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Introduction

The Great Recession has sparked a new wave of interest among scholars and policymakers in the economic and political consequences of capital account liberalization. Now that many countries around the world have substantially liberalized their financial policies, capital can move quickly across borders, arguably causing real estate booms, credit expansions, and other distortions.[1] Earlier scholarship highlighted the dangers of excessive capital inflows for emerging-market countries—such as Chile, Argentina, and Mexico in the 1970s and 1980s—with underdeveloped financial systems and profligate politicians. Similarly, financial liberalization with uneven economic reforms was central to explanations of the Asian financial crisis of 1997-8.[2] Recently, some scholars have focused their attention on the consequences of capital flows for *developed* economies, finding links between global imbalances—in which large amounts of capital slosh from surplus to deficit countries—and banking crises in the U.S., Ireland, Iceland, and other industrialized countries.[3] A recent wave of scholarship demonstrates the often deleterious consequences for political leaders of these crises.[4] Even the International Monetary Fund, once the champion of neoliberal reform, has begun to question the merits of complete capital account liberalization, noting the links between capital inflow surges and both

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[1] On financial liberalization, see Haggard and Maxfield 1996; Goodman and Pauly 1993; Pauly 1988; Rosenbluth 1989; Quinn 1997; Quinn and Inclan 1997. On the distortions associated with capital inflows, see Bernanke 2009; Bini Smaghi 2008; Caballero 2014; Chinn and Frieden 2011; Reinhart and Reinhart 2008; Reinhart and Rogoff 2009; Obstfeld and Rogoff 2009; and Portes 2009.

[2] For example, Diaz-Alejandro (1985) links the 1980s crises in the Southern Cone to problems stemming from financial liberalization and a surge in foreign credit. Similarly, Calvo's (1998) canonical work on "sudden stops" and Kaminsky and Reinhart's (1999) influential article on "twin" crises identified the potentially destabilizing effects of current account deficits and capital inflows to emerging-market countries. See also Ghosh *et al* 2014 on surges in emerging markets, and Kim *et. al.* 2015 on the link between surges and sudden stops.

[3] See, for example, Chinn and Frieden 2011; Iversen and Soskice 2012; Reinhart and Reinhart 2008; and Reinhart and Rogoff 2009.

[4] See Chwieroth and Walter 2015; Funke et. al. 2015; Crespo-Tenorio et al 2014; Gandrud and Hallerberg 2013; Grossman and Woll 2014; Walter 2013; Pepinsky 2008; and Rosas 2006.

financial instability and increased inequality.[5] In short, it appears that financial liberalization and capital inflows are getting a bad reputation.

However, an important puzzle remains: the empirical link between capital inflows and banking crises is tenuous in developed economies. While some countries with large "external imbalances"—large current account deficits that require offsetting capital inflows—suffered severe bouts of instability during the Great Recession (e.g., the US, UK, and Greece), other deficit countries have largely avoided the crisis and are now being upheld as paragons of stability (e.g., Australia, Canada, and New Zealand). Drawing on 140 years of data on 14 industrialized countries, Jorda, Schularick, and Taylor (2011) find that current account deficits are unreliable predictors of financial instability. However, they find that deficits often go hand-in-hand with credit growth—itself a predictor of crises—and that this connection is strengthening over time in the post-Bretton Woods era.[6]

In this paper, we reconcile the potential dangers of financial liberalization and capital inflows with the mixed results in the empirical literature. We argue that the destabilizing impact of capital inflows is conditional upon the relative prominence of banks versus non-bank financial markets. When banks compete with well-developed national securities markets to provide financing for businesses, their appetite for risk increases.[7] Capital inflows amplify this risk and increase the chance of a banking crisis. In contrast, when banks operate alongside relatively underdeveloped securities markets, they are more likely to maintain their conservative bias and capital inflows are less likely to be destabilizing.

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[5] See Ostry, Loungani, and Furceri 2016 and Seabrooke 2012.

[6] In contrast, Amri, Richey, and Willett 2016 find only a weak (and since the 2000s, shrinking) correlation between capital inflow surges and credit booms.

[7] As discussed below, our conception of bank competition is related to the idea of bank-based and market-based financial systems (see, e.g., Demirguc-Kunt and Levine 2001; Zysman 1983) and "market-based banking" (Hardie et al 2013).

Securities markets as alternatives to traditional bank lending arise from deliberate and sometimes inadvertent acts of government, often occurring during the very early days of a country's financial sector development. While a full accounting of the political origins of bank- and securities-market competition is beyond the scope of this paper, we demonstrate that securities market development is historically sticky and largely invariant to capital inflows over time.

Empirically, we expect that the relative prominence of securities markets amplifies or attenuates the destabilizing influence of capital inflows. To explore this hypothesis, we assemble a dataset of banking crises covering the advanced industrialized countries from 1976 to 2011. Results from conditional logit and linear probability models suggest that capital inflows, conditional upon high levels of bank-to-non-bank competition, are associated with a higher incidence of crises. We further explore the impact of capital inflows on banks' actual risk taking as indicated by their capital adequacy levels and measures of insolvency risk. Our results demonstrate that banks' prudential capital cushions tend to decline with the combination of capital inflows and prominent securities markets, whereas in financial systems with relatively underdeveloped securities markets, inflows have little impact on capital adequacy or insolvency risk.

The rest of the paper proceeds as follows. In the next section, we provide a critical overview of the prevailing arguments about global imbalances and financial crises. We then unpack the risk taking of banks within the context of the broader financial landscape. Banks in isolation can be expected to intermediate between savers and borrowers with a conservative bias. However, in the presence of broad and deep securities markets—which offer an attractive alternative to banks as a source of capital for firms—banks feel incentives to extend riskier loans,

ramp up their leverage, and seek more precarious funding sources. Capital inflows exacerbate

banks' risk taking and amplify the scale of bank lending, thereby increasing the chance of a

banking crisis. The empirical section describes the dataset and econometric models and

summarizes our main findings. In the conclusion, we explore the policy implications of our

findings and urge a reconsideration of the conventional wisdom on global imbalances and

banking crises.

Capital Inflows and Financial Crises

Why might capital inflows destabilize domestic banking systems? Persistent capital

inflows—a manifestation of a global imbalance—could flood a domestic financial system and

incentivize financial managers and regulators to make poor decisions. Among the many

articulations of the imbalance theory of financial crises, Richard Portes' formulation is perhaps

the clearest:

> "The global imbalances that have built up in the past decade permitted and indeed
> stimulated the dysfunctional aspects of financial markets and instruments that are now
> troubling us. They brought low interest rates, the search for yield, and an excessive volume
> of financial intermediation, which even the sophisticated American and British financial
> systems could not handle responsibly."[8]

As this concise summary makes clear, the causal chain linking imbalances to crises runs from

current account deficits to large capital inflows to distortions in the allocation of capital. In this

stylized view, current account deficits in the US, UK, and elsewhere were financed with large

capital inflows from surplus countries that ended up being intermediated poorly by the domestic

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[8] Portes 2009, 2.

financial system.[9] Iversen and Soskice (2012) highlight the role of global imbalances as magnifiers of risk-taking by highly leveraged financial institutions whose failures had dire systemic consequences, while Chinn and Frieden (2011) see capital inflows as driving real estate bubbles and other distortions in industrialized countries, not dissimilar to the boom-and-bust cycles of Latin American countries in the 1980s.[10] Indeed, the U.S. current account deficit grew to nearly 6 percent of GDP in 2008, a figure that in retrospect seems like a clear warning of bad times ahead.

Despite its strengths, the argument about destabilizing capital inflows requires some finessing. To begin, the economics literature has shifted its gaze from *net* inflows to *gross* inflows, reflecting the likelihood that inflows of short-term portfolio capital can have financial stability implications even if there are offsetting outflows of other types of capital.[11] We return to this issue in the empirical section below. Moreover, the "global imbalances" view must reckon with the fact that capital does not always flow from surplus to deficit countries. In the case of the US from 2002-7, approximately two-thirds of foreign capital inflows arrived from countries with which the US was not running large current account deficits, such as the UK and certain Eurozone countries.[12] The primary source of the large US current account deficits prior to the Great Recession – its $300 billion bilateral trade deficit with China – had very little, if anything, to do with either the large influx of foreign capital into the US in the 2002-7, or the collapse of these flows in 2007-9. These facts challenge the "excess saving" view of the financial crisis, in

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[9] Whelan 2010.

[10] On the link between capital inflows and distortions in the allocation of credit, see Schwartz 2009.

[11] See references in footnote 49.

[12] Borio and Disyatat 2011; and Whelan 2010.

which capital from surplus countries creates inherent distortions as it flows to vulnerable deficit countries.[13]

Of course, it might still be the case that large capital inflows are a primary cause of financial crises, even if they do not originate in countries with large current account surpluses. As we noted earlier, the empirical evidence is not clear-cut. Reinhart and Reinhart (2008) find that the probability of a banking crisis conditional upon a capital inflow "bonanza" is higher than the unconditional probability. Similarly, Mendoza and Terrones (2012) find that capital inflows often trigger banking credit booms, which themselves are a common precursor to banking crises. Iversen and Soskice (2012) argue that the combination of global imbalances and under-regulated systemically important financial institutions led to the recent crash in the U.S. and the U.K. However, Jorda, Schularick, and Taylor (2011), upon examining a set of industrialized countries over 140 years, conclude that current account deficits are not statistically significant correlates of banking crises in most of their model specifications.[14]

Ultimately, the connections between current account balances, capital inflows, and financial crises are empirically and theoretically unclear.[15] Perhaps in recognition of this, some observers have advanced a slightly different theory, in which global imbalances and banking crises are the result of common causes.[16] These authors argue specifically that macroeconomic policies in both surplus and deficit countries – in particular, lax monetary policy, low real interest rates, and exchange rate undervaluation – cause both external imbalances and banking crises. Evaluating this perspective is difficult, since it suggests that a variety of factors interact

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[13] Bernanke 2009.

[14] In a related study, Amri, Richey, and Willett 2016 find only a weak connection between capital inflow surges and credit booms for a sample of 46 countries from 1981-2010.

[15] For a review, see Amri and Willett 2015.

[16] Bini Smaghi 2008; and Obstfeld and Rogoff 2009.

simultaneously to cause both imbalances and crises. On one level, this is intuitively appealing, as all of the factors mentioned likely played some role in causing the Great Recession. On another, however, this "common causes" view provides useful cover for policymakers who might otherwise be held accountable for triggering the crisis. Indeed, if major crises are the result of a complex combination of macroeconomic policies in a large number of countries, then it becomes almost impossible to say what the most salient causes really were, let alone what should be done to prevent them from happening again. But a more pressing concern for this perspective is that the links between monetary policy, imbalances, and crises are all tenuous, making it unlikely that there exists a common underlying cause. Some countries have maintained resilient banking systems amidst substantial current account deficits, while other countries with similar macroeconomic imbalances have experienced punishing crises. How can we explain this puzzle?

Beyond Imbalances: Banks and Their Domestic Competitors

A common assumption in the empirical literature on crises is that banking systems are all alike. Scholars pay insufficient attention to the variation in national financial systems, including the relative importance of banks and non-bank financial institutions across countries and over time. Our simple hypothesis is that banks tend to take on more risk when they face competition from securities markets, and these risks are magnified in the face of capital inflows. Therefore, a national financial system with a large and deep securities market is more likely to experience a banking crisis in the face of capital inflows than a financial system with a relatively underdeveloped securities market. This argument helps to explain why capital inflows are

sometimes, but not always, a source of instability for banking systems in the advanced industrialized countries.

A sound banking system is widely acknowledged to be a cornerstone of well-functioning financial markets.[17] Because of inherent problems of asymmetric and incomplete information, financial markets are prone to problems of adverse selection and moral hazard, which lead to rationing, free riding, herd behavior, bubbles, and crises.[18] In this environment, financial intermediaries – namely, deposit-taking commercial banks – play a unique role in addressing the information problems inherent in financial markets. By screening borrowers before transactions occur and monitoring firms and individuals afterwards, banks mitigate both adverse selection and moral hazard.[19] Banks also perform the critical functions of intermediation (linking potential borrowers and lenders) and "maturity transformation" (turning short-term deposits into long-term loans) that enable the functioning and development of modern financial markets.[20]

Scholars have long pointed out that banks have a comparative advantage in reducing the transaction costs involved with funding standardized low-risk endeavors.[21] Because traditional bank loans are generally illiquid, a bank's managers have strong incentives to monitor their debtors carefully, and to select only creditworthy debtors in the first place.[22] Thus, the conservative bias of banks weighs in favor of funding sound projects with solid balance sheets and competent managers.[23]

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[17] For an excellent overview, see Wolf 2008.
[18] Wolf 2008.
[19] Mishkin 2006, 29-30.
[20] Wolf 2008, 15.
[21] Allen and Gale 2000; Boot and Thakor 1997; and Holmstrom and Tirole 1993.
[22] See Mosley 2003 for an application to merchant banks in the 19th century.
[23] Levine 1997, 2000

Absent other sources of influence, capital inflows need not alter banks' conservative bias in developed economies. Even for emerging-market countries, the lesson from the financial crises of the 1980s and 1990s was not that inflows were inherently destabilizing, but rather that liberalization should proceed cautiously until the banking system has time to fully develop and mature. Reflecting this caution, the IMF justified its recent reversal of its longstanding opposition to the use capital controls on the logic that premature financial liberalization creates undue risk of imprudent lending and banking crises.[24] Once appropriate financial managers and prudential regulations are in place, the banking system can safely channel capital inflows to worthy borrowers. Furthermore, countries such as Australia and Canada—both of which have experienced substantial capital inflows in recent years— are frequently cited as evidence of the possibility that conservative banking can persist even in the most liberalized and developed banking systems.[25]

We part company with previous scholarship by arguing that banks' conservative bias varies as a function of the degree of competition from nonbank financial institutions and markets.[26] At the heart of these markets is the financial instrument known as a security, defined as a claim on an issuer's future income or assets. The most common types of securities are stocks (representing claims on the net income and assets of corporations) and bonds (which promise to make payments over a specific period of time). Financial derivatives are securities whose value is derived from an underlying asset or a previously issued security. The increasing availability of all types of securities in a national financial system implies a precarious role for traditional bank lending. If securities markets are broad and deep, businesses searching for funds for expansion or

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[24] See International Monetary Fund 2012.
[25] See, e.g., Bordo, Redish, and Rockoff 2015.
[26] On bank-based versus market-based financial systems, see Culpepper 2005 and Zysman 1983. On banks as sources of patient capital, see the contributions in Hall and Soskice 2001.

investors seeking to lend their excess funds for profit can go directly to these markets rather than using a bank as a financial intermediary. And as Hardie *et al* (2013) note, banks themselves become more market-oriented in the sense that bank loans can be transformed into securities, and non-bank financial institutions provide wholesale funding to supplement banks' deposit bases.

Securities markets look more kindly upon riskier firms and projects than banks do. When markets are highly liquid, investors can generally sell their financial instruments at the market-clearing price. The holders of securities therefore have fewer incentives to monitor a firm's managers than a bank with an illiquid portfolio.[27]   Moreover, because investors in securities are more likely to be motivated by short-term gains, the managers of the issuing firm are incentivized to emphasize short-term growth over long-term stability. To be sure, securities markets are not inherently bad or destabilizing. Innovative firms with higher-risk, higher-reward projects are better able to find funding by bypassing traditional intermediaries, and they can also avail themselves of customized risk-management instruments. As a result, it is not uncommon for scholars to tout the stability-enhancing functions of securities markets.[28] By dispersing credit risk, such markets can, in principle, mitigate the otherwise concentrated shock of a default by a major borrower.

The danger for financial instability, in our view, comes from the reaction of banks to the threat of competition from securities markets. If these markets begin to lure away firms in search of capital, it is only reasonable to expect that banks would take steps to regain their business. We posit two channels in which securities markets can enhance banks' risk taking. The first channel involves traditional banking activity. Banks that once turned their backs on risky borrowers might, in the face of competition, be more willing to extend traditional loans at more favorable

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[27] Beck *et al* 2001; Diamond 1991; and Rajan 1992.
[28] See Shin 2009 for a review of the literature.

terms. Securities market competition might also prompt banks to extend *more* loans relative to their capital bases as a way of maintaining their profit levels. In other words, even old-fashioned brick-and-mortar banks with little to no direct involvement in securities markets can become riskier as securities markets grow.

The second channel pertains directly to the securities markets themselves. Banks face incentives to create more sophisticated products to remain competitive, and they generally rely on markets to hedge some of the risks associated with these products. This greater reliance on market liquidity can make banks' balance sheets more suspect in times of economic downturns or shocks, thereby hampering their ability to provide ongoing liquidity to customers.[29] Securities markets may actually concentrate – rather than disperse – risk in the banking sector, thereby increasing the risk of crises.[30] The underlying reason for this is that securities open up new sources of funding for traditional banks by introducing a variety of new creditors into the financial system, including pension funds, mutual funds, and insurance companies.[31] This pool of new creditors expands further in times of large capital inflows, as foreign investors and central banks channel large amounts of funding into securities backed by traditional banking products, including mortgages and trade receivables. In this environment, banks have strong incentives to increase their leverage in order to boost profitability. This can occur through several channels: 1) an increase in traditional loans to ever-riskier borrowers; 2) the accumulation of risky securities and derivatives on bank balance sheets; and 3) the sponsorship of or investment in off-balance sheet entities invested in securitized financial instruments. In a financial downturn, these channels have the perverse effect of concentrating risk in the banking system itself (and

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[29] Rajan 2005.
[30] Acharya, Schnabl, and Suarez 2013.
[31] Shin 2009; Hardie et al 2013.

particularly in the largest financial intermediaries), rather than dispersing risk throughout the economy.[32]

Opaque chains of complex securities can impair the ability of even the most sophisticated investors to gauge the level of risk in the financial system.[33] The prominence of foreign investors can exacerbate these risks. Indeed, capital inflows are particularly likely to be misallocated—or to be funneled toward high-risk projects without adequate oversight—in highly securitized financial markets because foreign investors have an even greater information asymmetry problem than domestic actors.

The discussion above suggests our key hypothesis: the combination of capital inflows and prominent securities markets creates a heady cocktail that increases a country's vulnerability to destabilizing banking crises. Before moving on to the empirical analysis, we first shift to a brief discussion of the political origins of bank-to-nonbank competition.

The Political Origins of Bank and Securities-Market Competition

Securities are prominent in every developed financial market, and they play a role in all but the most primitive of developing-country markets. However, securities markets are more important in certain countries than in others. Figure 1 depicts a snapshot of the cross-national variation in the relative importance of traditional banking in 2007 using the ratio of stock market volume to bank lending. At the bottom of the figure are countries such as Austria and New Zealand in which traditional bank lending is the key process for "mobilizing savings, allocating capital, overseeing the investment decisions of corporate managers, and providing risk

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[32] Shin 2009.
[33] Gorton 2009.

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management vehicles."[34] In contrast, in countries such as the U.S. and Finland, investors are able to tap into diverse and sophisticated financial markets for funding, often bypassing traditional financial intermediaries in favor of arms-length transactions between the buyer and seller of financial instruments.[35]

[Figure 1 here]

The importance of relationship-based finance relative to decentralized financial markets has its roots in policy decisions often from the distant past. Trading in securities can only thrive in environments with strong rule of law, high degrees of transparency, and detailed rules for accounting and exchange.[36] Organized banking systems often have political incentives to suppress these features, thereby maintaining their centrality in the financing process. In contrast, banking systems that lack political voice may be unable to prevent the government from enacting policies that encourage arms-length financial transactions.

For example, the emergence of a highly developed securities market in the US is partly attributable to the early fragmentation and disorganization of the banking system in the 1800s, and from a Populist fear of large financial institutions.[37] From President Jackson's veto of the rechartering of the Second Bank of the United States to the longtime prohibition against

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[34] Demirguc-Kunt and Levine 2001, 81.

[35] Indicators of the relative importance of bank lending and financial markets do not track the di- or tri-chotomous classifications of the Varieties of Capitalism literature (Hall and Soskice 2001). For example, liberal market economies (LMEs) are highly diverse with respect to securities markets, from highly developed (U.S.) to remarkably underdeveloped (New Zealand). Analytically, we expect that a coordinated market economy (CME) such as Japan, with its highly developed securities markets, will be home to banks that behave differently from those in other CME countries like Austria, with its relatively underdeveloped markets. We follow Hardie *et al* 2013 in their wariness of these classifications for studying financial market dynamics and fragility.

[36] Allen and Gale 2001.

[37] Roe 1994.

interstate branching, the country maintained a strong bias against centralized banking.[38] Even the creation of the Federal Reserve System in 1913 sustained a regional, decentralized structure of bank governance and control.[39] In summing up the history of banking in the US, Allen and Gale (2001) note the weaknesses of US banks helped to strengthen the role of financial markets. Securities, in a sense, filled a void that commercial banks were not able to fill, and the relative prominence of securities markets endures to this day.[40]

In contrast, countries that today have relatively underdeveloped securities markets often had powerful and concentrated banking systems at critical points in their financial development. In many European countries as well as Japan, powerful banking coalitions ensured that the evolving regulatory framework tilted toward large banks, especially during the 1930s.[41] Other countries endured securities-related shocks that prevented financial markets from developing at the same clip as traditional banking. France, which is generally classified as a classic bank-based system in the economic history literature, offers a telling example of the 18th century "Mississippi Bubble," in which investors were enticed by the promise of great riches from the Mississippi delta region of North America. A frenzy of speculation in shares of the Mississippi Company in the early 1700s led to a stock market boom throughout Europe followed by a spectacular bust in France in 1720. The shock led to the creation of an official French bourse to regulate the market in shares of stock, and an enduring skepticism of the role of securities in providing direct funding to exploratory ventures.

The accumulation of policy decisions, firm behaviors, and market decisions required to develop a thriving securities market imply a degree of path-dependence in a country's financial

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[38] Calomiris and Haber 2014.
[39] Lowenstein 2015.
[40] Allen and Gale 2000, 34.
[41] Rajan and Zingales 2003.

market characteristics.[42] A financial system dominated by bank lending is unlikely to morph into

a securities-based system in a short time, even though securities markets are gradually becoming

more prominent in many countries around the world. Moreover, it is unlikely that foreign capital

can, by itself, prompt such a transformation. Figures 2 and 3 illustrate the relative stability of

market characteristics over the last three decades, even in the face of large changes in current

account balances (and resulting capital inflows or outflows), for Canada and Germany. The

figures depict the current account deficit (in which higher numbers correspond to larger deficits)

and levels of gross portfolio capital inflows to trend GDP. The figures demonstrate the relative

stability of financial market characteristics from 1976 to 2011 even in the face of widely variable

current account deficits and persistent gross portfolio capital inflows.

[Figures 2 and 3 here]

Empirical analysis

In order to test our argument, we employ time-series cross-sectional analysis of data of an

original dataset covering up to 31 OECD countries from 1976 through 2011.[43] Our unit of analysis is the

country-year and our dependent variables (described further below) are a binary indicator of a banking

crisis and country-level measures of bank capital and insolvency risk. We employ the following basic

model:

DV_{it} = β_0 + β_1 *Capital inflows* + β_2 *Financial Market Structure* + β_3 *Capital*

inflows*Market Structure + β_4 *Private bank credit/GDP* + β_5 *Per capita GDP growth* + β_6

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[42] See Hall and Soskice 2001.

[43] Our banking crisis samples include all countries currently in the OECD, even if they were not members at the start of the sample. In the bank-level analysis below, our sample is restricted by data availability to 29 countries from 1990 to 2009.

Inflation + β₆ OECD average per capita GDP growth + β₇ US real interest rate + β₇ Total

global banking crises + temporal controls + country fixed effects + ε

In our banking crisis models, the main explanatory variables enter as five-year, lagged moving averages, rather than current year observations or one-year lags. Our aim is to ensure that we are picking up systematic trends in the explanatory variables, rather than year-to-year fluctuations in capital inflows, financial market structure, or major macroeconomic indicators.

The banking crisis models are estimated using both conditional (fixed effect) logit models and fixed effect OLS (linear probability, or LPM) models, in order to address issues of unobserved heterogeneity and heteroskedasticity. Following Signorino and Carter (2010), we include the country-specific number of years since the last banking crisis, its square, and its cube, in order to control for temporal dependence in the data. The bank capital and insolvency risk models employ OLS with country fixed effects and Driscoll-Kraay standard errors to control for cross-sectional dependence in the data.[44]

Dependent variables

Our first dependent variable is banking crises. We draw primarily on the banking crisis classification from the World Bank's Global Financial Development Database (2016), which updates and extends Laeven and Fabian Valencia's *Systemic Banking Crises: A New Database* (2008). This variable measures large-scale, systemic banking crises, defined as follows:

> Under our definition, in a systemic banking crisis, a country's corporate and financial sectors experience a large number of defaults and financial institutions and corporations face great difficulties repaying contracts on time. As a result, non-performing loans increase sharply and all or most of the aggregate banking system capital is exhausted. This situation may be accompanied by depressed asset prices (such as equity and real estate prices) on the heels of run-ups before the crisis, sharp increases in real interest rates, and a slowdown or reversal in capital flows. In some cases, the crisis is triggered by depositor runs on banks, though in most cases it is a general realization that systemically important financial institutions are in distress.[45]

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[44] Driscoll and Kraay 1998, Hoechle 2011.
[45] Laeven and Valencia, 2008, 5.

The WB dataset identifies 131 crisis-years for the OECD countries from 1976-2011 in our sample (out of 760 country-years).[46] Using this data, we create *WB banking crisis,* a binary variable that takes a value of "1" if country *i* experiences a banking crisis at time *t*.

As a robustness check, we also draw on the widely-used dataset on banking crises from Reinhart and Rogoff (hereafter RR) to create a second measure of crises. RR define a banking crisis as follows:

> "We mark a banking crisis by two types of events: (1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; or (2) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions."[47]

This classification is a more encompassing measure than the World Bank measure, which excludes "banking system distress events that affected isolated banks but were not systemic in nature" (6). Consequently, the frequency of RR crises is greater: in our dataset, there are 139 RR crisis-years across the OECD countries in our sample from 1976 to 2009 (out of 740 country-years). As with the WB classification, *RR banking crisis* is binary, with a value of "1" indicating a systemic banking crisis in country *i* at time *t*.

In addition to testing for the determinants of banking crises, we also employ two national-level measures of bank capital adequacy and solvency, respectively. The first variable, *Tier 1 Commercial Bank Capital*, is the (logged) asset-weighted tier 1 capital ratio of commercial banks headquartered in each country in our sample. Tier 1 capital encompasses loss-absorbing capital including common stock and disclosed reserves; as Tier 1 capital increases, banks are generally more resilient to shocks. The data to construct this variable are taken from the firm-level *BankScope* dataset. The second variable, *Z-score* is a widely-used measure of bank-level insolvency risk. It is defined as follows:

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[46] Since our models, both logit and linear, are fixed effect specifications, all countries experiencing no banking crises during the time period are excluded from the sample.
[47] Reinhart and Rogoff 2011, 1680.

> The z-score….compares buffers (capitalization and returns) with risk (volatility of returns) to measure a bank's solvency risk. The z-score is defined as $z \equiv (k+\mu)/\sigma$, where k is equity capital as percent of assets, μ is return as percent of assets, and σ is standard deviation of return on assets as a proxy for return volatility. The popularity of the z-score stems from the fact that it has a clear (negative) relationship to the probability of a financial institution's insolvency, that is, the probability that the value of its assets becomes lower than the value of its debt. A higher z-score therefore implies a lower probability of insolvency.[48]

As with our measure of tier 1 capital, we aggregate the bank-level data from *BankScope* to develop an asset-weighted, national commercial bank Z-score for each country in our sample. This variable also enters as a natural log into the regressions. Our data sample for the bank-level analysis runs from 1991 through 2011 for *Tier 1 Commercial Bank Capital,* and from 1991-2010 for *Z-score.*

Independent variables

Our two key explanatory variables are international capital inflows and financial market structure, along with their interaction. Both our theory and a growing number of recent studies suggest that gross capital inflows, rather than net capital flows, are most closely associated with the risk of banking crises.[49] For example, Caballero (2014) capital inflow "bonanzas" are strongly associated with banking crisis, but that this effect is driven by portfolio equity and debt flows. One key concern with using net capital flows (measured via current account balances) is that countries may experience very large gross inflows or outflows in a given year, even while net flows (as captured by the current account balance) are not very large as a share of GDP. Indeed, in our sample of OECD countries from 1976 to 2011, the correlation between current account balances and gross inflows is only 0.01. A second potential issue with using net capital flows is that they may be measuring productive foreign direct investment (FDI) rather than potentially destabilizing portfolio capital inflows. This is also true with aggregate gross capital inflow measures, which include both FDI and portfolio flows, along with "other investments" (bank flows,

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[48]http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTGLOBALFINREPORT/0,,contentMDK:23268766~pagePK:64168182~piPK:64168060~theSitePK:8816097,00.html

[49] See e.g., Amri et. al. 2016, Rey 2015, Forbes and Warner 2012, Mendoza and Terrones 2008.

public loans, and trade credit).[50] For these reasons, our primary measure of capital inflows is *Gross*

portfolio flows, the five-year, lagged moving average of gross portfolio capital flows as a share of trend

GDP. This variable is calculated from a newly available World Bank dataset on gross capital inflows. It

captures equity and debt inflows.[51] In our view, using *Gross portfolio inflows* addresses these concerns

and allows us to isolate in our models the sustained gross inflows from foreigners that are part and parcel

of the dominant story linking capital inflows to banking crises.

     While gross portfolio flows are our preferred measure of capital inflows, we also test models

using net capital flows, as a robustness check. For these models, we substitute the variable *Net flows*, the

five-year, lagged moving average of the current account surplus/deficit in country i at time t, as a share of

GDP. For ease of interpretation, we rescale this variable such that higher values of *Net flows* indicate

greater deficits, rather than surpluses. The current account balance is the mirror image of the capital

account balance, so a current account deficit necessarily implies a capital account surplus, or net inflow of

capital from the rest of the world. Current account data are taken from the World Bank.

     Our second key explanatory variable is the domestic financial market structure of a country. This

variable, *Market Structure,* is a measure of the relative importance of securities markets relative to

traditional banking in the domestic financial system in country i at time t. Identifying an optimal measure

of bank-based versus market-based systems is difficult, given the diversity of financial instruments

(stocks, bonds, derivatives) involved and because one must decide whether to measure the size and depth

of securities markets or the degree to which financial regulations permit markets to thrive. No single

metric captures both of these dimensions, but these variables are highly correlated. In this article, we

focus on the *Market/bank ratio*, the ratio of stock market volume traded to bank lending, expressed as a

natural log. This variable is calculated from two component variables in the World Bank's *Global*

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[50] Broner et. al. 2013.

[51] The specific variable is the "portfolio investment liabilities" (PIL) component of *CIF*, the "aggregate gross inflows by foreigners" variable in the Broner et. al. database. The authors scale PIL by trend GDP, using the Hodrick-Prescott filter and nominal GDP data from the World Bank's *World Development Indicators* and the IMF's *World Economic Outlook* (Broner et. al. 2013, 5).

Financial Development Database.[52] The stock market variable, which equals total shares traded on domestic stock exchanges as a percentage of GDP, serves as a useful – albeit imperfect – proxy for the overall depth and liquidity of securities markets.[53] The bank lending variable, which measures private credit extended by deposit money banks as a percentage of GDP, measures the size of the traditional commercial banking sector. Higher values of *Market/bank ratio* indicate a more prominent securities market relative to traditional bank financial intermediation.

Control variables

In addition to our main explanatory variables, we include several additional variables as controls for alternative factors that might influence the probability of banking crises. The first two variables, *Per capita GDP growth* and *Inflation*, control for country-specific macroeconomic conditions that might influence financial stability. Data for both variables are taken from the World Bank's *World Development Indicators*.[54] We also include *Private credit by deposit money banks to GDP* as a control for both general financial market depth and level of development, and to ensure that *Market Structure* is capturing the relative size of banking and securities markets rather than simply the size of the banking sector or the baseline level of financial depth in a country.[55] This variable also enters as a natural log of the five-year moving average.

In addition, we include several variables identified in the literature as year-specific global factors affecting financial stability for the countries in our sample.[56] The first of these is *OECD average per*

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[52] Čihák et. al. 2012. See also: http://data.worldbank.org/data-catalog/global-financial-development.
[53] It is theoretically possible for a country to have large and well-developed stock markets in the absence of similar bond markets. Historically, however, bond markets (driven by sovereign lending) have preceded stock market development. Moreover, in the contemporary global economy, the geographical correlation between the largest stock markets and the most complex derivatives markets is extremely high. For these reasons, we believe *Market/Bank* to be a reasonable proxy of the size and depth of securities markets overall.
[54] GDP is measured in constant 2005 dollars.
[55] Private bank credit/GDP and liquid liabilities to GDP, another commonly used measure of financial development/depth, are correlated at 0.78.
[56] Reinhart and Reinhart 2008.

capita GDP growth, the lagged average growth rate of GDP per capita (constant \$2005) in the OECD

countries in year *t*. The second variable is *US real interest rate*, the lagged average on the yield on US

short-term Treasury bills in year *t*. Past work has found that reductions in global interest rates and slower

growth in the world's major economies are associated with increased probabilities of capital inflows in

developing countries.[57] We also include the lagged number of banking crises in the world as a further

control for the level of global financial stability. Table 1 presents summary statistics for all of the

variables in our dataset.

[Table 1 here]

Results: banking crisis models

Table 2 presents the results of our regression analysis of the determinants of banking crises. We

begin first with a baseline specification (Model 1) that includes only the control variables. In Model 2,

we introduce *Gross portfolio inflows*, which is positive and significant at the 95% confidence level,

indicating a correlation between higher levels of capital inflows and an increased probability of banking

crises. In Model 3, we introduce *Market/bank ratio* and the multiplicative interaction between *Gross*

portfolio inflows and *Market/bank ratio*. Model 4 replicates Model 3 but substitutes the RR crisis

measure for the WB variable. Models 5 and 6, respectively, re-estimate the fully interactive model, for

each crisis variable, using a linear probability model (LPM) in lieu of the conditional logit specification.

Finally, Models 7 and 8 present the fully interactive models but substitute *Net flows* (current account

balances) for *Gross portfolio inflows*.

[Table 2 here]

In the baseline model, the results reflect past findings in the large literature on financial crises.

Crises are strongly and positively correlated with private credit growth, inflation, and income growth, and

negatively correlated with the average income growth rate in the industrialized countries. There is also

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[57] Fernandez-Arias and Montiel 1996; and Reinhart and Reinhart 2008.

strong evidence of temporal dependence in the incidence of banking crises among the OECD countries. These results on the control variables are broadly consistent across all of the specifications in Table 2.

In Model 2, we add *Gross portfolio flows* to the model. This variable is positively and significantly correlated with banking crisis, as expected. In Model 3, we introduce *Market/bank ratio* and its interaction with *Gross portfolio flows.* As the goodness-of-fit statistics indicate, this specification is strongly preferred to the baseline Model 1, and also weakly preferred to Model 2. Moreover, the three components of the multiplicative interaction are jointly significant at the 99% confidence level. As noted above, Models 4-8 illustrate that this result is not dependent on the choice of specification (logit vs. LPM), banking crisis classification (WB vs. RR), or measure of capital flows (gross portfolio vs. net/current account). [58]

In these multiplicative interactive models, however, one cannot simply interpret the individual regression coefficients on the interaction terms and their components. Rather, as Figures 4 through 7 illustrate, the coefficients on our measures of capital inflows must be assessed at different values of financial market structure (*Market/bank ratio*). These models are generated using the LPM specifications (Models 5 and 6) and illustrate average conditional marginal effects.

[Figures 4-7 here]

As these graphs illustrate, our argument finds strong support in the data. In Figure 4, *Gross portfolio inflows* have a positive and significant effect on the probability of a banking crisis only at high values of *Market/bank ratio*. In contrast, the results suggest that external imbalances have no effect on the probability of banking crises in countries where the market/bank ratio is lower and financial systems consist primarily of traditional commercial banks. This finding is mirrored in Figures 5-7, which

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[58] There is an ongoing debate in economics and political science about the desirability of using probit/logit models versus OLS ("linear probability models") for analyzing binary data (Angrist and Pitschke 2009; Beck 2015). Our results are robust to either approach, as illustrated in Table 2. In generating Figures 4-7 below, we employ the LPM specifications because of the greater ease of generating and interpreting marginal effects with this approach. These effects are "sample average" marginal effects (Beck 2015).

illustrate the corresponding average marginal effects for *Gross portfolio inflows* (Reinhart-Rogoff crisis) and *Net flows* (both WB and RR crisis classifications) across the range of values of *Market/bank ratio*.

To illustrate the substantive significance of these results, we generate the predicted probability of a banking crisis using the specification of Model 1 (*Gross portfolio flows*, WB crisis classification).[59] Setting all variables constant at sample means, the predicted probability of a crisis in this specification is only 1.0%. We then generate first differences calculating the effect of a 1.5 standard deviation increase in *Gross portfolio flows* at both low and high levels of *Market/bank ratio*, corresponding to 1.5 standard deviations below and above the sample mean of -1.69 (-3.8 and 0.38, respectively). The results are striking. At the "low" value of *Market/bank ratio*, the increase in *Gross portfolio flows* has no significant association with the probability of a banking crisis: the predicted change in probability is 17.8%, but the 95% confidence intervals overlap zero (-0.5%, 65.2%). In contrast, at the "high" value of *Market/bank ratio*, the increase in *Gross portfolio flows* has a large, positive, and significant correlation with the probability of a banking crisis (29.0%, 95% CIs: 3.7%, 74.3%).

To further illustrate the magnitude and conditional nature of these results, we zero in on two real-world country-year cases in our dataset: Sweden 1981 and Spain 2003. We choose these two observations because they correspond most closely to the "low" and "high" levels of *Market/bank ratio* noted above: Sweden's market/bank ratio in 1981 was -3.75, while Spain's in 2003 was 0.39. Drawing once again on the specification of Model 1, Table 2, we set all variables in our analysis at the relevant values for these two country-year observations and calculate the predicted effect of a 1.5 standard deviation increase in *Gross portfolio flows* on the probability of a banking crisis. The results provide further support for our theory that capital inflows are destabilizing only in more securitized financial systems. For Sweden 1981, the estimated first difference is 3.0%, which is substantively large given that the baseline predicted probability of a crisis for Sweden in 1981 is only 1.6%. However, this point

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[59] Calculations done in Stata 14.1 using CLARIFY (King et. al. 2003). We use the unconditional fixed effects logit to generate these probabilities, rather than the conditional logit specification in Table 2. The results are substantively similar, and the incidental parameters problem is not an issue given the structure of our data (Beck 2015).

estimate is not statistically significant and the 95% confidence intervals overlap zero (-0.1%, 19.3%). In contrast, for Spain 2003, the baseline predicted probability of a crisis is 3.2%, and the estimated first difference effect of a 1.5 standard deviation in *Gross portfolio flows* is extremely large (48.0%) and significant at the 95% confidence level (7.5%, 86.9%).

Robustness checks

We estimate a range of additional models as robustness checks [see Reviewers' Appendix]. First, we re-estimate the models in Table 2, truncating our sample at 2006 to ensure that our results are not dependent on including the global wave of crises in the 2007-10 period. The conditional, interactive findings hold up in all of the *Gross portfolio flow* models, using both classifications of banking crises. The pre-2007 results are mixed when using *Net flows*, however, suggesting again that our argument is driven primarily by large gross flows, rather than large current account imbalances. We also re-estimate our models using a "stripped" specification that removes all of the control variables except the controls for temporal dependence. Once again, we find that our results are strongly robust in the specifications using *Gross portfolio flows* but offer only mixed support when substituting *Net flows*.

Third, we conduct robustness checks to test different lag structures for our explanatory variables. We re-estimate the multiplicative interaction models using three-year moving averages on all of the independent variables, rather than five-year averages.[60] In these specifications, the results are broadly robust. We also test models using one-year lags of the independent variables, but these models do not yield consistently significant results for the interactive marginal effects. This is not surprising, in our view, since our theory suggests that large capital inflows take time to work their way into the domestic financial system and through the banking sector. The lack of support for the one-year lag specifications also mirrors the indeterminacy of the existing literature on capital flow "surges" or "bonanzas," which frequently uses one-year deviations in capital flows from their long-run trend.[61] This approach assumes

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[60] Results available on request.
[61] See., e.g., Crystallin et. al. 2015.

that large sustained inflows – even massive ones – *within* the trend can be easily absorbed without

causing trouble in the financial sector, while a one-year spike can cause a crisis in the following year. In

our view, this is far less likely than the potential destabilization resulting from a prolonged influx of

capital, which our three-year and five-year trend variables better operationalize in the analysis.

Finally, we also re-estimate our models substituting *Private credit by deposit money banks to

GDP* for the *Market/bank ratio* to test whether our measure of market structure is simply picking up the

level of financial depth or development in a country.[62] The results clearly indicate that this is not the case.

There is no clear conditional relationship between capital inflows and levels of bank credit, in contrast to

our clear and consistent findings of a conditional, interactive relationship between capital inflows and the

market/bank ratio.

In sum, our banking crisis results are largely robust to, and not dependent on, the use of different

lag structures, the inclusion or exclusion of the recent wave of global financial crises, and the presence or

absence of control variables. Moreover, our robustness analysis clearly indicates that our measure of

financial market structure is not driven simply by the denominator of the ratio (levels of bank credit or

financial development). Across a wide range of specifications, we find similar results: capital inflows are

correlated with an increased risk of banking crises, but only in financial systems where banks compete

alongside sufficiently large and developed securities markets.

Results: Tier 1 bank capital and commercial bank Z-scores

If our argument is correct, we should observe not only a greater incidence of banking crises in

countries where large capital inflows enter a financial system characterized by large national securities

markets; we should also observe banks themselves behaving systematically differently in these cases. We

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[62] Private bank credit to GDP and liquid liabilities to GDP – a widely used broader measure of overall
financial liquidity or depth – are very highly correlated (0.83 in our sample, N=760), whereas bank credit
and market/bank are correlated only weakly (0.20).

test this implication in a second set of analyses focusing on the determinants of bank capital levels and insolvency risk.

To test this hypothesis, we employ the two national-level, asset-weighted measures of bank capital adequacy and solvency described earlier: *Tier 1 Commercial Bank Capital* and *Z-score*, both of which enter our regressions as natural logs. Our goal with these analyses is to explore the behavior of the national banking system in the aggregate, rather than hone in on the risk taking of any particular bank. Certainly some banks will be riskier than others within a country, but exploring this variation is beyond the scope of this article. For each of these dependent variables, we include specifications using the two different measures of capital inflows (*Gross portfolio inflows*, *Net flows*) and the multiplicative interactions between capital inflows and *Market/bank ratio*. In contrast to the banking crisis models, here we do employ one-year lags of our independent variables. As noted above, there are strong theoretical and empirical reasons to employ five-year moving averages in the crisis models, given the time lag between large capital inflows and the actual outbreak of a systemic crisis. In contrast, we expect banks' actual behavior to change incrementally and quickly in the presence of large capital inflows; the accumulation of banks' risky behaviors are likely to trigger a systemic crisis only after a period of years.

Table 3 present the results of this additional analysis. Once again, the results provide strong support for our hypotheses.

[Table 3 here]

As illustrated in Figures 8 and 9, the conditional marginal effect is clear in both *Tier 1* capital models: larger capital inflows – measured either as gross or net flows – are associated with reduced bank capital levels but only at high levels of *Market/Bank*. At low levels of *Market/Bank*, however, capital inflows have no significant correlation with bank capital levels.

[Figures 8-11 here]

The results for the two models measuring insolvency risk (lower Z-scores) are mixed. In Figure 10 (Z-scores, gross portfolio inflows), the three component terms of the multiplicative interaction are jointly

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significant at the 90% level (p<0.073), but the graph of the average conditional marginal effect overlaps zero at all values of *Market/bank ratio*. Moreover, In Figure 11, we once again see the conditional and significant marginal effect, as expected: net capital flows are positively correlated with insolvency risk (lower Z-scores), but only at high levels of *Market/bank ratio*. Thus, while the Z-score analysis provides only qualified support for our argument, these findings, in tandem with the strong and clear results on the Tier 1 capital analysis, suggest that banks do behave differently in the wake of large capital inflows in different types of financial systems.

Taken together, the results of our banking crisis and bank capital/insolvency risk analyses paint a clear picture about the relationship between capital inflows, financial market structure, and financial stability. Large capital inflows are – as the literature argues – frequently destabilizing for banking and financial stability. Yet our empirical analysis shows that this relationship is clearly conditional. In financial systems where banks compete alongside (and directly) with large securities markets, capital inflows lead banks to engage in riskier behavior. Ultimately, this behavior and enhanced financial vulnerability lead to a higher incidence of banking crises. In contrast, where banks face less competition from non-bank actors in equity and debt markets, the clear relationship between capital inflows and financial instability is no longer evident.

Conclusion

In the wake of the Great Recession, observers in both policy and academic circles have pointed to global imbalances as the main perpetrator of financial crises. As we have argued throughout this paper, we believe this view is only partially correct. Our empirical analyses suggest that the prominence of securities markets relative to commercial banking is the critical factor that tips the balance between benign and destabilizing capital inflows. One interpretation of our results is that bank-dominated financial sectors act as a "financial levee" that insulates countries from the destabilizing influence of capital inflows. Our results suggest that scholars

would be well served to shift their attention from global imbalances and current account deficits toward developing richer explanations of causal pathways linking financial intermediation to financial stability. That said, we do not argue that external imbalances are unimportant or benign. Rather, our argument is simply that these factors' importance has been overstated in the recent crisis literature, at the expense of other factors – most notably, financial market structure – of equal importance for financial stability.

Our findings raise questions about precisely which aspects of securities markets are most important for financial stability. Our measures of financial market structure are necessarily crude, as they do not gauge the relative prominence of different types of securities. Better historical data on derivatives such as mortgage-backed securities, credit default swaps, and other asset-backed securities could help us determine whether certain financial products are particularly influential in amplifying the destabilizing effects of capital inflows. Also omitted from this paper is an empirical analysis of the role of regulation as a buffer against crises; indeed, regulation might be a second "financial levee" that buffers the impact of imbalances on financial stability.[63] A number of regulatory dimensions may be important, including the degree of government ownership of the banking sector, rules about financial transparency, capital adequacy requirements, and the specific modalities of bank inspections.

Finally, our analysis only touched on the origins of securities markets and the welter of historical policy decisions that help to determine the relative strength of traditional banking in a modern economy. There is considerable variation across countries in the responsiveness of national financial markets to the demands of foreign investors. Whereas US markets appeared to

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[63] See Amri and Kocher 2012 for a cross-national empirical study covering the three decades before the global financial crisis, and Helleiner 2014, Quaglia 2012, and Young and Park 2013 for analyses of post-crisis regulatory response.

generate new (and more) financial instruments to soak up a seemingly endless supply of capital during the 2000's, Australia maintained its focus on traditional banking even in the face of an even larger (relative to GDP) inflow of foreign capital. Looking ahead, more research into the determinants and characteristics of financial market structure is critical if scholars and policymakers are to more completely understand how, why, and when countries fall victim to banking crises. The findings presented in this paper strongly suggest that global imbalances and capital inflows, on their own, do not tell the whole story – either of the current global financial crisis or of the determinants of banking instability more generally over the last three decades.

Table 1 – Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Banking crisis (World Bank)	760	0.17	0.38	0	1
Banking crisis (Reinhart-Rogoff)	740	0.19	0.39	0	1
Tier 1 capital (log)	619	2.21	0.32	1.00	3.53
Z-score (log)	632	3.83	0.23	2.74	5.22
Gross portfolio inflows (log, % trend GDP)	760	1.12	0.85	-0.82	4.63
Current account deficit/GDP (%)	701	0.88	4.36	-14.61	16.79
Market/bank ratio (log)	760	-1.69	1.38	-4.44	1.52
Constant GDP per capita growth (%)	760	2.49	1.99	-7.35	10.94
Inflation (%, log)	760	9.57	18.55	-0.59	196.14
Private bank credit/GDP (%, log)	760	4.02	0.63	2.30	5.39
Total world banking crises (WB)	760	13.43	10.12	0	30
Total world banking crises (RR)	740	12.98	7.21	1	26
OECD average GDP growth rate (%)	760	2.22	1.75	-4.49	4.15
US real interest rate (%)	760	4.80	2.08	-1.28	8.72
Years since last banking crisis (WB)	760	13.43	10.12	0	30

Table 2 – Regression Results, Banking Crisis Models

Model	1	2	3	4	5	6	7	8
Specification	*Logit*	*Logit*	*Logit*	*Logit*	*LPM*	*LPM*	*Logit*	*Logit*
Banking crisis variable	*World Bank*	*World Bank*	*World Bank*	*Reinhart-Rogoff*	*World Bank*	*Reinhart-Rogoff*	*World Bank*	*Reinhart-Rogoff*
Capital flows variable	*Gross flows*	*Gross flows*	*Gross flows*	*Gross flows*	*Gross flows*	*Gross flows*	*Net flows*	*Net flows*
Gross portfolio inflows/trend GDP (%, log)		1.180	1.921	1.672	0.145	0.143		
		[0.342]***	[0.519]***	[0.453]***	[0.041]***	[0.047]***		
Market/bank ratio (log)			-0.714	-0.629	-0.084	-0.069	-0.013	-0.258
			[0.348]**	[0.272]**	[0.023]***	[0.034]***	[0.241]	[0.216]
Gross inflows*market/bank ratio			0.275	0.168	0.028	0.016		
			[0.188]	[0.159]	[0.016]*	[0.022]		
Current account (net inflows)/GDP (%, log)							0.460	0.383
							[0.112]***	[0.100]***
Net inflows*market/bank ratio							0.059	0.041
							[0.046]	[0.051]
Private bank credit/GDP (%, log)	7.678	7.511	7.550	0.758	0.304	0.725	8.483	3.279
	[1.123]***	[1.176]***	[1.186]***	[0.586]	[0.059]***	[0.095]***	[1.201]***	[0.699]***
Inflation (%)	0.117	0.131	0.131	0.031	0.003	0.003	0.160	0.041
	[0.024]***	[0.025]***	[0.026]***	[0.015]**	[0.001]**	[0.001]***	[0.027]***	[0.018]**
Per capita GDP growth ($2005, %)	0.463	0.495	0.533	0.170	0.012	0.018	0.611	0.254
	[0.127]***	[0.129]***	[0.134]***	[0.103]*	[0.014]	[0.014]	[0.146]***	[0.125]**
US real interest rate (%)	0.093	0.135	0.098	0.247	0.004	0.017	0.069	0.262
	[0.104]	[0.106]	[0.109]	[0.098]**	[0.014]	[0.013]	[0.110]	[0.103]**
OECD average per capita GDP growth (%)	-0.292	-0.296	-0.263	-0.316	-0.023	-0.033	-0.327	-0.352
	[0.111]***	[0.115]***	[0.116]**	[0.123]**	[0.009]**	[0.012]***	[0.117]***	[0.132]***

Model	1	2	3	4	5	6	7	8
Specification	Logit	Logit	Logit	Logit	LPM	LPM	Logit	Logit
Banking crisis variable	World Bank	World Bank	World Bank	Reinhart-Rogoff	World Bank	Reinhart-Rogoff	World Bank	Reinhart-Rogoff
Capital flows variable	Gross flows	Gross flows	Gross flows	Gross flows	Gross flows	Gross flows	Net flows	Net flows
Banking crises worldwide (count)	0.029	0.022	0.024	-0.065	0.000	-0.009	0.050	-0.038
	[0.020]	[0.021]	[0.022]	[0.028]**	[0.003]	[0.003]**	[0.023]**	[0.030]
Years since last banking crisis	-0.643	-0.685	-0.630	-0.851	-0.073	-0.115	-0.525	-0.725
	[0.114]***	[0.116]***	[0.116]***	[0.103]***	[0.017]***	[0.019]***	[0.121]***	[0.107]***
Years since last banking crisis^2	0.023	0.025	0.022	0.045	0.003	0.006	0.015	0.035
	[0.006]***	[0.006]***	[0.006]***	[0.007]***	[0.001]**	[0.001]***	[0.007]**	[0.007]***
Years since last banking crisis^3	0.000	0.000	0.000	-0.001	0.000	0.000	0.000	0.000
	[0.000]**	[0.000]***	[0.000]**	[0.000]***	[0.000]*	[0.000]***	[0.000]	[0.000]***
Constant					-0.943	0.104		
					[0.318]***	[0.469]		
Observations	760	760	760	740	760	740	722	650
Countries	28	28	28	27	28	27	30	27
Log-likelihood	-118.972	-113.022	-110.993	-170.817	-76.010	-170.685	-108.212	-147.660
AIC*n	255.944	246.044	245.986	365.634	176.020	365.369	240.423	319.320
BIC	297.644	292.377	301.586	420.914	231.620	420.649	295.407	373.044

* p<0.1; ** p<0.05; *** p<0.01

Models 1-4, 7-8: conditional (fixed effects) logit

Models 5-6: Linear probability models (OLS with country fixed effects & Driscoll-Kraay SEs)

Table 3 – Regression Results, Tier 1 Capital and Z-Score Models

Model	1	2	3	4
Capital flow variable	*Gross portfolio*	*Net (current account)*	*Gross portfolio*	*Net (current account)*
Dependent variable	*Tier 1 capital (log)*	*Tier 1 capital (log)*	*Z-score (log)*	*Z-score (log)*
Capital flows (% GDP)	-0.002	-0.009	-0.001	-0.005
	[2.39]**	[3.41]***	[1.43]	[2.51]**
Market/bank ratio	0.071	0.059	0.027	0.032
	[3.55]***	[2.98]***	[2.25]**	[2.86]***
Capital flows*Market/bank ratio	-0.001	-0.001	-0.000	-0.002
	[2.18]**	[0.23]	[0.84]	[1.15]
Lagged dependent variable	0.586	0.578	0.459	0.441
	[6.37]***	[7.98]***	[6.26]***	[6.95]***
Private bank credit/GDP (% log)	0.048	0.079	0.022	0.032
	[1.61]	[3.53]***	[0.87]	[1.59]
Inflation (%)	0.008	0.010	0.012	0.013
	[1.83]*	[1.93]*	[1.86]*	[2.27]**
Per capita GDP growth ($2005)	-0.010	0.002	0.002	0.007
	[1.60]	[0.19]	[0.61]	[1.05]
US real interest rate (%)	-0.016	-0.013	-0.013	-0.019
	[3.26]***	[3.00]***	[1.80]*	[3.88]***
OECD avg. per capita GDP growth (%)	-0.000	-0.014	-0.016	-0.016
	[0.00]	[1.23]	[1.87]*	[2.12]**
Number of banking crises worldwide	0.002	0.003	-0.000	0.001
	[1.54]	[3.01]***	[0.07]	[1.17]
Constant	0.837	0.699	2.068	2.102
	[3.24]***	[3.44]***	[6.44]***	[8.51]***
Observations	*484*	*505*	*490*	*512*
Countries	*29*	*31*	*29*	*31*
Log-likelihood	*249.460*	*190.311*	*282.840*	*252.740*
*AIC*n*	*-476.920*	*-358.623*	*-543.679*	*-483.481*
BIC	*-430.917*	*-312.153*	*-497.541*	*-436.859*

* $p<0.10$; ** $p<0.05$; *** $p<0.01$
OLS regressions, country fixed effects, Driscoll-Kraay standard errors
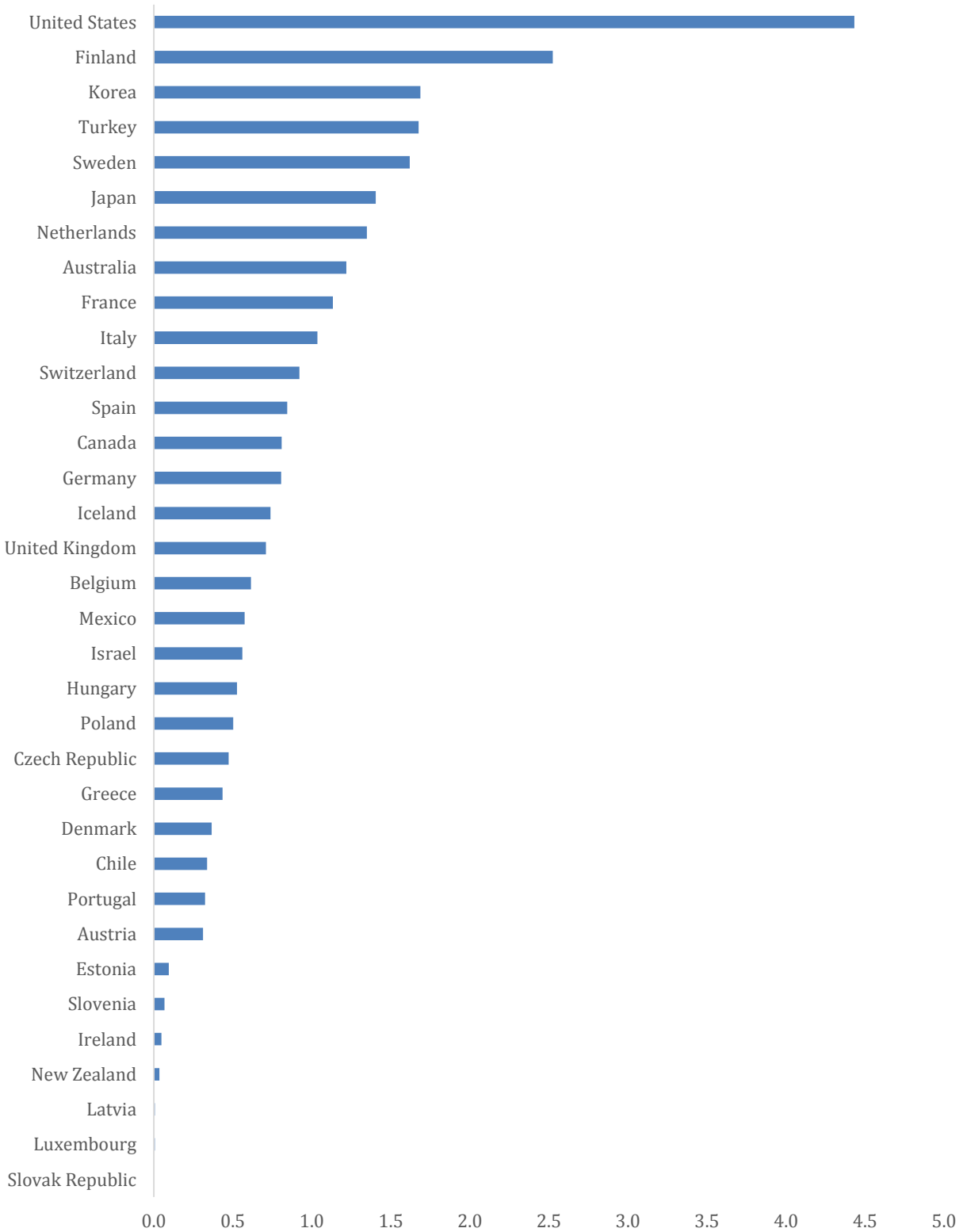
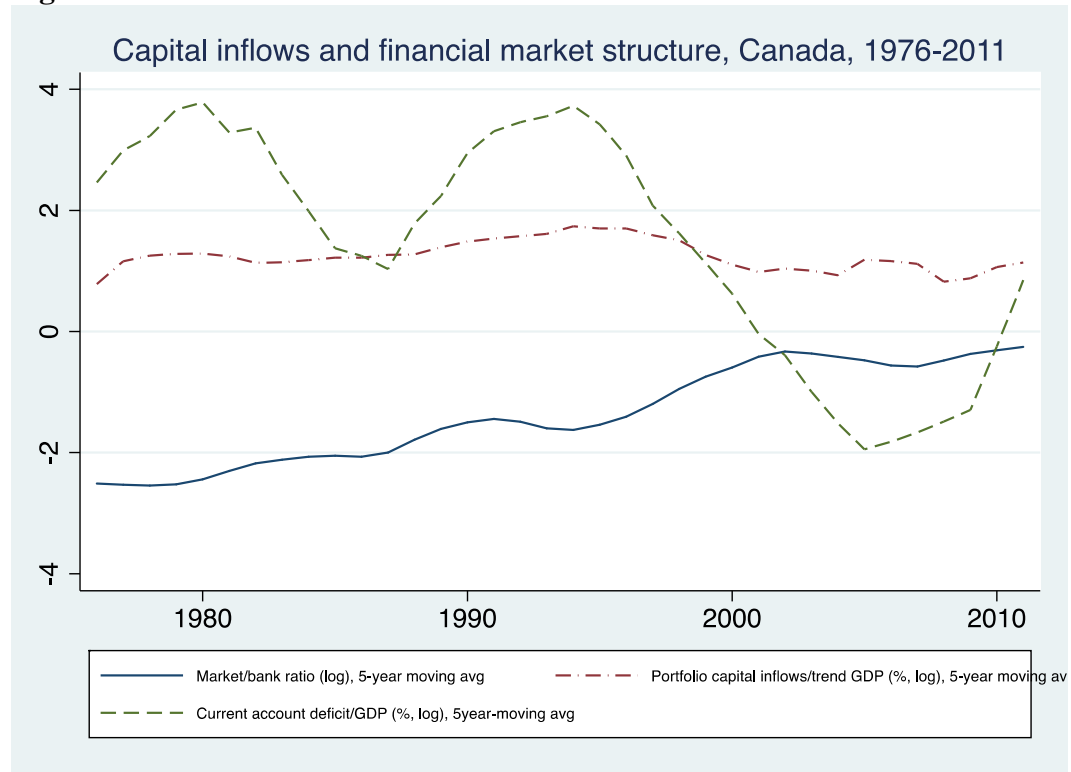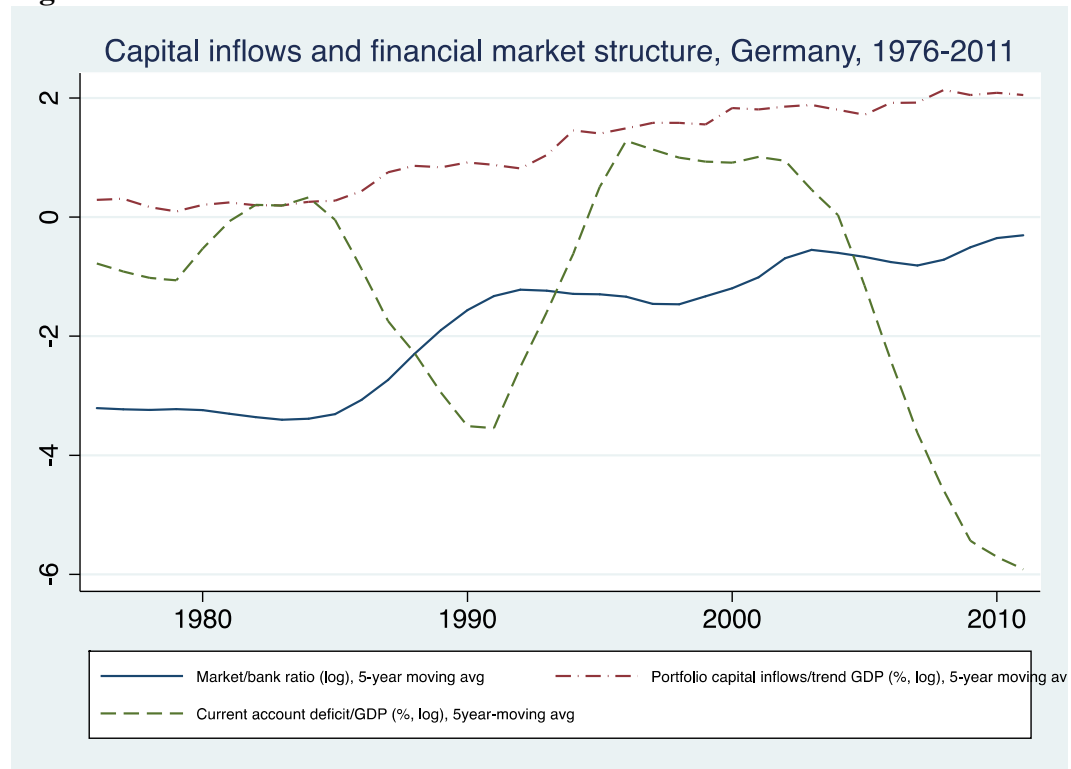## FIGURE 1 – MARKET/BANK RATIO, OECD COUNTRIES, 2007

Figure 2

Capital inflows and financial market structure, Canada, 1976-2011

Legend:
- Market/bank ratio (log), 5-year moving avg
- Portfolio capital inflows/trend GDP (%, log), 5-year moving av
- Current account deficit/GDP (%, log), 5year-moving avg

Figure 3

Capital inflows and financial market structure, Germany, 1976-2011

Legend:
- Market/bank ratio (log), 5-year moving avg
- Portfolio capital inflows/trend GDP (%, log), 5-year moving av
- Current account deficit/GDP (%, log), 5year-moving avg

Figure 4 – Average Conditional Marginal Effect of Gross Portfolio Capital Inflows by Market/Bank Ratio (World Bank Banking Crisis, Model 5, Table 2)
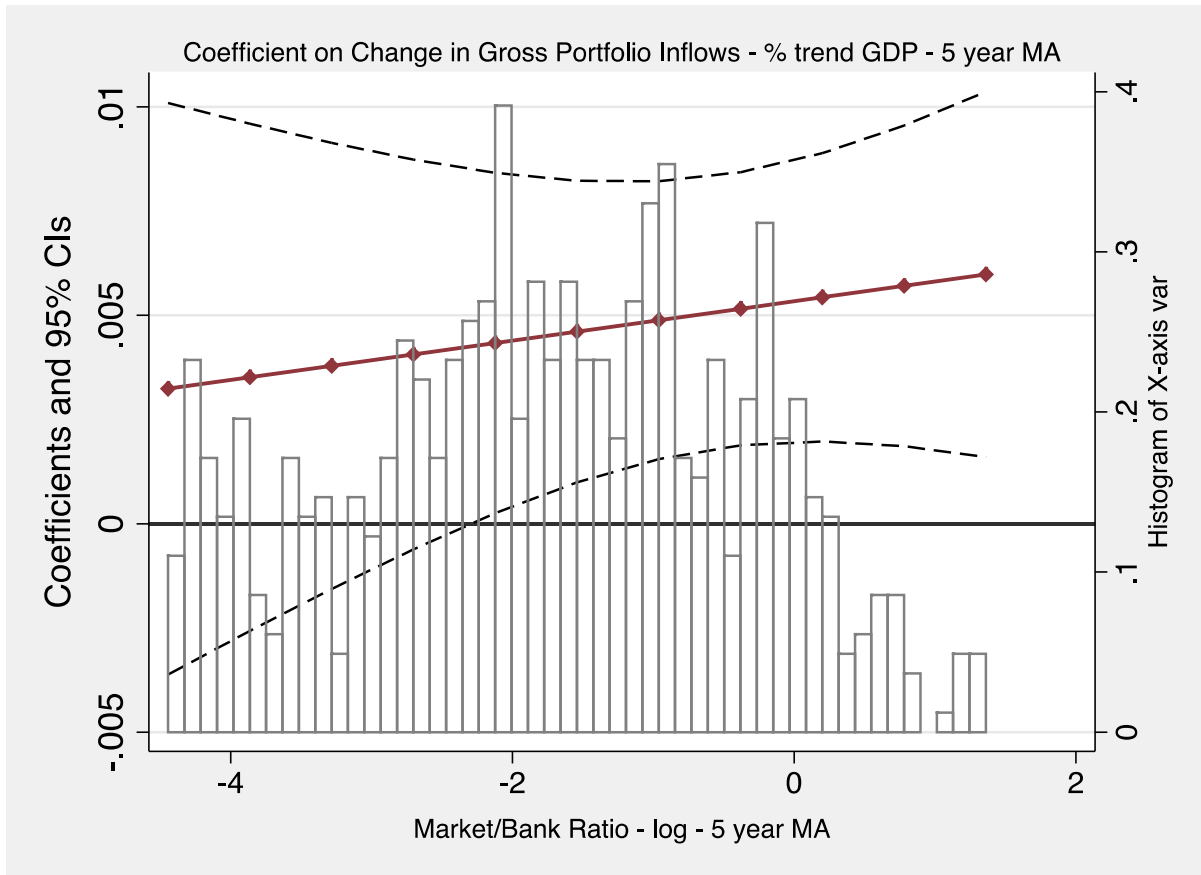
Figure 5 – Average Marginal Effect of Gross Portfolio Inflows by Market/Bank Ratio (Reinhart-Rogoff Banking Crisis, Model 6, Table 2)
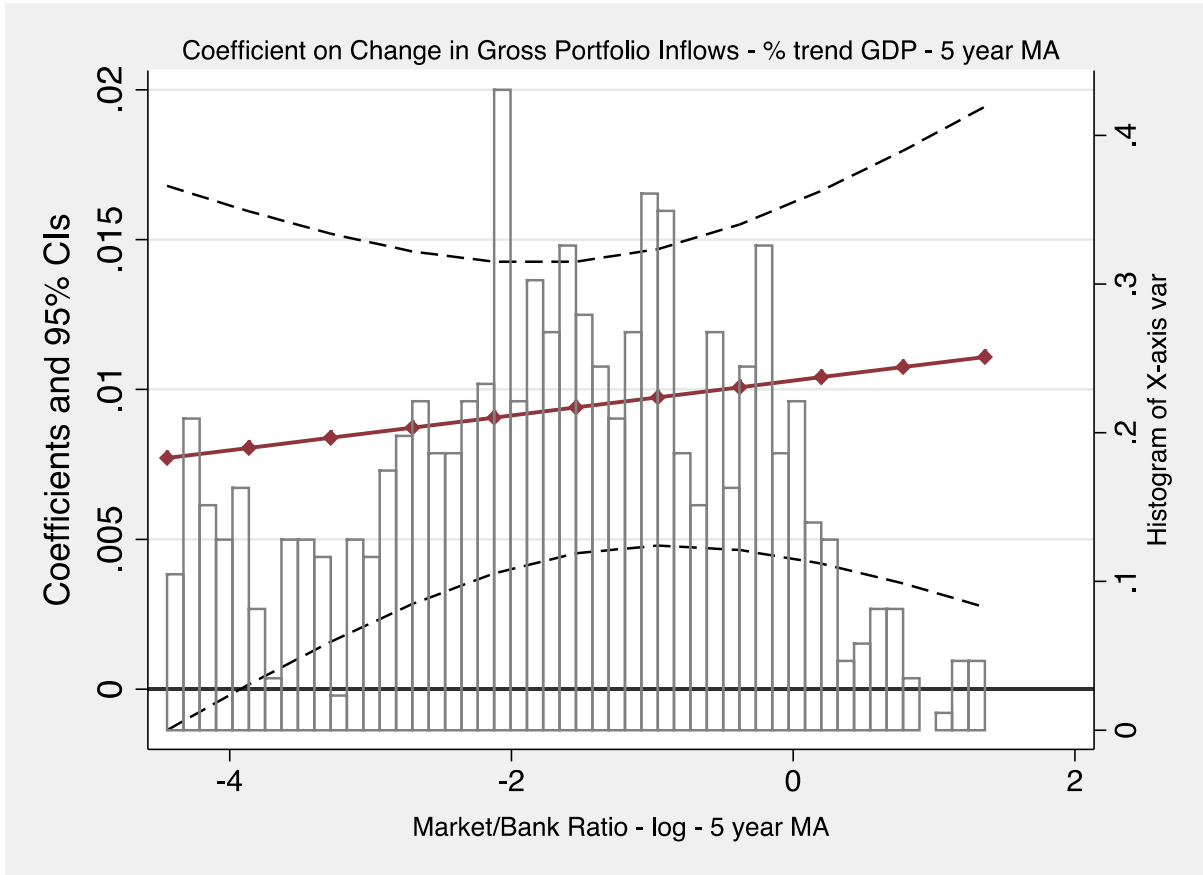
Figure 6 – Average Conditional Marginal Effect of Net Capital Flows (Current Account) by Market/Bank Ratio (World Bank Banking Crisis)
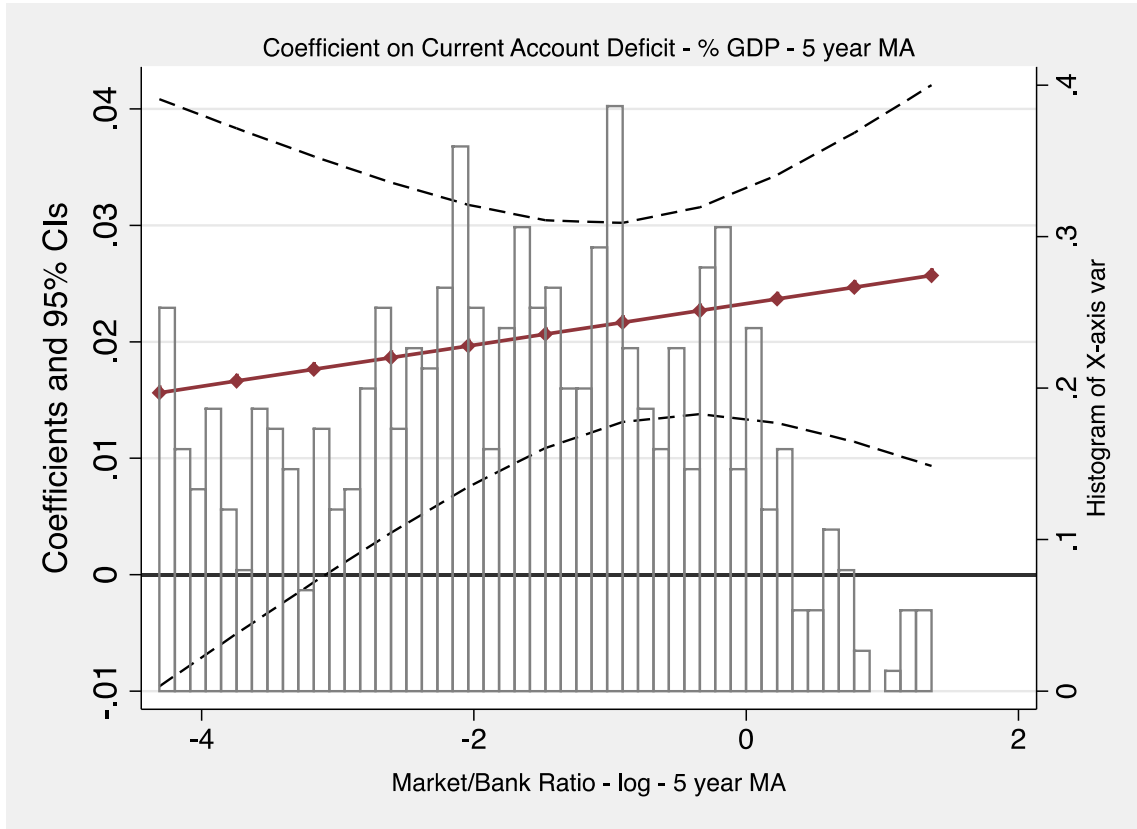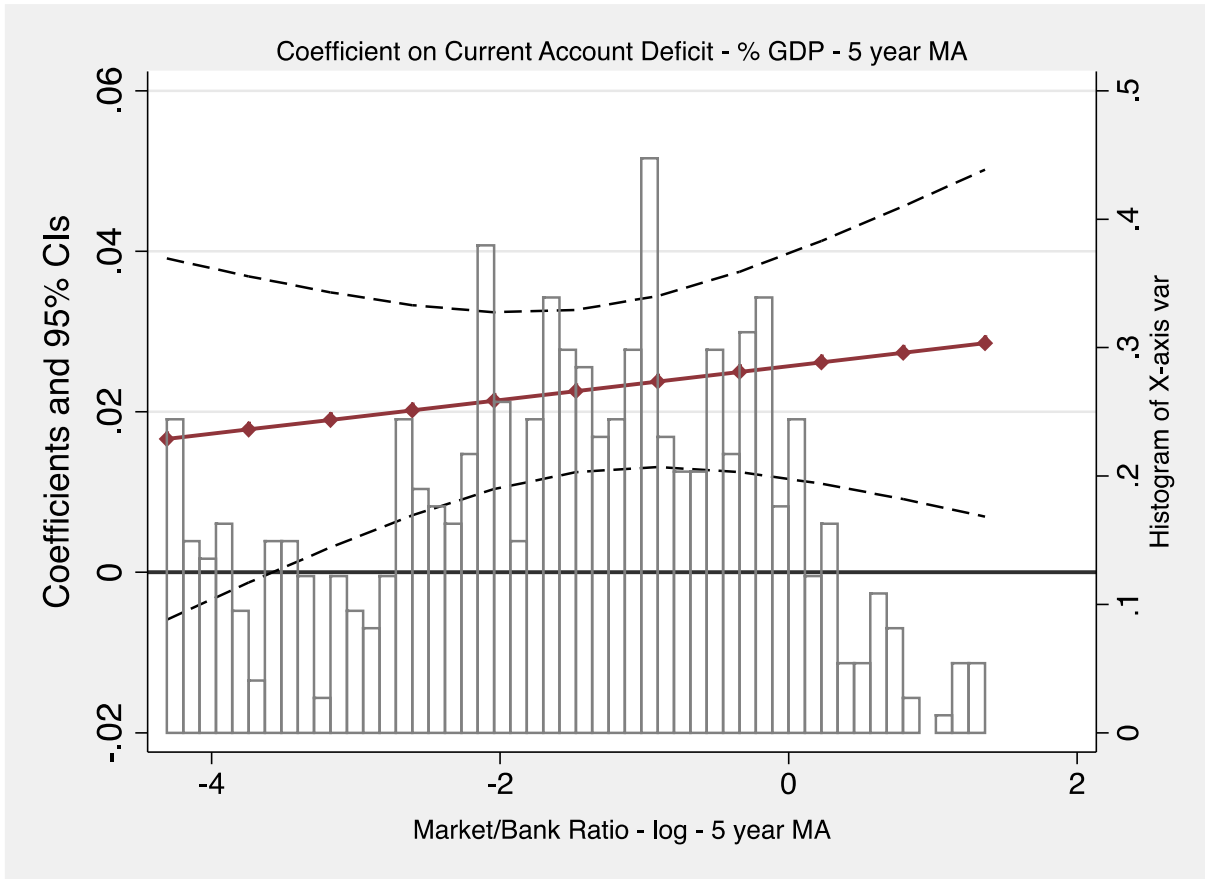
Figure 7 – Average Conditional Marginal Effect of Net Capital Flows (Current Account) by Market/Bank Ratio (Reinhart-Rogoff Banking Crisis)

Figure 8 – Conditional Marginal Effect of Gross Portfolio Inflows by Market/Bank Ratio (Tier 1 Commercial Bank Capital Ratio, Model 1, Table 3)
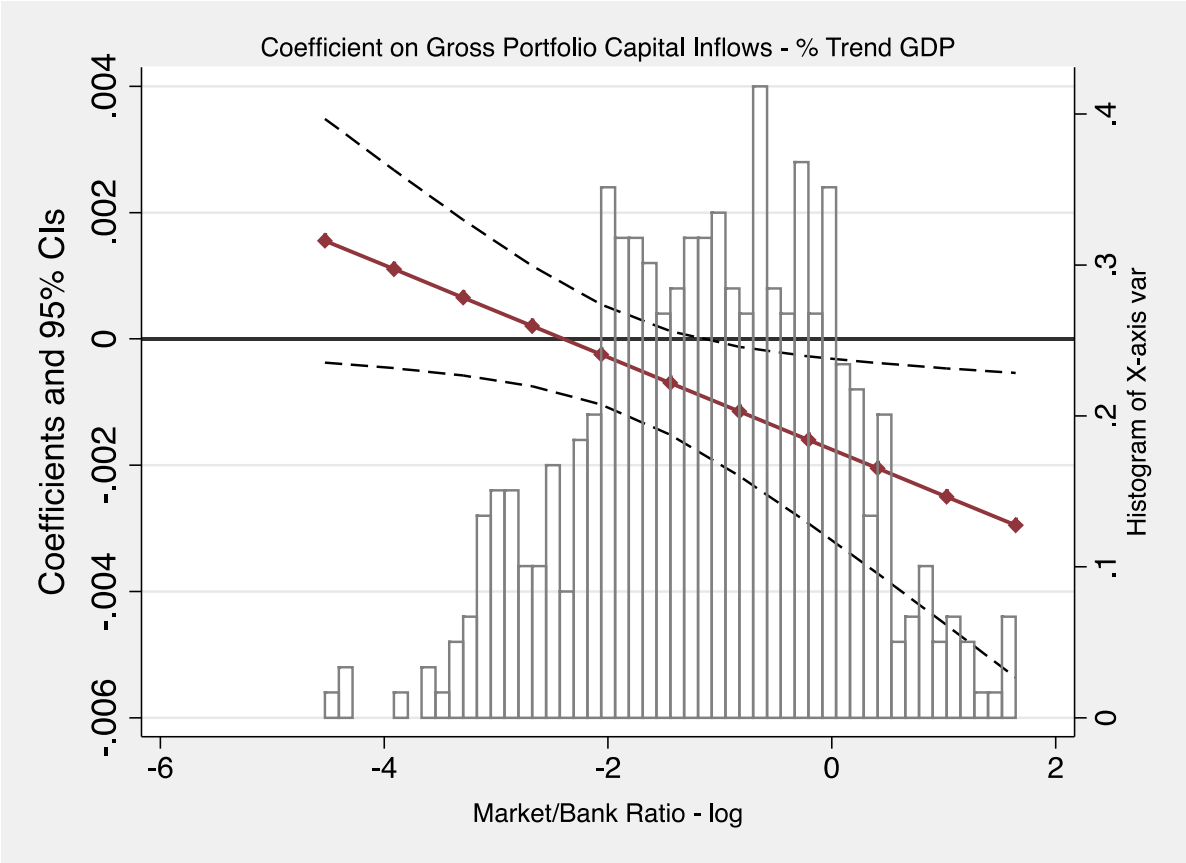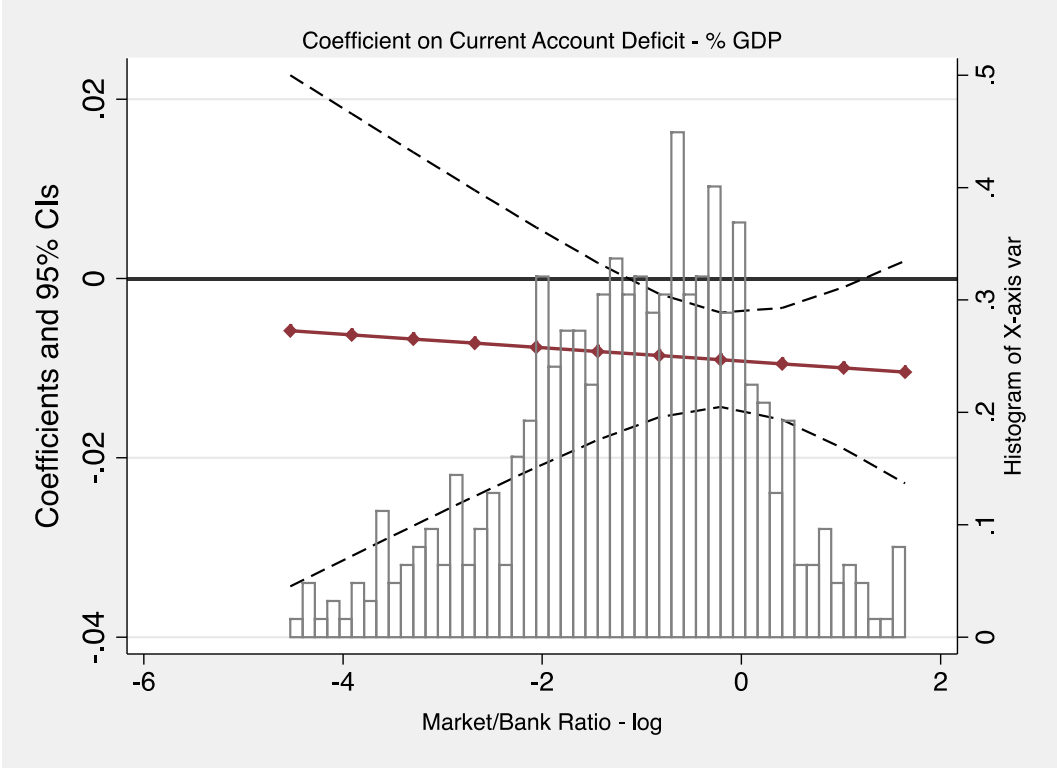
Figure 9 – Conditional Marginal Effect of Net Capital Flows (Current Account Balance) by Market/Bank Ratio (Tier 1 Commercial Bank Capital Ratio, Model 1, Table 2)

Figure 10 – Conditional Marginal Effect of Gross Portfolio Inflows by Market/Bank Ratio (Commercial Bank Z-Score, Model 3, Table 3)
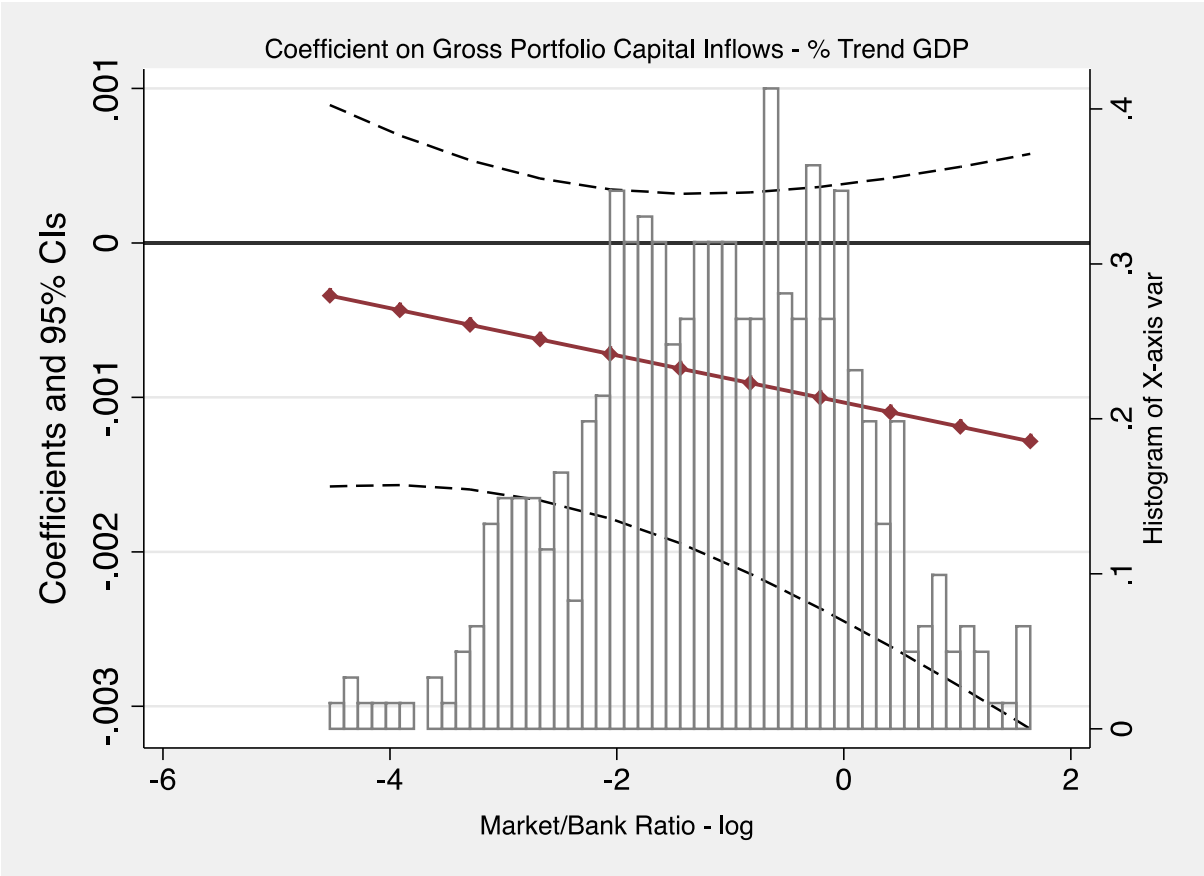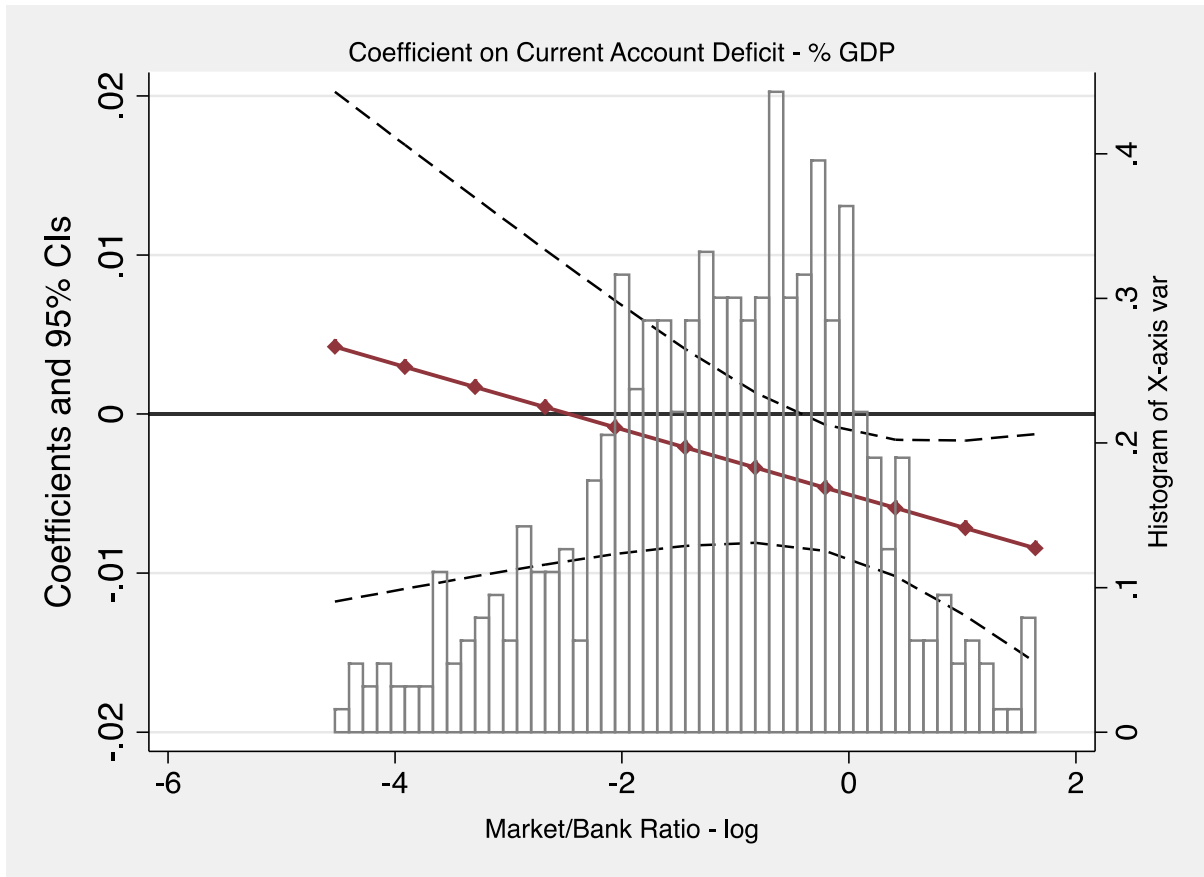
Figure 11 – Conditional Marginal Effect of Net Capital Flows (Current Account Balance) by Market/Bank Ratio (Commercial Bank Z-Score, Model 4, Table 3)

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