Recent Research on International Macro-prudential Policy in the IFM program   
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In the years since the severe Global Financial Crisis of 2008[[1]](#endnote-1), macro-prudential policies have attracted interest as a potential additional set of tools to complement ordinary monetary policy, a possible means of counteracting financial market excesses and subsequent crashes.

Since my last [report](http://www.nber.org/programs/ifm/ifm.html), members of the Program in International Finance and Macroeconomics have written over one hundred working papers each year, many of them subsequently published in leading journals. There is not space here to summarize all or most of them. Instead, I will concentrate on some of the recent research that can be described as falling into the category of international macro-prudential regulation. All of the working papers in the IFM program can be found on the NBER's publications webpage using the "working papers by program" feature.

We have long had micro-prudential regulation of banks and securities markets. But macro-prudential thinking begins with the observation that the whole of the financial system is more than the sum of the parts. A *micro*-prudential regulation might, for example, limit the loan-to-value ratio for individual mortgages or set capital minimums for individual lenders, at levels that are figured by taking the probability of housing price fluctuations as exogenous. Thus it is a “partial equilibrium” approach. A *macro*-prudential approach recognizes that housing prices are endogenous: during a credit-fueled housing boom, the probability of a crash is greater and so regulations on individual borrowers and lenders may need to be set more stringently.

Financial regulators need to think about the cycle, and macroeconomic policy-makers need to think about financial regulation. It is not just banks and private financial institutions who were led by a micro perspective into thinking that default probabilities were independent across households and who therefore treated mortgage-backed securities as virtually riskless. Some regulatory agencies also neglected the correlation across borrowers and so under-estimated the possibility that many mortgages could fail simultaneously in a housing downturn.

This survey of recent NBER research on international macro-prudential policies is divided into four distinct areas: (1) national prudential policies that are macro in the sense of being cyclical; (2) macro-prudential regulation that focuses on the composition of debt, treating foreign debt as carrying an extra risk beyond that of domestic debt [and thus, in our example, might restrict mortgage borrowing in foreign currency more than in domestic currency]; (3) a precautionary approach to the national balance sheet with regard, in particular, to foreign exchange reserves; (4) global liquidity conditions and coordination issues. There is some emphasis an emerging markets.

1. **Country use of macro-prudential policies**

One root source of capital market imperfections is the need for borrowers to have collateral, in order to prove creditworthiness.[[2]](#endnote-2) Once a debtor is up against a collateral constraint he may be forced to sell assets (“fire sale”), driving down the market price and thereby putting other borrowers up against their own constraints. Javier Bianchi and Enrique Mendoza show how overborrowing carries a “pecuniary” externality because private agents do not internalize how the price of assets used for collateral respond to collective borrowing decisions.[[3]](#endnote-3) Such a model suggests that financial innovation may have played a role in the financial crisis of 2008-09.[[4]](#endnote-4)

Many observers warn of the moral hazard dangers from bailing out creditors or lenders in a financial crisis. But if the time-consistent system features government intervention during the de-leveraging phase of the cycle, it is appropriate to take this into account beforehand: restrictions or taxes on over-borrowing during the boom phase of the cycle will reduce or pay for the likelihood of bailouts during the bust phase. In theory, taxes on debt and dividends that vary with the stage of the cycle can offset the externality.[[5]](#endnote-5)

Wall Street is connected to Main Street. These financial market imperfections can be combined with standard macro models in which labor markets and goods markets do not always clear. The collateral constraint acts as a financial accelerator, magnifying economic downturns. Monetary policy may not be adequate to combat the recession that results during the de-leveraging phase, especially if the nominal interest rate cannot fall enough because of a liquidity trap, more specifically the Zero Lower Bound.[[6]](#endnote-6) In this context, central banks may be able, in place of monetary policy, to use ex ante macro-prudential policies during the boom phase, such as debt limits and mandatory insurance requirements, which offset the overborrowing externality.[[7]](#endnote-7)

Shocks can be transmitted through the banking sector in particular.[[8]](#endnote-8) Standard bank regulations to reduce risk include:[[9]](#endnote-9) capital requirements, a limit on leverage, dividend taxes, liquidity requirements,[[10]](#endnote-10) deposit insurance,[[11]](#endnote-11) stress tests,[[12]](#endnote-12) ongoing supervision of financial institutions,[[13]](#endnote-13) and minimum reserve requirements. Developing countries use reserve requirements countercyclically (far more than advanced countries do), probably as a substitute for monetary policy which is diverted, for example, by the need to raise interest rates in recessions in order to defend the currency.[[14]](#endnote-14)

Booms in real estate lending and house prices bubbles, which can originate in loose credit market conditions imported from abroad, materially heighten the risk of financial crises. [[15]](#endnote-15) Some countries have had success with regulations in the housing sector, to discourage households from taking out excessive mortgages. The regulations include maximum ratios of debt service to income (DSTI) and loan-to-value (LTV). These become “macro-prudential” when they are raised or lowered with the cycle.[[16]](#endnote-16)

**2) Regulation of foreign liabilities**

Prudential regulation cannot be imposed domestically without regard to the international dimension. For one thing, authorities may treat foreign debt as carrying extra risk beyond that of domestic liabilities. For example, they may set higher reserve requirements for banks foreign-currency deposits than domestic.

The tightening of capital requirements or other regulations on domestic banks in one country may “leak” abroad, in the sense that the fund-raising activity goes overseas.[[17]](#endnote-17) This suggests one justification for capital controls. Charles Engel, in a survey of macroprudential policy under high capital mobility, concludes that the leakage justifies international coordination of prudential policy, as under the Basel III agreement.[[18]](#endnote-18)

**(2b) Macro prudential measures in Emerging Markets**

Models of financial market imperfections, overborrowing, crises, and macro-prudential regulation have been considered appropriate for emerging markets[[19]](#endnote-19) long before the Global Financial Crisis of 2008 impelled most economists to contemplate them seriously for advanced countries. Some of the same lessons and models that international economists had developed to explain the EM sudden stops of the 1990s, for example, could be applicable to Europe and the US as well.[[20]](#endnote-20) Korea is one country that has had some success with macro-prudential measures that vary over the cycle.[[21]](#endnote-21)

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| **(2c) Capital flow management policies include both macro-prudential and capital controls**  Although the theory of pecuniary externalities offers an explanation why financial markets do not always deliver the best outcomes and so why macro-prudential regulation might be justified, a finer-grained analysis is needed if the conclusions are to be of practical use. What is different about the danger of over-borrowing internationally as opposed to domestically? What is different about controls on international capital flows as opposed to domestic prudential regulation?  Macro-prudential regulations and capital controls have come to be grouped in the common category of Capital Flow Management policies, which have been found capable of reducing financial fragility.[[22]](#endnote-22) Distinguishing between macroprudential regulation (to limit leverage) and capital controls (to induce precautionary behavior), Anton Korinek has argued that the latter may be relevant only for EM countries, where foreign-currency debt can render devaluation contractionary.[[23]](#endnote-23)  **(2d) Capital controls when exchange rates are fixed**  The theory of overborrowing as a pecuniary externality can help update the traditional point that capital controls can be used to insulate a pegged-currency country by showing their prudential aspect:[[24]](#endnote-24) Controls can be used to reduce capital inflows in boom times and then reversed in bad times, like an umbrella that one uses only when it is raining. Another analogy, introduced by Michael Klein, is gates that can be opened or closed with the cycle (Brazil, South Korea) versus walls that are up permanently (China and India).[[25]](#endnote-25)  Of course capital controls[[26]](#endnote-26) also have drawbacks, such as raising firms’ cost of capital[[27]](#endnote-27) or lack of enforceability.[[28]](#endnote-28)  **(2e) Regulation to influence the composition of liabilities**  Some kinds of regulation aim to alter the composition of foreign liabilities, more than the total level.  Capital controls may, for example, seek to alter the *maturity composition*, reducing short-term capital flows that are prone to sudden reversals.[[29]](#endnote-29)  Another concern is the *currency composition* of liabilities. EM countries have in the past borrowed abroad primarily in terms of dollars or other foreign currencies, rather than in terms of their own currency. In the case of bank borrowing, such short-term foreign exchange liabilities are an example of the sort of “non-core” funding sources (i.e., other than customer deposits) that banks increasingly turn to in a credit boom.[[30]](#endnote-30) The resulting “currency mismatch” led to contractionary balance sheet effects when EM currencies were forced to devalue in the crises of 1994-2001. After that experience, many EM countries sought to reduce this sort of vulnerability in their balance sheets by avoiding unhedged foreign currency liabilities.[[31]](#endnote-31)  One study of 51 emerging market economies over the period 1995–2008 suggests that some countries were able to use of foreign currency (FX)-related prudential measures, domestic prudential measures, and financial-sector capital controls to reduce the share of foreign exchange lending in total domestic bank credit (and reduce the share of portfolio debt in total external liabilities), which enhanced resilience when the Global Financial Crisis hit in 2008-09.[[32]](#endnote-32)   |  | | --- | |  | |

A broader definition of macro-prudential policies would include other efforts to strengthen the national balance sheet, such as increased holdings of foreign exchange reserves by the central bank, as precautions to reduce financial fragility.

1. **The role of reserves in**  **a precautionary approach to the national balance sheet**

**(3a) Foreign exchange reserves**

In the decade following the crises of the 1990s, EM central banks built higher levels of foreign exchange reserve holdings. One important reason was the pre-cautionary motive: they believe it helps protect their countries against the worst effects of a financial or balance of payments crisis.[[33]](#endnote-33) This belief was tested in the Global Financial Crisis, a common shock experienced by all countries. Some studies have found that, yes, those countries that had been holding a high level of foreign exchange reserves did indeed tend to come through 2008-09 in better shape than others.[[34]](#endnote-34) Countries that had a high ratio of foreign exchange reserves to external borrowing in particular were not hit as badly as those with a low ratio.[[35]](#endnote-35) Again in 2013, those countries that had been holding more reserves seemed better able to withstand the “taper tantrum” shock of higher US interest rates.[[36]](#endnote-36) Some other studies, however, have found less evidence of an effect.[[37]](#endnote-37)

**(3b) CFM Policy alternatives including also reserves and appreciation**

Consideration of a complete set of alternative policies for managing a capital boom would include not just Capital Flow Management policies but also conventional counter-cyclical macroeconomic policies such as tightening monetary policy, tightening fiscal policy,[[38]](#endnote-38) or allowing the currency to appreciate.[[39]](#endnote-39) How the authorities manage the boom will have a big influence on the country vulnerability to subsequent adverse shocks.

1. **Revisions in the trilemma, global liquidity conditions, and international coordination**

A long-standing principle in international macroeconomics (often associated with Robert Mundell) goes by the name of “the Impossible Trinity.” Also called the “trilemma,” the proposition states that even though a country might wish to have a fixed exchange rate, highly integrated financial markets, and the ability to set its own monetary policy, it cannot have all three of these things. The logic is simple. If there are no differences between the domestic currency and foreign currencies and no barriers to the cross-border movement of capital, then the domestic interest rate is tied to the world interest rate. The domestic country loses the ability to set its own interest rate.

This principle helps explain the travails of the euro-zone: member countries have found it difficult to live with central bank policies that are no longer tailored to their own economic circumstances.[[40]](#endnote-40) It also helps explain past crises such as currency crashes in Emerging Markets. When the Federal Reserve raised interest rates, it would force Mexico, for example, to choose between an unwanted tightening of its own monetary conditions and an unwanted abandonment of the peso’s peg to the dollar. This area of research is of particular interest at a time when Fed quantitative easing has come to an end and many observers are anxious that an expected increase in US interest rates might once again reverse the flow of finance to emerging countries and trigger new crises.

Research questions abound. Does the trilemma mean that emerging markets should turn back the clock on capital controls? Does it mean that the movement toward floating exchange rates is the answer? Are intermediate regimes such as managed floating more workable than the corner choices?[[41]](#endnote-41) Do floating rates in fact insulate countries from foreign interest rates as advertised? Do macro-prudential regulations offer a solution? Or is there a new need for international policy coordination across central banks so that the Fed, for example, would take EM interests into account when sets interest rates?

**(4a) Do floating rates really insulate?**

In some theoretical models, capital market imperfections may prevent floating rates from performing the shock absorption role claimed in traditional macroeconomic analysis. Some, such as Emanuel Farhi and Ivan Werning, find that in such circumstances taxation of capital flows can be welfare-improving.[[42]](#endnote-42) Others find that capital controls are of limited help.[[43]](#endnote-43)

**(4b) US financial conditions drive global liquidity and the world capital flow cycle**

Helene Rey finds that one global factor explains an important part of the variance of a large cross section of returns of risky assets around the world. This time-varying global factor can be interpreted as the perceived importance of risk, as reflected in a measure such as the VIX.[[44]](#endnote-44) US monetary policy is, in turn, a driver of this global factor and of international credit flows and leverage.[[45]](#endnote-45) As an example of “reach for yield,” the carry trade entails short-term capital flows from low interest rate countries such as the US to high interest rate countries such as EMs.[[46]](#endnote-46)

Traditional textbook theory under the trilemma says that floating exchange rates help insulate small countries against global financial factors such as US monetary conditions, each country choosing the monetary policy that suits its own economic conditions. But transmission of liquidity and risk effects may invalidate this insulation proposition.[[47]](#endnote-47) After all, many countries with floating exchange rates suffered effects of the US-originated Global Financial Crisis in 2008-09. Macro-prudential regulations might reduce vulnerability to such liquidity and risk shocks. The issue is very relevant in 2015, with fears that coming increases in US interest rates might trigger EM crises as sometimes in the past.

**(4c) When interest rates are at the Zero Lower Bound**

A particular version of the monetary independence problem may arise when countries are seeking to ease monetary policy in the presence of a liquidity trap. For example, interest rates may already be at the Zero Lower Bound, as has been the case in Japan since the late 1990s and other major countries since 2009. If the textbook theory is right, currency depreciation offers another channel for monetary stimulus besides the interest rate. But if floating exchange rates in fact do not allow sufficient monetary independence, again there may be a role for CFM (capital flow management) measures. Some argue that, in a global economy with open financial markets, the problem of the Zero Lower Bound introduces a new dimension to the international policy trilemma.[[48]](#endnote-48)

# (4d) Central bank coordination

# Another response to the problem of spillovers from US monetary policy to emerging market countries is a call from EM leaders for the major central banks to coordinate monetary policy with an eye toward its international repercussion (e.g., [Raghuram Rajan](http://www.nber.org/people/raghuram_rajan), Governor of the Reserve Bank of India). Of course the mandate of the Fed, as of other central banks, is to act in the interests of its own economy.[[49]](#endnote-49) But that need not rule out taking into account international repercussions of monetary policy moves or coordinating with other countries.[[50]](#endnote-50) Macro-prudential policies may themselves need to be coordinated internationally.[[51]](#endnote-51)

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