other public governance issues. In an economy with rampant corruption, financial institutions, especially state-owned financial institutions, which are common in the developing world, often direct lending to politically connected borrowers. Therefore, reforms that strengthen the quality of domestic public governance and rule of law would also lead to a reduction in the resource misallocation in the domestic financial market. According to the logic of Section 2.1, this will improve the chances of a developing country benefiting from financial globalization.

There is also a connection between domestic governance and the discussion in Section 2.3 on distortions in the domestic labor market. A key message from Section 2.3 is that a combination of low economy-wide total factor productivity (TFP) and a rigid labor market could reduce the domestic returns on capital sufficiently in financial autarky, such that an open capital account would lead to capital flight.

A key determinant of economy-wide TFP is the quality of the domestic governance institution. Expropriation risks reduce returns on capital. Governance reforms that strengthen the rule of law and protection of investor rights reduce risks and would help to raise the economy-wide TFP. According to the logic of Section 2.3, this would also improve the chances of a developing country benefiting from financial globalization.

To summarize, governance reforms may be relevant for all three channels discussed in Sections 2.1 to 2.3. Just because capital account openness on its own might not achieve the desired outcomes (in terms of greater efficiency, higher growth, and lower unemployment) does not

automatically means maintaining the capital controls is the way to go. It might be useful to think of complementary reforms needed that can enhance the chance of achieving more desirable outcomes. If developing countries can make sufficient progress on governance reforms, then they may be able to realize more favorable outcomes from a more open capital account.

If removing capital account restrictions does not always lead to better macroeconomic outcomes for developing countries, it is important to note that imposing capital account restrictions does not automatically lead to better outcomes either. Because capital controls in practice are often not put in place for macroprudential reasons, they do not necessarily deliver more economic and financial stability (Forbes and Warnock, 2012; Forbes, Fratzscher, and Straub, 2015; and Forbes and Klein, 2015).

3. Gaining Monetary Policy Autonomy

One source of shocks to developing countries is foreign monetary policy shocks. For example, when the US Federal Reserve raises its interest rate (for the benefit of US domestic policy), tightening monetary policy might not be a desirable policy move for a given developing country. What can a developing country do to avoid passive importation of an undesirable macroeconomic policy shock?

The existing literature is somewhat split on this topic. A narrow interpretation of the trilemma hypothesis is that a country cannot simultaneously have an independent monetary policy, a fixed exchange rate, and freely mobile capital. A broad and indeed fairly common interpretation of the trilemma hypothesis is that a country can have an independent monetary policy if it pursues a flexible exchange rate, or imposes capital controls, or does both. The notion that a flexible exchange rate regime provides insulation against foreign shocks is said to be supported in the data in Edwards (2012), Klein and Shambaugh (2015), and Obstfeld (2015), among others.

On the other hand, Frankel, Schmukler, and Serven (2004) do not reject the null of full transmission of international interest rates to developing countries in the long run (during 1970-1999), even for countries with a flexible exchange rate regime. Using equity prices for firms

across emerging market economies, Tong and Wei (2011) find that, in terms of the extent to which an emerging market economy was affected by the GFC, a flexible nominal exchange rate by itself does not provide much help, but capital flow management encouraging more FDI and fewer non-FDI types of capital flows before the GFC tended to provide some cushion during the GFC. While they do not use the language of trilemma versus dilemma, their results are consistent with the idea that the presence or absence of capital controls is more crucial than the nominal exchange rate arrangement.

In terms of pairwise correlations among cross-border capital flows, Rey (2015) points out that whether a country has a flexible or a fixed nominal exchange rate regime does not seem to make a difference, but whether it has capital controls does. The findings of the last three papers are consistent with each other. Rey's (2015) title, "Dilemma Not Trilemma," makes more famous or more memorable a view that capital controls appear to be both necessary and sufficient for a country to be insulated from global financial cycles. Interestingly, neither Frankel, Schmukler, and Serven (2004), nor Tong and Wei (2010), nor Rey (2015) directly examine how combinations of nominal exchange rate regimes and capital controls affect a country's conduct of monetary policy in relation to foreign monetary shocks, which we aim to do in this paper.

A key challenge in the empirical work on this question is that co-movement in interest rates across countries does not automatically imply policy spillovers. For example, purely domestic shocks to the United States and India could be such that both find it optimal to raise interest rates. One would not want to label that as policy spillovers from the United States to India. Yet, the existing literature does not formally separate co-movement in interest rates between a peripheral and a center country due to common shocks and policy shocks.

Han and Wei (2018) employ a set of innovations to address this challenge. First, they estimate a desirable change in a peripheral country's interest rate based on the changes in the variables (revisions in the inflation projection and revisions in the output growth) that go into that country's Taylor rule. Second, we use revisions in the (semi-annual) projections of a country's inflation rate and growth rate by the IMF's World Economic Outlook (WEO) to approximate the surprised changes in the relevant variables. They define policy spillovers from

changes in the US interest rate to changes in a peripheral country's interest rate as part of the co-movement in the interest rates beyond what can be explained by the Taylor rule.

Another innovation of the paper is to provide a specification and an estimation method that can include the Quantitative Easing (QE) episodes, when one does not observe much change in the US interest rate. Han and Wei use a likelihood function to incorporate the latent (but censored) changes in the US policy rate. When the US interest rate is above the lower bound, changes in the US monetary policy stance can be directly observed from the changes in its interest rate. On the other hand, when the US interest rate is at or near the lower bound, changes in the US policy stance are inferred from changes in the US money supply relative to its aggregate output. This is one of the first attempts in the literature to incorporate lower-bound episodes in a study of international monetary policy transmissions.

The economic message of Han and Wei (2018) is interesting from the viewpoint of managing financial globalization. They report evidence of a "2.5 lemma" or something between a trilemma and a dilemma: A flexible exchange rate regime appears to convey monetary policy autonomy to peripheral countries when the center country raises its interest rate, but does not do so when the center country lowers its interest rate. In other words, "fear of floating" mostly takes the form of "fear of appreciation." Capital controls provide insulation to peripheral countries from foreign monetary policy shocks even when the center lowers its interest rate. The "2.5 lemma" pattern is more nuanced than the findings in the existing literature.

It is useful to situate the paper in the context of the relevant literature. Obstfeld (2015) examines the role of the nominal exchange rate regime but does not explicitly examine the role of capital controls in the international transmission of monetary policy shocks. Since many countries with a flexible nominal exchange rate regime also maintain capital flow management, what appears to be the effect of a flexible exchange rate could instead be the effect of capital controls. Han and Wei (2014) and Klein and Shambaugh (2015) look at capital controls and the nominal exchange rate regime but do not fully account for common shocks that can give the appearance of a lack of policy independence of the peripheral country. They also reach opposite conclusions. While Han and Wei (2014) find that a flexible exchange rate by itself does not confer monetary policy autonomy, Klein and Shambaugh (2015) find that a moderately flexible

exchange rate does but partial capital controls do not. Aizenman, Chinn, and Ito(2016) introduce both exchange rate stability and financial openness in analyzing the sensitivity of peripheral countries' policy rates to core countries' monetary policies. They find that economies that pursue greater exchange rate stability and financial openness face stronger links with center economies, which is consistent with our conclusion. However, they introduce exchange rate stability and financial openness separately and not as a policy combination. In their specification, a policy regime is jointly determined by a combination of capital controls and a nominal exchange rate regime.

The paper by Han and Wei (2018) also differs from previous papers by explicitly allowing for asymmetric responses by peripheral countries in a flexible exchange rate regime to center country interest rate changes. In other words, peripheral countries may or may not feel equally compelled to follow the center country's policy moves depending on whether the latter loosens or tightens its monetary policy. In addition, this paper is the first to use IMF revisions in GDP growth and inflation projections in gauging domestic policy needs, and the first to incorporate the quantitative easing episodes in the context of international monetary policy transmission.

Farhi and Werning (2014) used a New Keynesian model to investigate whether capital controls are needed for maximizing welfare when a country already has a flexible exchange rate. They found that the answer is yes: Even with a flexible exchange rate regime, capital controls raise welfare. In their framework, capital controls are introduced as a "tax" over capital inflows during capital inflow surges caused by negative risk premium shocks and as "subsidies" to capital outflows when the capital flows revert. In other words, capital controls work in the opposite way to risk premium shocks. When social welfare is affected by both terms of trade and the intertemporal path of consumption, it is generally useful to employ both tools. With a flexible exchange rate to influence terms of trade and capital controls to influence intertemporal consumption, social welfare is higher than by just using one of the tools. This theoretical result is consistent with the "2.5 lemma" pattern That is, when the center country loosens its monetary policy (which tends to generate a capital flow surge into other countries), peripheral countries appear to feel compelled to follow suit by lowering their interest rates, unless they have capital control measures in place.

Specification and data

Han and Wei's specification can be explained in two steps. The first step describes the relationship between the monetary policy of a periphery country and that of a center country (the United States), after accounting for other determinants of the periphery's monetary policy.

Let $\Delta r_{i,t}^p$ denote the changes in the policy interest rate of (peripheral) country i at time t . It is assumed to depend on four factors: the value of the policy rate one period ago, $r_{i,t-1}^p$; a change in the desired policy rate, $\Delta r_{i,t}^{P*}$, driven solely by domestic factors; a change in the interest rate driven by the center country, Δr_t^{US} ; and a global financial cycle factor, which can be approximated by percentage changes in the Chicago Board Options Exchange Market Volatility Index, ΔVIX_t . More precisely,

$$(1) \quad \Delta r_{i,t}^p = \lambda r_{i,t-1}^p + \gamma_1 \Delta r_{i,t}^{P*} + \gamma_2 \Delta r_t^{US} + \delta \Delta VIX_t + \varepsilon_{i,t}.$$

The lagged policy rate, $r_{i,t-1}^p$, could capture policy momentum or policy space. For example, if a higher policy rate in the recent past allows more space for downward policy changes, one may expect a negative coefficient, λ .

When country i 's interest rate is observed to have changed alongside that of the United States, is it a spillover of policy shocks or coincidence of a common shock? To separate the two, the key is to specify the desired change in country i 's policy rate that is driven solely by its domestic need, $\Delta r_{i,t}^{P*}$. Han and Wei propose doing this through a combination of the Taylor rule and the estimated surprise components in growth and inflation projections. That is, a Taylor rule specifies on which variables the desired change in the policy rate depends, and the surprise components in inflation and growth projections determine by how much the desired policy rate should change.

This means that $\Delta r_{i,t}^{P*}$ should be driven by news about the domestic output gap and the inflation gap. The revisions in semi-annual projections of GDP and CPI by the IMF's World Economic Outlook (WEO) can be used to represent the surprise components in the output gap and the inflation gap. Economic theory tells us to expect positive coefficients on both factors.

This is one of the major differences between this paper and the existing literature such as Han and Wei (2014) and Obstfeld (2015), which does not incorporate such surprise components.

Let $r_{i,t}^{p*}$ be the desired monetary policy rate of country i ; then $\Delta r_{i,t}^{p*}$ is the desired change in the policy rate since the previous period. The least squares regression model of the Taylor rule is defined as:

$$(2) \Delta r_{i,t}^{p*} = \tilde{c} + \tilde{\phi}_1 * \Delta GDP\ growth_{i,t} + \tilde{\phi}_2 * \Delta Inflation_{i,t} + \tilde{e}_{i,t},$$

where \tilde{c} is the intercept term and $\tilde{e}_{i,t}$ is the error term. Crucially, $\Delta GDP\ growth_{i,t}$ and $\Delta Inflation_{i,t}$ are revisions to the projections of GDP growth and inflation rates by the IMF between its two projection horizons. The IMF releases its projections (typically) twice a year, in April and October (sometimes September). For each country, the projections are done by desk economists in the Fund, under the overall coordination of its research department to ensure global consistency. The projections presumably take into account all information available to the Fund and the best judgments of the Fund staff at the time of the projections. Our maintained assumption is that the IMF projections of a member country's growth and inflation are unbiased estimates of the projections of the member's central bank. Due to the IMF's privileged access to member countries' central banks and the caliber of its staff, such an assumption seems reasonable. It is also useful to note that formally made IMF projections of growth and inflation are conditional on the government's existing macroeconomic policies. That's why the projections are called projections rather than forecasts. One (helpful) consequence of the IMF methodology is that one does not need to worry about potentially endogenous responses of inflation and growth to anticipated changes in future interest rates.

To find out which combinations of capital control regimes and nominal exchange rate systems can provide monetary policy independence, γ_2 in equation (1) is assumed to be a function of different regimes:

$$(3) \gamma_2 = \beta_1 D_{fixed.NC} + \beta_2 D_{fixed.C} + \beta_3 D_{flex.NC} + \beta_4 D_{flex.C}$$

where $D_{fixed.NC} = 1$ if an economy chooses a fixed exchange rate regime without capital controls, and zero otherwise; $D_{fixed.C} = 1$ if an economy chooses a fixed exchange rate regime plus capital

controls, and zero otherwise; $D_{flex.NC} = 1$ if an economy chooses a flexible exchange rate regime and no capital controls, and zero otherwise; finally, $D_{flex.C} = 1$ if an economy chooses a flexible exchange rate regime plus capital controls, and zero otherwise.

According to Bruno and Shin (2015), Obstfeld (2015), and Rey (2015), global financial cycles may affect a country's monetary policy stance separately from transmissions of monetary policies from the center to periphery countries. Following these authors, ΔVIX_t – change in the implied volatility of S&P 500 index options – is used as a measure of global financial uncertainty. Lower values of ΔVIX_t are often interpreted as a larger global risk appetite or greater tolerance of risk taking.

Replacing $\Delta r_{i,t}^{P*}$ and γ_2 in equation (1) with equations (2) and (3), we have

$$(4) \Delta r_{i,t}^p = c + \lambda r_{i,t-1}^p + \phi_1 * \Delta GDP\ growth_{i,t} + \phi_2 * \Delta Inflation_{i,t} \\ + \beta_1 D_{fixed.NC} \Delta r_t^{US} + \beta_2 D_{fixed.C} \Delta r_t^{US} + \beta_3 D_{flex.NC} \Delta r_t^{US} + \beta_4 D_{flex.C} \Delta r_t^{US} + \delta \Delta VIX_t + \\ e_{i,t},$$

where c is the intercept term and $e_{i,t}$ is an error term.

With this specification, one can interpret coefficient β_1 as a measure of spillover from a change in the US policy rate to the interest rate in a peripheral economy with a combination of a fixed exchange rate regime and no capital controls. If one wishes to interpret the trilemma hypothesis narrowly, one would expect $\beta_1 = 1$ or at least $\beta_1 > 0$. In other words, there is no monetary policy autonomy for any economy with a fixed nominal exchange rate system and no capital controls. Common interpretations of the trilemma hypothesis often go beyond this. In particular, one expects that a flexible exchange rate system would confer monetary autonomy: $\beta_3 = \beta_4 = 0$.

If capital controls are not fully effective because they are “leaky,” one would observe $\beta_2 > 0$. On the other hand, if capital controls are completely effective in conferring monetary policy autonomy, one will expect $\beta_2 = \beta_4 = 0$. In between the two extreme cases, if capital controls are partially effectively (but a flexible exchange rate system is not effective on its own), one may observe that $\beta_1 > \beta_2 > 0$, and $\beta_3 > \beta_4 > 0$. In other words, by checking for the signs and

relative magnitudes of different β s, one can find out whether a given policy regime (a combination of a nominal exchange rate regime and a capital control regime) provides no, partial, or complete monetary policy autonomy.

An interesting twist introduced by Han and Wei (forthcoming) is to allow for potentially asymmetric policy responses by peripheral countries depending on whether the center country raises or lowers its own interest rate. That is, a dummy for the case of a higher US interest is constructed; β_3 and β_4 are each split into two separate parameters depending on the direction of the US monetary policy.

Based on this methodology, Han and Wei (forthcoming) report two key findings. First, for countries with a flexible exchange rate regime and no restrictions on capital account transactions, there is a “2.5 lemma” pattern, or something between a trilemma and a dilemma. In particular, when the center country (the United States) raises its interest rate, the flexible exchange rate appears to offer some policy autonomy, in the sense that peripheral countries don’t generally follow the US monetary policy by raising their own rates. (In contrast, those peripheral countries on a fixed exchange rate appear to follow the US policy moves closely if they don’t have capital controls.)

On the other hand, when the center country lowers its interest rate, the peripheral countries appear to follow the US policy move by lowering their own interest rates, even if they have a flexible exchange rate. One interpretation of this pattern is that the peripheral countries are reluctant to see their currencies appreciate relative to the US dollar. The fear of appreciation (but not of depreciation) gives rise to this asymmetric policy response.

4. Conclusions

As cross-border capital flows expand more rapidly than world GDP, developing countries do not wish to miss their associated benefits. At the same time, they do not wish to unwittingly import negative side effects of financial globalization. What are the main benefits of embracing financial globalization? When would a country fail to benefit from financial globalization? What should it do to insulate itself from undesirable foreign monetary shocks?

There are three main potential benefits of reducing barriers to cross-border capital flows: (1) lower cost of capital flows, especially for small and medium-sized firms, (2) better ability to handle income risks (with a lower sensitivity of household consumption to fluctuation in output), and (3) more discipline in macroeconomic policies. These potential benefits do not work out strongly in the data, especially the last two.

There are four broad reasons for why a developing country may fail to benefit from reducing barriers to capital flows: (1) distortions in the domestic financial market (resources do not go to the most productive firms), (2) distortions in the international capital market (tendency to overborrow in the international market, especially in short-term debt, and/or in debt denominated in a foreign currency), (3) distortions in the domestic labor market (which reduce the returns on capital and raise the probability of capital flight under an open capital account), and (4) weakness in the domestic public governance.

Financial globalization may also bring challenges to the management of monetary policy for developing countries. This paper also reviews the literature on the roles of the nominal exchange rate regime and capital flow management in the transmission of international monetary shocks.

With regard to the existing literature, Han and Wei (2018) introduced several methodological innovations/improvements. First, a measure of a country's desired change in the interest rate based on the Taylor rule is proposed and the surprise components in inflation projections and growth projections by the IMF's World Economic Outlook are used to gauge the terms in the Taylor rule. This modification allows for a decomposition of co-movements between a country's and the US interest rates into two parts: that which is caused by common shocks to fundamentals in the US and the peripheral country, and that which reflects the dependence of the peripheral country on US monetary policy, or "fear of deviations." Second, since quantitative easing has become a nontrivial part of the recent US monetary policy history, and little change in the US interest rate is observed during this period, Han and Wei (2018) also develop a methodology that allows this part of the time series to be incorporated in the estimation. Third, monetary autonomy in terms of both long-term and short-term interest rates is examined.

The paper reaches different conclusions from some of the well-known papers in the literature. In particular, neither a dilemma nor a trilemma characterizes the patterns in the data

completely. Instead, some combination of the two seems to be the norm: For peripheral countries without capital controls, a flexible nominal exchange rate allows them to have some policy autonomy when the center country tightens its monetary policy. On the other hand, when the center country loosens its monetary policy, their “fear of appreciation” takes over and they often pursue a similarly looser monetary policy even if the domestic Taylor rule suggests otherwise. Therefore, a flexible exchange rate offers asymmetric or incomplete insulation from foreign monetary policy shocks. In comparison, capital controls do offer insulation from foreign monetary policy shocks for peripheral countries in either a fixed or flexible exchange rate regime.

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