Does Financial Structure Shape Industry Structure? Evidence from Timing of Bank Liberalization[*]

Markus Behn, Rainer Haselmann, Amit Seru, and Vikrant Vig

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Abstract

In this paper we posit and empirically demonstrate that the structure of a country's financial system impacts its industry structure through its influence on the allocation of credit to firms within and across industries. We exploit variation in domestic banks' ability to compete with foreign entrants at the time of liberalization across 26 emerging economies to generate significant changes to the structure of financial system – market share of foreign banks – in an economy. We then use within-country, cross-sectional variation at the bank level, at the industry level, and at the firm level to test our hypothesis. Following liberalization, arm's length foreign capital crowds out domestic lending in countries with weak domestic banking sector. In contrast, there is an increase in the aggregate supply of credit in countries with more competitive domestic banks. We show that these differential changes in financial structure significantly affect the allocation of credit. There is a higher growth rate and lower growth volatility for industry sectors in economies with more competitive domestic banks. These results are driven by more credit flowing to industries that are reliant on external financing and to smaller firms. In contrast, industry growth is lower and growth volatility is higher in countries with uncompetitive domestic banks. These results are driven by credit flow to small firms. Thus, the timing of liberalization of credit markets interacts with the development of the incumbent domestic banking sector, and the change in financial structure it induces has implications on the allocation of credit and economic growth.

Keywords: financial market opening, foreign banks, integration of banking markets
JEL Classification: G14, G15, G21, F36, O16

1 Introduction

It is now well accepted that financial systems can influence the allocation of credit and shape an economy's growth path.[1] What is not as well understood is whether there are factors that accentuate or hinder this transformation. In this paper we posit and empirically demonstrate that a specific factor the structure of the financial system in a country – impacts the nature in which finance affects growth. We exploit variation in domestic banks' ability to compete with foreign entrants at the time of liberalization to generate significant changes in the structure of financial system, i.e., the market share of foreign banks, in an economy. We show that these changes have a meaningful impact on the nature and allocation of credit in the economy which in turn alters the industry structure of the economy–through its influence on firm financingand shapes the growth path of industries in an economy.

Our main argument – that bank liberalization has differential effects on the financial structure of an economy depending on domestic banks' ability to compete with foreign entrants– is based on insights from the industrial organization and trade literature.[2] The rationale is simple. Foreign bank entry induces competitive pressure, and better developed domestic banks are likely to invest and innovate in response to the competitive threat, for example by improving their technology and processes. In contrast, such a change might be harder for less developed banks that cannot compete with foreign entrants. Consequently, one expects that, following liberalization, changes in financial structure are relatively larger in countries with relatively less developed domestic banks. In particular, following liberalization, the market share of foreign banks should dramatically increase in countries with a weak domestic banking sector, while not changing as much in countries with a better developed local banking sector.

There are several reasons for why variation in the structure of the financial system could induce differences in how credit is allocated within an economy. Opening of financial markets could alter the nature of financial intermediation since foreign banks are expected to import capital, stimulate competition, introduce new technologies, and import better supervision and regulation from their home countries (see, e.g., Levine 1996).[3] It is also possible that such changes in nature of intermediated capital could shape the structure of industries. In particu-

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[1] One potential channel is that lenders and intermediaries screen out bad projects (Bagehot 1873, Schumpeter 1912, Diamond 1984, Boyd and Prescott 1986). Another theory argues that pressures from external financiers encourage managers to pursue value-maximizing investment policies (Jensen 1986). See also Wurgler (2000).

[2] See Aghion et al. (2003, 2008) who analyze changes in the efficiency and productivity of domestic firms following the elimination of entrance barriers to foreign firms.

[3] The Washington Consensus—based on the classical Shaw (1973) – McKinnon (1973) framework and actively promoted by the IMF and the World Bank—pushed for the elimination of all entry barriers and state involvement in the banking sector following these arguments (e.g., World Bank 2002). It is worth noting that there has been criticism of this view as well. In particular, critics have argued that liberalization could introduce financial fragility which could hamper allocation of credit within an economy adversely (see, Demirguc-Kunt and Detragiache 1999, Kaminsky and Reinhart 1999, or Weller 2001 who all note that several countries experienced banking sector crises shortly after the financial sector was deregulated.

lar, the arm's length nature of foreign bank financing could make it difficult for soft information borrowers – like local entrepreneurial firms which typically rely on domestic relationship lending (see, e.g., Stein 2002, Berger et al. 2005, Mian 2006)to obtain financing. Thus, a large change in share of foreign bank lending following liberalization could alter the type of firms within an industry that would obtain financing. Finally, to the extent that some industries might be composed of more soft informationally sensitive entrepreneurial firms than others, a change in market share of foreign banks in an economy could significantly alter the amount of financing obtained by such industries. Thus, following a large change in the structure of financial system, one would expect changes in industry structure of the economy and the growth path of industries in an economy.

We empirically investigate our hypothesis using information from Abiad and Mody (2005) and Bekaert and Harvey (2004) on liberalization events in 26 emerging markets, and a comprehensive data set from Bureau van Dijk's Bankscope data base. We start our analysis by demonstrating that, following liberalization, domestic banks that are unable to compete with foreign entrants decrease their lending relative to more competitive domestic banks, where bank competitiveness is based on the bank's profitability, the cost-to-income ratio, or the non-performing loans ratio prior to the event. This change in competitive landscape has effects on the nature of aggregate lending in the economy. Economies with fewer competitive domestic banks at the time of liberalization see foreign lending crowding out domestic lending, resulting in a sharp increase in the foreign market share and an aggregate loan supply that is lower than before. In contrast, economies composed of more competitive domestic banks at the time of liberalization see some increase in the aggregate loan supply and a moderate increase in the market share of foreign banks. Thus, as posited earlier, bank liberalization has differential effects on the financial structure of an economy depending on domestic banks' ability to compete with foreign entrants.

Next, we evaluate how the documented changes in financial structure relate to a country's industry structure and growth path. Following liberalization, there is a higher growth rate and lower growth volatility for industry sectors in economies with more competitive domestic banks. This "growth is driven by industries that are more reliant on external finance and with a larger share of small and medium enterprises. These findings are consistent with more efficient financial intermediation in economies with competitive domestic banking sector following liberalization.[4] In contrast, industries in countries with less competitive domestic banks exhibit lower growth rates and higher growth volatility. Again, these effects are driven by industries with a high share of small and medium enterprises. These results are consistent with our earlier argument that soft informationally sensitive borrowers are likely to be adversely impacted after liberalization in economies that see expansion of foreign bank lending. We con-

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[4]Beck et al. (2008) argue that small firms are relatively opaque and as a result benefit the most from reduction in informational frictions that are likely to accompany more efficient financial intermediation.

firm all the industry level findings using firm level data. In particular, we show that following liberalization, small and opaque firms are less able to obtain bank financing in economies with less competitive domestic banks at the time of liberalization.

We conduct several additional analysis that lend credence to our interpretation. First, it is important that the liberalization events for countries in our sample are not systematically related to the future growth prospects occurring in these economies. We are assured that this is the case for several reasons. One, we investigate the dynamics of effects we document and consistently show that the changes occur *after*, not before the event. Two, we exploit within-country, cross-sectional variation at the bank level, at the industry level, and at the firm level, and document differential effects of financial structure on banks, industries, and firms within the same economy. This analysis also mitigates concerns about the endogenous timing of liberalization events. Finally, as noted in Abiad et al. (2010), the nature of political processes and external pressures applied by the EU, the IMF or the World Bank in many of our sample countries also mitigate concerns regarding the timing of these events being endogenous to a growth prospects of these economies.

Second, the entry mode chosen by foreign banks – greenfield new investments or taking over existing domestic banks – could potentially impact subsequent outcomes we see in different economies. We show that the effects we document are present regardless of the mode of entry chosen by foreign banks.Third, we demonstrate that our findings are robust to using various definitions for banks' ability to compete. Finally, we account for other events that might affect lending in our sample countries, like changes in creditor rights or current account liberalization

Our paper connects to a large literature that debates the effect of financial liberalization on economic outcomes and presents a mixed evidence (see Beim and Calomiris 2001 for an early discussion). The benign view of financial liberalization is that it improves the functioning of credit markets and this in turn promotes economic growth.[5] In this context, several papers examine the removal of entry barriers to the banking market and document mostly positive effects on the efficiency of financial intermediation (Jayaratne and Strahan 1998, Berger et al. 2000, Claessens et al. 2001, Unite and Sullivan 2003, Barth et al. 2004, Demirguc-Kunt et al. 2004, Bonin et al. 2005a, Clarke et al. 2006, Degryse et al. 2012, Giannetti and Ongena 2012), economic growth and volatility (Jayaratne and Strahan 1996, Morgan et al. 2004, Bruno and Hauswald 2013), or the creation of new firms (Black and Strahan 2002). Similarly, equity market liberalization seems to foster economic growth (Bekaert and Harvey 2004) and to reduce consumption growth volatility (Bekaert et al. 2006). However, several scholars have expressed strong concerns that the removal of entry barriers may also increase the fragility of the banking sector and this may in turn hurt growth (Stiglitz 1994, 2000, Vives 2001, Aghion

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[5]This view goes back to the original work of McKinnon (1973), Shaw (1973). See Levine (1996) and Levine (2001) for an extensive discussion in the context of bank liberalization.

et al. 2004).[6] Indeed, Morgan and Strahan (2004) document higher growth volatility following bank liberalization within an international sample of almost 100 countries; moreover, several countries experienced banking sector crises shortly after the financial sector was deregulated (Demirguc-Kunt and Detragiache 1999, Kaminsky and Reinhart 1999), and evidence from several studies suggests that benefits from liberalization materialize only for large and transparent companies that are able to obtain funding from foreign banks (Berger et al. 2001, Mian 2006, Detragiache et al. 2008, Giannetti and Ongena 2009). Small and soft information borrowers might be harmed by credit rationing if foreign banks engage in 'cream skimming' behavior on hard information (Sengupta 2007, Detragiache et al. 2008).

We add to this literature by exploring how the competitiveness of the domestic banking sector at the time of liberalization impacts industry structure and economic growth, allowing us to explain the mixed findings in the literature. Our findings suggest that domestic institutions need to be developed to a reasonable degree for financial liberalization to have a positive impact on economic growth. In other words, we highlight the importance of the timing of liberalization and its effect on the structure of lending within an economy.[7]

Our paper also relates to the industrial organization literature that documents the effects of reduction in trade barriers on product and labor markets. Aghion et al. (2003, 2008) document a heterogeneous response of firms' efficiency and productivity following the elimination of entrance barriers to foreign firms. Consequently, opening of product markets amplifies initial differences in productivity. In a related paper, Sabirianova et al. (2005) show that the more foreign firms enter a market, the higher the productivity gap between foreign and domestic firms. Our paper documents similar effects for financial markets with additional consequences for industry structure due to the impact on firm financing.

The remainder of the paper is organized as follows: In Section 2 we describe the bank liberalization reforms in emerging markets that constitute our sample as well as our underlying data sources. Section 3 illustrates the consequences of our event for loan supply and financial structure. We investigate how changes in financial structure affect real economic outcomes and industry structure in Section 4. In Section 5 we provide some extensions and additional robustness checks. Section 6 concludes.

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[6]There is also a trade liberalization literature that cautions against the benefits of liberalization; e.g., Rodriguez and Rodrik (2000) express reservations against the bright side view of liberalization and assert that contrary to expectations, liberalization may be detrimental to growth.

[7]Our paper is also related to literature following Lucas (1990) famous article on why we do not observe capital flows from developed countries to emerging markets, although emerging markets have lower levels of capital per worker and hence a higher marginal product of capital (e.g., Bosworth and Collins 1999, Gourinchas and Jeanne 2013). An interesting feature of this puzzle is that among non-industrial countries with high rates of investment, those that rely less on foreign capital seem to grow faster than those that rely more on foreign capital (Prasad et al. 2007). A potential explanation for this is that non-industrial countries do not have corporations or financial systems to channel the arm's-length foreign capital into its most productive uses. We provide evidence that suggests that countries with underdeveloped domestic financial sectors may not be able to use foreign capital to finance growth.

2 Liberalization reforms and data

2.1 The event: Bank liberalization reforms across the world

During the last two decades many emerging markets throughout the world have opened their banking sectors to foreigners as part of a broader process of financial liberalization.[8] However, an ongoing debate about risks and benefits of liberalization resulted in a diverse set of market opening strategies across countries. While some countries removed all entry barriers for foreign banks, as suggested by, e.g., Sachs and Warner (1996)[9], others were more reluctant to completely open their markets and maintained restrictions on foreign bank operations.[10]

We collect information on banking market opening policies for a large sample of emerging market economies that had not yet fully liberalized their banking markets at the onset of our sample period in 1995. Our primary source of data is Abiad and Mody (2005), who provide an indicator that codes changes in entry restrictions for foreign banks for countries from several regions. Unfortunately the data base does not include Eastern European economies, which are, however, of special interest since they opened their banking markets during the 1990s in the quest to join the European Union. Therefore, we construct the Abiad and Mody (2005) indicator on foreign entrance restrictions for these countries based on data from the Bekaert and Harvey (2004) database on important financial, economic and political events in emerging markets. Specifically, the index from Abiad and Mody (2005) (a) is coded as 0 when no entry of foreign banks is allowed or tight restrictions on the opening of new foreign banks are in place; (b) is coded as 1 when foreign bank entry is allowed, but nonresidents must hold less than 50 percent equity share; (c) is coded as 2 when the majority of share of equity ownership of domestic banks by nonresidents is allowed or equal treatment is ensured for both foreign banks and domestic banks or an unlimited number of branching is allowed for foreign banks.[11] Overall, we obtain the coding of the index for 26 emerging economies located in Central and Eastern Europe, Asia, Latin America and Africa.[12] Of these 26 countries, 22

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[8]See, e.g., Williamson and Mahar (1998), Kaminsky and Schmukler (2008) or Abiad et al. (2010) for a documentation of liberalization reforms across the world in recent decades. Following the market opening, many countries saw a sharp increase in foreign bank ownership. E.g., Claessens et al. (2008) document for a sample of 103 developing countries an increase in foreign ownership from 23 percent in 1995 to 38 percent in 2006.

[9]Sachs and Warner (1996) argue that high product market competition through liberalization fosters allocative efficiency which in turn promotes economic growth.

[10]For reviews about experiences with the removal of entry barriers see Barros et al. (2005) and Coricelli (2001).

[11]Abiad and Mody (2005) use information on seven different dimensions of financial sector policy to calculate an index of financial reform. The subindex on entry barriers incorporates information on four dimensions: Restrictions on foreign bank entry, restrictions on domestic bank entry, restrictions on branching, and restrictions on banking activities. The first of these dimensions exactly matches our variable of interest, hence we take over the coding of our event variable from this sub-subindex.

[12]We include all countries not yet fully liberalized at the onset of our sample period in 1995 for which we are able to obtain the coding of the event variable. For 17 of our 26 sample countries liberalization information is taken from the Abiad and Mody (2005) database and for the remaining 9 countries from the Bekaert and

reduced restrictions on foreign bank entry during our sample period, while the remaining four countries remain only partially liberalized throughout the whole sample period. We use central bank sources in order to double check information on all liberalization reforms.[13]

An overview of our sample countries and their respective reform years can be found in Panel A of Table 1. The table also contains a short description of the reforms themselves. Many countries eliminated limitations on foreign ownership in the banking sector, while others like Indonesia or Taiwan also made it easier for foreign banks to open branches. Some countries like Guatemala or Costa Rica took a more gradual approach and liberalized only partly. All in all, we have a diverse set of reforms that captures the different facets of bank liberalization. In Figure 1 the development of the foreign market share aligned around the respective reform year of our sample countries is plotted.[14] Many countries were already partially liberalized at the onset of our sample period, so that the average market share of foreign banks five years before liberalization was about 18 percent.[15] However, foreign bank operations were still restricted and highly regulated in these countries. The figure shows that the foreign market share rose to about 50 percent five years after liberalization, which illustrates that liberalization had a significant impact in our sample countries.

2.2 Bank data

We obtain bank balance sheet data and time series information on bank ownership from Bureau van Dijk's Bankscope database. This database contains detailed information on up to 30,000 banks and goes back until the early 1990's. A problem with the database is that each version covers only the most recent years. To gather data on the earlier years, we merge information from the 2011 internet version of the database with data from older CD-ROM versions. In this way, we obtain a consistent dataset for the entire sample period from 1995 to 2007. The years 1993 and 1994 are excluded due to very thin data availability. To avoid a possible distortion of results due to other forces being at work during the global financial crisis, we also exclude the years 2008 and 2009. Careful revision of the data is necessary to avoid double counting and the inclusion of irrelevant data. We eliminate unconsolidated statements whenever both unconsolidated and consolidated statements are available for a certain bank. Moreover, we eliminate all statements of non-bank financial institutions, such as clearing institutions, central

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Harvey (2004) database.

[13]Overall, the quality of the two databases is very good. We make only two minor corrections: In Mexico, restrictions on foreign bank entry were removed in 1997, two years earlier than reported in the Abiad/Mody database (Hernández-Murillo 2007). For Bulgaria, the event definition is not unambiguously clear from the two databases. We consult a paper by Miller and Petranov (2001) to obtain the correct date of liberalization.

[14]The foreign market share is defined as the share of total bank assets owned by foreign banks within the respective country.

[15]Foreign bank presence prior to liberalization can also be explained by historical reasons in some of our sample countries. For example, in Mexico, foreign banks were allowed to enter before restrictions were put in place in 1982. These restrictions were removed again in the 1990s (see Hernández-Murillo 2007).

banks or securities firms.

In large parts of the paper we distinguish between domestic and foreign lending. Hence, we need to identify ownership of our sample banks. Bankscope includes detailed information on ownership, giving both name and nationality of a bank's shareholders as well as their respective shares in the bank. Banks are coded as foreign if at least 50 percent of their assets are foreign owned. Unfortunately, even with different versions of the Bankscope database, ownership information is only available for the years 2000 to 2007. Hence, for the years 1995 to 1999, we consult the banks' or central banks' websites in order to check whether there was a takeover.

Our sample provides information on 842 distinct foreign and domestic banks. We aggregate loans from all banks within a given market in order to calculate country level loan supply in a given year. In the bank level regressions our focus is on domestic banks. Among the 842 banks, our sample contains 542 distinct domestic banks with 4,604 bank-year observations.[16] Panel B of Table 1 contains descriptive statistics of the domestic bank balance sheet information by country. It reports the number of banks per country as well as mean values for bank assets, loans, ROA, market share, a solvency measure (equity by total assets) and a liquidity measure (liquid assets by total assets). The number of domestic banks per country ranges from six in Ghana, Lithuania and Slovakia up to 78 in Brazil. Importantly, the sample is not dominated by a single country: India, the country with the most bank-year observations, makes up approximately 15 percent of the overall sample. Within the sample, domestic banks from Korea, Taiwan or Singapore are the largest on average, while somewhat surprisingly, African banks are the most profitable ones.

2.3   Competitiveness of domestic banks and macroeconomic data

As outlined in the introduction, we want to analyze how differences in domestic banks' ability to compete with foreign entrants affect outcomes of banking sector liberalization. To measure domestic banks' competitiveness we rely on several accounting based measures.

As a starting point, we focus on banks' profitability. The more profitable a bank (measured by its return on assets, ROA) prior to liberalization, the better it should be able to counter the competitive threat of foreign entrance. Therefore, we use a bank's ROA in the year before liberalization as a proxy for its ability to compete with foreign entrants. Alternatively, we define a dummy taking the value of 1 if the respective bank has an ROA in the top quartile of all sample banks in the year before liberalization ($D(competitive\ bank)$).[17] Using this dummy, we calculate the pre-event fraction of domestic banks with a relatively high ROA (weighted by total assets), i.e., the fraction of domestic banks that are likely to be able to compete with

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[16]Besides foreign banks, we exclude also banks that were taken over by foreign banks from the bank level analysis. If foreign entrants selected these banks based on their efficiency this could create a potential bias to our analysis. However, we show in Section 5 that this is not the case.

[17]Alternatively, we use different cut-offs (top decile, top half). Our results are robust to these changes.

foreign entrants. For the four countries that did not experience a liberalization event during our sample period the measure displays the share of competitive domestic banks at the onset of our sample period in 1995.[18] The first column of Table 1, Panel C displays for each sample country the resulting share of competitive banks at liberalization (*Initial ROA*). There is considerable variation in this measure across our sample countries. In Eastern Europe, the Czech Republic opened its banking sector while there were basically no profitable domestic banks. In Poland a fraction of 7 percent of total banking assets was managed by relatively profitable banks. Most Asian countries opened their banking markets while having a domestic banking sector that was largely unprofitable. Among the countries that did not open their markets, only Brazil has a considerable fraction of profitable domestic banks. Since we conduct sample splits based on the *Initial ROA* measure, we define a dummy that takes the value of one if *Initial ROA* is above the median and zero otherwise. The respective classification is displayed in column 2.

Alternatively, we use the cost to income ratio *(Initial cost to income ratio)* and the non-performing loans ratio *(Initial NPL ratio)* to obtain measures for domestic banks' ability to compete. We obtain data for the aggregate banking sectors of our sample countries in the year before liberalization from the World Bank World Development Indicators (columns 3 and 4).[19] A relatively high aggregate cost to income ratio indicates a rather underdeveloped and unprofitable domestic banking sector. Similarly, a high non-performing loans ratio indicates that domestic banks have problems in screening and monitoring profitable investment projects and are thus less likely to be able to compete with better developed foreign entrants. Throughout the main part of the paper we consistently apply the measure *Initial ROA*. In Section 5, we verify that our most important findings are robust to the two alternative definitions of banking sector competitiveness (*Initial cost to income ratio* and *Initial NPL ratio*).

The last three columns of Table 1, Panel C, report macro controls obtained from the World Bank World Development Indicators. We control for banking market concentration by including the Herfindahl index of each banks' market share in a given banking market (Herfindahl index), and further include the logarithm of the inflation rate (log(inflation)) and the annual GDP growth rate (GDP growth).

2.4 Industry data

To investigate whether the effects of bank liberalization are transmitted to the real economy, we collect data on industry output from UNIDO's INDSTAT4 (2011) database. This database contains time series information on 127 countries for the period 1990-2008. The measure of

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[18]Zimbabwe is the only sample country that had two events. We consistently code the first event as the liberalization event. Results are unaffected by this decision.

[19]Series GFDD.EI.07, defined as operating expenses as a share of the sum of net interest revenue and other operating income, and series GFDD.SI.02, defined as the ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans.

industry output reported in the UNIDO database is based on the census concept and covers only activities of an industrial nature.[20] The data is originally stored in national currency valued at current prices. In order to make data from different countries comparable, it is converted into current U.S. dollars using the average period exchange rates as given in the International Financial Statistics (IFS). Following Rajan and Zingales (1998), the analysis is confined to manufacturing sectors (U.S. SIC 2000-3999) in order to reduce the dependence on country-specific factors like natural resources. The UNIDO dataset is classified by ISIC Rev. 3 codes. Using three-digit industry codes as the level of analysis, we obtain a panel of up to 47 industries per country-year. The basic industry specification includes 10,520 country-industry-year observations for 1,132 distinct country-industries.

In Section 4, we examine whether industries that differ in certain characteristics are heterogeneously affected by liberalization. Industry measures for external dependence and the share of small and medium enterprises (SMEs) are obtained from papers by Rajan and Zingales (1998) and Beck et al. (2008), respectively.[21]

Rajan and Zingales (1998) measure a firm's dependence on external finance as capital expenditures minus cash flow from operations divided by capital expenditures and aggregate data for U.S.-based publicly listed companies of the 1980's into an industry index. They argue that industries differ in their use of external finance for technological reasons that are persistent across countries. The U.S. is taken as a benchmark economy as its capital markets are among the most advanced in the world and hence there are relatively few frictions, market imperfections or policy distortions. Moreover, data for publicly traded companies is used as these are relatively large companies that are financially not constrained. Therefore the amount of external finance they use is a relatively pure measure of the demand for external finance. As Rajan and Zingales (1998) point out, the identifying assumption that technological differences persist across countries does not require that industries have the same value for external financial dependence in every country, but that the ranking among them remains relatively stable across countries. Panel D of Table 1 shows that there is considerable variation in the amount of external finance that industries need in order to fund their operations. Sectors with the highest dependence on external finance are Plastic Products and Office/Accounting/Computing Machinery. On the contrary, Tobacco and Leather sectors seem to rely mostly on internal funding.

The share of small and medium enterprises within an industry is obtained from Beck et al.

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[20]For details on the INDSTAT data see UNIDO Statistics Unit (2011).

[21]For this the three-digit ISIC Rev. 3 codes used in the UNIDO Statistics Unit (2011) dataset are matched to three-digit ISIC Rev. 2 codes used in these earlier papers. ISIC Rev. 3 codes are generally finer than ISIC Rev. 2 codes so that in some cases several of the sectors in this paper have the same value for the respective measure. The United Nations Statistics Division provides tables with correspondences between different sector classifications on its website. As a consistent matching of ISIC Rev. 3 sectors 331 Medical instruments, 332 Optical instruments and 333 Watches and clocks is not possible, these sectors are excluded from the analysis.

(2008) and calculated as the industry's share of total employment by firms with less than 20 employees. The paper rests on the same identifying assumptions as Rajan and Zingales (1998) and also uses the U.S. as a benchmark economy to measure an industry's technological share of small firms. Beck et al. (2008) emphasize that even if there are policy distortions and market imperfections in the U.S., the approximation remains valid as long as these distortions do not systematically distort the ranking of industries. Again, Panel D of Table 1 shows considerable variation between industries. While Wood products and Printing and Publishing are industries with relatively high shares of SMEs, there are few small firms in the Tobacco or the Basic Chemicals industry.

2.5 Firm data

Unfortunately, no database contains detailed information on firms from all our sample countries for the period from 1995 to 2007. Nevertheless, we would like to use firm level data in order to support our argumentation and present evidence on the mechanism behind our industry results. As a compromise, we use Bureau van Dijk's Amadeus database to obtain data on a subsample of countries, the Eastern European countries. The database contains balance sheet and other financial information on public and private firms from 43 European countries. Similar to the industry level, we focus on the manufacturing sector and include only firms from U.S. SIC sectors 2000-3999. Our basic firm-level regressions contains 30,489 observations for 7,228 distinct firms from eight Eastern European countries.

Panel E of Table 1 provides a description for the Amadeus data. It covers the period from 1995 to 2004 and is hence well-balanced around the years 1999 and 2000, in which most Eastern European countries liberalized their banking sectors. Dependent variables in the regressions are a firm's total debt and the ratio of total debt to total assets. Firms from all countries are comparable in size (as measured by total assets or sales), tangibility (defined as fixed assets over total assets) and profitability (defined as EBIT over total assets). The last three columns show the average values of three dummy variables: The first one takes a value of one if the average firm size (as measured by total assets) prior to liberalization is lower than median, the second one takes a value of one if the average firm age (in years) prior to liberalization is lower than median, and the third one takes a value of one if the firm operates in an industry with a higher than median value of external dependence according to Rajan and Zingales (1998). Importantly, each dummy varies significantly within each country, so that differences between firms of different external dependence, different size, or different age cannot be attributed to differences between countries.[22]

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[22]In Hungary, the liberalization event was relatively early in 1996. Amadeus does not contain information on Hungarian firms in 1995, so that we are unable to define the dummy variables for initial size and initial age.

3 Timing of liberalization and financial structure

In this section we examine how the removal of entry barriers for foreign banks affects the financial structure within liberalizing countries, and how the effect depends on domestic banks' inherent ability to compete with foreign entrants. We start by examining how the individual domestic bank is affected by liberalization, and move on to aggregate country-level effects in the second part of the section.

3.1 Impact on bank-level loan supply

We hypothesize that domestic banks' reaction to liberalization depends on their inherent ability to compete with foreign entrants. Using pre-event profitability as a proxy for a bank's competitiveness, we test this hypothesis by estimating the following equation:

$$\text{Log}(loans)_{ijt} = \alpha_i + \alpha_{jt} + \phi'B_{it} + \delta \times (\textit{Initial bank ROA}_i \times \textit{Event}_{jt}) + \epsilon_{ijt}, \qquad (1)$$

where i indexes the individual bank, j country and t time; the dependent variable is the logarithm of bank i's loans supply at time t; α_i are bank fixed effects that control for observed and unobserved heterogeneities across banks, and α_{jt} are year-country interactions that control for year-specific shocks to certain banking markets (such as the *Event* variable itself); bank control variables are denoted by B_{it} and include the bank's market share, the ratio of equity to assets and the ratio of liquid assets to total assets. The *Initial bank ROA* serves as a proxy for a bank's competitiveness and is interacted with the *Event* variable; alternatively, we define a dummy taking the value of 1 if the bank's ROA is in the top quartile of all our sample banks (foreign and domestic) in the year before the respective event (*D(competitive bank)*). The specification further includes a random error term ϵ_{ijt}. Standard errors in all our regressions are clustered at the country level to allow for correlation among observations from the same country.[23]

Results are reported in Table 2. In column 1 we include only the *Event* variable, for which the coefficient is negative, but insignificant. Next, we include the interaction between *Event* and *Initial bank ROA*, which enters with a positive sign and is significant at the 10 %-level. More profitable banks, i.e., banks that are better able to compete with foreign entrants, react to liberalization by increasing their loan supply relative to less profitable banks. In column 3 we use the dummy *D(competitive bank)* instead of the bank's initial ROA. The negative coefficient for the event variable indicates that less competitive domestic banks decreased their loan supply following liberalization, while the positive sign for the larger interaction term indicates that more competitive domestic banks increased their loan supply. This result is robust to

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[23]Results are robust to double clustering on country and year, which results in smaller standard errors in most cases.

the inclusion of country-specific trends in column 4, year-country interactions in column 5, and time-varying bank control variables in column 6. The difference between the groups of banks is economically meaningful: For example, the coefficient in column 6 implies that more competitive domestic banks increased their lending by about 37 percent relative to less competitive banks following liberalization. Further robustness checks are provided in Section 5.

These bank-level results suggest that the timing of liberalization has an important effect on the loan supply of domestic banks. Banks that are able to compete with foreign entrants benefit from potential spillover effects and improved access to international capital markets associated with liberalization, and react by increasing their loan supply. In contrast, less competitive banks are unable to adapt to the new competitive environment and lose market shares to foreign entrants and more competitive banks. This result is important as it suggests that domestic banks' inherent competitiveness is a crucial determinant of post-liberalization financial structure.[24]

3.2 Impact on aggregate loan supply and financial structure

To test how liberalization affects financial structure, and how this effect depends on the competitiveness of the domestic banking sector, we analyze the development of aggregate, domestic, and foreign loan supply. As explained in Section 2.3, we split our sample into countries with a lower than median and countries with a higher than median share of competitive banks at liberalization (see variable *D(initial ROA)* in Panel C of Table 1). For each subsample, we estimate:

$$\text{Log}(loansupply)_{jt} = \alpha_j + \alpha_t + \psi_k' C_{jt} + \delta \times Event_{jt} + \epsilon_{jt}, \qquad (2)$$

where j indexes country and t time; the dependent variable is the logarithm of either aggregate, domestic, or foreign loan supply, and C_{jt} is a vector of macro control variables that includes GDP growth, the logarithm of inflation, and the Hirschman-Herfindahl Index to control for competition within the banking sector.

The results for the regressions are reported in Table 3. We start by investigating the effect of liberalization on aggregate loan supply and include all our sample countries in column 1, which shows that on average there was no significant increase in aggregate loan supply after the market opening. This finding is remarkable: Foreign banks are expected to bring fresh capital into emerging markets, which should translate into an increase in aggregate loan supply. The insignificant coefficient for liberalization suggests that in many cases foreign lending just substitutes domestic lending. Interesting heterogeneities emerge when we apply the sample

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[24]The focus in this section is on the reaction of domestic banks, i.e., we do not account for the reaction of foreign banks and banks that were taken over by foreign banks. If banks that were taken over by foreign entrants were selected based on their efficiency this could create a potential bias to our analysis. We address this issue in Section 5. Furthermore, we look at aggregate outcomes in the next two sections, hence also incorporating lending by foreign banks and banks that were taken over by foreign banks.

split described above. For countries with less competitive domestic banks, the coefficient for liberalization is significantly negative (column 2), while countries with more competitive domestic banks see the expected increase in the aggregate supply of credit (column 3, the p-value is 0.16).

Columns 4-9 of Table 3 illustrate the underlying cause of this finding. As expected, all countries experience significant increases in foreign lending following the event (columns 4-6). This is illustrated in Figure 2, which shows the development of foreign loan supply around liberalization reforms in our sample countries. However, the increase in foreign lending translates into an even larger decrease in domestic lending in countries with less competitive domestic banks (column 8). In contrast, domestic lending in countries with more competitive domestic banks is not significantly affected by the event (column 9). Domestic banks' heterogeneous reaction to liberalization is reflected in the development of aggregate loan supply (columns 1-3), which is further illustrated in Figure 3. The figure shows Epanechnikov kernel densities of residuals from a regression of aggregate loan supply on country and year dummies as well as the macro control variables from above. Densities are plotted for countries with an above/below median share of competitive domestic banks at liberalization before and after the event. There is a clear rightward shift for countries with relatively competitive domestic banks, while the density for countries with less competitive domestic banks is shifted to the left. Both shifts are statistically significant, as the the Kolmogorov-Smirnov test for the equality of distribution functions is rejected at the 1 % level.

The above results imply that the post-event market structure (i.e., the relative market share of domestic and foreign banks) depends on the inherent competitiveness of the domestic banking sector. This is illustrated in Table 4, where we report results for regressions using the foreign market share (columns 1-3) or the foreign bank ratio (columns 4-6) as dependent variables.[25] Column 1 shows a significant increase in the market share of foreign banks following liberalization (recall Figure 1). Applying the same sample split as above, columns 2 and 3 indicate that the increase is much stronger in countries with less developed domestic banks (23.7 percent), compared with countries with better developed domestic banks (9.4 percent). Similarly, while the foreign bank ratio increases in all countries (column 4), the effect in the former group of countries is about 2.5 times as large as the effect in latter group (columns 5 and 6). For both the foreign market share and the foreign bank ratio, the difference between the coefficients for the two groups is significant at the 1 %-level.

Overall, our findings suggest that foreign and domestic lending are complementary if domestic institutions are sufficiently developed to compete with foreign entrants. Competitive domestic banks seem to benefit from liberalization, so that countries with better developed domestic markets see an increase in aggregate lending and a moderate increase in the for-

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[25]The foreign market share is defined as the share of foreign bank assets in all bank assets, the foreign bank ratio is defined as the ratio of foreign banks to all banks within the country.

eign market share. In contrast, foreign lending seems to replace domestic lending in countries where domestic banks are unable to compete with foreign entrants, inducing a sharp increase in the foreign market share; moreover, these countries experience a decline in aggregate lending, which could be explained by two reasons. First, it could be that foreign banks make better lending decisions than domestic banks and simply refuse to take over some of their unhealthy customers. In this case, the decline in the total volume of credit could still be accompanied by an increase in the efficiency of financial intermediation, as better developed foreign banks could be better at channeling capital into its most productive use. On the other hand, it could be that foreign banks over-engage in 'cherry-picking' their customers and also refuse to take over some of the healthy customers of the domestic banks they replace. For example, it could be that small firms who rely on relationship lending become credit-constrained after liberalization. We will investigate this issue in the next section.

4   The real effects of bank liberalization

In this section we examine how the timing of liberalization transmits to the real sector. Distinguishing between countries with rather competitive and countries with rather uncompetitive domestic banking sectors, we examine how liberalization affects industry output and volatility, and investigate whether outcomes depend on industry characteristics like external financial dependence or the share of small and medium firms. Further, by looking at firms of different size or age, we analyze whether the timing of liberalization has a differential effect on firms' financial structure and debt taking.

4.1   Economic growth and stability

4.1.1   Industry growth

We start by examining the overall effect of liberalization on industry output, using the UNIDO data described in Section 2.4. As before, we use the dummy *D(initial ROA)* to split our sample into countries with a lower than median and those with a higher than median share of competitive domestic banks at liberalization, and estimate the following specification for each subsample:

$$\text{Log}(output)_{ijt} = \alpha_{ij} + \alpha_t + \delta \times Event_{jt} + \epsilon_{ijt}, \tag{3}$$

where i indexes industry, j country, and t time; the dependent variable is the logarithm of country-industry output. We include country-industry interactions in all regressions in order to account for any unobserved time-invariant determinants of industry performance (e.g., natural endowments, location). Time fixed effects α_t control for changes in economic performance over time.

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Albeit illustrative, the estimation of Equation (3) could be problematic if countries that differ in the development of the domestic banking sector differ in several other dimensions that might have an influence on industry performance. While the country-industry interactions absorb any fixed differences between countries, time-varying omitted variables pose a threat to identification and might bias our results. The identification of within-country, cross-sectional effects allows us to circumvent this issue (compare to Rajan and Zingales 1998). Specifically, we replace the year effects with year-country interactions that control for time-varying differences across countries, and include an interaction between the liberalization variable and certain industry characteristics (i.e., an industry's external financial dependence and an industry's share of small and medium enterprises (SMEs)) into Equation (3):

$$\text{Log}(output)_{ijt} = \alpha_{ij} + \alpha_{jt} + \lambda \times (Industry\ characteristic_i \times Event_{jt}) + \epsilon_{ijt}. \qquad (4)$$

Regression results on the industry level are presented in Table 5. Column 1 shows that industry output in the average country is not affected by the event. The coefficient for liberalization is positive but insignificant. However, positive effects of liberalization should be particularly pronounced for those industries that are more dependent on external finance (see Rajan and Zingales 1998). Therefore, column 2 includes an interaction between liberalization and external dependence and finds a positive and highly significant effect for the whole sample of countries. Thus, industries that are more reliant on external finance grow relatively faster, which is consistent with an improvement in the efficiency of financial intermediation following liberalization. The effect is economically meaningful: The model implies that the industry at the 75th percentile of external financial dependence (0.47) experiences a 16.1 percent larger increase in industry output as compared with the industry at the 25th percentile (0.14, see last line of Table 5). In contrast, we do not find a significant effect for the interaction between liberalization and an industry's share of small and medium enterprises in the full sample (column 3).

As we documented significantly larger changes in the financial structure of countries with less developed domestic banks we proceed by applying the sample split from above. For countries with a lower than median share of competitive banks at liberalization, the coefficient for the event variable is negative and significant at the 10 %-level (column 2). Somewhat surprisingly, the interaction with external dependence is positive and significant also in this subsample (column 5). The interaction between liberalization and the share of small and medium enterprises, however, is negative and significant at the 1 % level. An interpretation of these findings is the following: Although aggregate lending declines in these economies, foreign banks seem to improve the efficiency of capital allocation and lend to more productive firms on average. In other words: Not the quantity, but the average quality of lending increases, fostering a positive effect on growth in industries that have to rely on external financing.

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However, large drops in domestic lending and sharp increases in the foreign market share are harmful for smaller firms in these economies. With foreign banks typically relying on hard information (Stein 2002, Berger et al. 2005, Mian 2006), small and opaque firms are unable to obtain the same level of funding in the post liberalization period, which negatively affects their growth prospects. On aggregate, negative effects seem to outweigh positive effects as average industry growth slows down following liberalization.

The picture is different in countries with better developed domestic banks, where output in the average industry increases following liberalization (column 7). Not surprisingly, we also get a positive effect for the interaction with external dependence (column 8), suggesting an improvement in both the quantity and the quality of lending within these countries. Interestingly, the interaction between liberalization and the SME share is also positive and significant. Small-firm industries seem to disproportionately benefit from liberalization in countries with sufficiently developed domestic banks (column 9). An interpretation of this finding is that liberalization fosters financial development, and better screening and monitoring devices on the part of banks help small and informationally opaque firms to overcome financial constraints (see Beck et al. 2008), thus helping them to grow faster. Taken together, this evidence is in line with the hypothesis that financial deepening fosters economic growth (King and Levine 1993a,b).[26]

Findings are illustrated in Figure 4, which plots Epanechnikov kernel densities of residuals from a regression of industry output on country-industry interactions and year fixed effects. The figure shows a rightward shift in the density following liberalization in countries with relatively competitive domestic banks, while residuals in countries with rather uncompetitive banks are shifted to the left. The Kolmogorov-Smirnov test for the equality of distribution functions indicates that both shifts are significant at the 1 % level.

Overall, results in this section suggest that liberalization increases the efficiency of financial intermediation and hence has a positive impact on industry growth rates within the liberalizing country. This is unambiguously true if domestic banks are sufficiently developed at the time of liberalization, so that they are able to compete with foreign entrants. If this is not the case, particularly small and opaque firms might be harmed by liberalization, as they lose the domestic relationship lenders they need in order to obtain funding. Section 4.2 provides further evidence on the firm level regarding this issue.

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[26]Bekaert et al. (2005) document that equity market liberalization increases annual real economic growth by about 1 %. In line with our findings they show that the largest growth responses occur in countries with high quality institutions.

4.1.2 Industry volatility

We conclude the industry section with some evidence on the effect of liberalization on output volatility, using an econometric framework similar to the one developed by Morgan et al. (2004).[27] Specifically, we estimate regressions of the following structure:

$$Fluctuation_{ijt} = \alpha_{ij} + \alpha_t + \delta_1 \times Event_{jt} + \epsilon_{ijt}, \tag{5}$$

where i indexes industry, j country, and t time. Country-industry interactions and time fixed effects are represented by α_{ij} and α_t, ϵ_{ijt} is a random error term. $Fluctuation_{ijt}$ equals the absolute deviation from conditional mean growth in industry output. Specifically, it is equal to the absolute values of the residuals from a regression of country-industry growth rates on a full set of country-industry interactions and year fixed effects:

$$Growth_{ijt} = \alpha_{ij} + \alpha_t + u_{ijt}, \tag{6}$$

and,

$$Fluctuation_{ijt} = |u_{ijt}|. \tag{7}$$

Hence, the fluctuation in economic growth for a given country-industry-year can be interpreted as the size of the deviation from average growth for that country-industry over our sample period and from average growth for all country-industries in that year.

Table 6 provides results for the estimation of Equation (5). In column 1 we include all sample countries. The coefficient for liberalization is positive but insignificant. It is positive and significant in countries with less competitive domestic banks (column 2; i.e., higher volatility in these countries). As foreign banks took over large shares of the market in these countries, this result is in line with arguments that point at possible withdrawals of funds by foreign banks at economic downturns. In contrast, the coefficient is negative and significant in countries with more competitive domestic banks (column 3; i.e., lower volatility in these countries). Bank liberalization seems to stabilize the economy if the domestic banking sector is sufficiently developed. Overall, results in this section complement the equity market liberalization results of Bekaert et al. (2006), and confirm our previous finding that only countries that have a well functioning domestic financial sector are able to leverage the maximum benefits from liberalization.

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[27]Empirical evidence on whether liberalization increases or decreases volatility of industrial production is mixed. While Morgan et al. (2004) show that the allowance of interstate banking reduced economic growth volatility within U.S. states, Morgan and Strahan (2004) cannot confirm their finding in a study using international data for nearly 100 countries in the 1990s. If anything, their results suggest that a larger foreign bank presence in non-industrial countries is associated with more, not less, volatility. Regarding equity market liberalization, Bekaert et al. (2006) show that liberalization did not—as often claimed—increase consumption growth volatility. Instead, they find a significant decrease in volatility for many countries. However, they conclude that volatility may not decrease or even increase in countries that have a poorly developed financial sector.

4.2 Firm debt taking and corporate capital structure

In this subsection, we extend our analysis by presenting firm-level evidence for a subsample of eight Eastern European countries. We start by estimating the general effect of liberalization on firm debt taking and corporate capital structure. Specifically, we estimate the following equation:

$$\text{Log}(debt)_{ijt} = \alpha_i + \alpha_t + \theta' F_{it} + \delta \times Event_{jt} + \epsilon_{ijt}, \tag{8}$$

where i denotes the individual firm, j denotes country, and t time. The dependent variable is the logarithm of total debt or, alternatively, the debt to asset ratio. Firm and time fixed effects are denoted by α_i and α_t, respectively. Additionally, the specification includes the logarithm of total sales, the firm's ROA (EBIT/Assets), and a measure of tangibility (tangible assets over total assets) as time-varying firm control variables.

Results for Equation 8 are provided in Table 7, column 1. The average firm had lower debt and a lower debt to asset ratio (column 6) following liberalization. We expect this result to be driven by markets with rather uncompetitive domestic banks and hence include an interaction between the event variable and the dummy *D(initial ROA)* from above. Indeed, the interaction is significantly positive in both cases: The reduction in total debt and the debt to asset ratio is less pronounced in markets with better developed domestic banks (columns 2 and 7). As shown in Table A.1 in the Appendix these results are robust to the inclusion of industry-year interactions and to using the ratio of debt to pre-liberalization assets as a dependent variable.

Next, we investigate whether liberalization had a differential impact on firms in our sample countries, and if so, whether the differential effect depends on the development of the domestic banking sector. For this purpose, we extend Equation (8) in the following way:

$$\text{Log}(debt)_{ijt} = \alpha_i + \alpha_t + \theta' F_{it} + \delta \times Event_{jt} + \eta \times (Event_{jt} \times D(initial\ ROA)_j) \tag{9}$$
$$+\kappa \times (Event_{jt} \times Firm\ char_i) + \nu \times (Event_{jt} \times D(initial\ ROA)_j \times Firm\ char_i) + \epsilon_{ijt}$$

In addition to the event variable and its interaction with the dummy *D(initial ROA)*, we include an interaction between liberalization and one of three dummy variables that indicate certain firm characteristics: The first dummy takes a value of one for firms in industries that have a higher than median value of external dependence according to Rajan and Zingales (1998); the second equals one if the average firm size (as measured by total assets) prior to the event is above median; and the third is equal to one if the firm is younger than median prior to the liberalization event. To make the equation complete, we also include a triple interaction between the *Event*, *D(initial ROA)* and the respective firm characteristic. The remaining interactions and main effects are absorbed by the firm fixed effects.

Table 7, columns 3 and 8 show the results for external dependence. The positive coefficients

for the triple interactions indicate that financially dependent firms are able to obtain relatively more debt in markets with more competitive domestic banks as compared to markets with less competitive domestic banks. Firms in the former group benefit from a better capital allocation process and do not suffer from the reduction in aggregate lending that we observe in the latter group. In the output growth regressions in Section 4.1.1 the interaction between liberalization was positive also for countries with less competitive domestic banks, which indicates that those firms that are able to obtain funding following the event are more productive on average. Again, this is in line with foreign banks making better allocation decisions than uncompetitive domestic banks.

We investigate the role of firm size in columns 4 and 9 of Table 7.[28] The triple interaction is positive and significant in both cases, indicating that smaller firms are relatively better off in markets with more competitive domestic banks. While both large and small firms are better off in better developed markets, the effect is particularly pronounced for the latter, indicating that large firms are able to obtain funding in both types of markets. Small firms, in contrast, depend on their domestic relationship lenders and become credit constrained if large parts of the banking sector are taken over by foreign entrants.

As an alternative to firm size, we use firm age as a measure of opaqueness in columns 5 and 10 of Table 7. Results are qualitatively very similar; the positive coefficient for the triple interaction shows that younger firms are relatively better off in countries with better developed domestic banks at liberalization.[29] Overall, the results on the firm level confirm our previous results on the bank and the industry level. The development of the domestic banking sector, i.e., the timing of liberalization, is crucial for post-event economic outcomes. If domestic banks are unable to compete with foreign entrants, domestic lending declines considerably and particularly small and opaque firms can become credit constrained.

5   Robustness checks

5.1   Selection concerns

In this section we undertake several checks to assess the robustness of our findings. First, we consider the issue that is introduced as we exclude banks from the analysis that were taken over by foreign banks during our sample period. If banks that were taken over by foreign entrants are selected based on their competitiveness this could create a potential bias to our analysis. On the one hand, foreign banks might 'cherry pick' especially competitive banks for

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[28]The sample for these regressions is smaller as we can only include firms for which we have estimates for initial size (or age), i.e., firms for which we have balance sheet information in the year before liberalization. However, sample selection does not affect our results: Results for the first three columns are very similar on the restricted sample and are available from the authors upon request.

[29]Again, results for the ratio of debt to pre-event assets are provided in Table A.1 in the Appendix.

takeovers. On the other hand, mostly state owned banks were sold by governments to foreign banks. These banks are likely to be rather less competitive (see, e.g., Bonin et al. 2005b).

In order to test whether banks that were taken over were selected based on their ability to compete, we estimate a probit model. The dependent variable *D(takeover)* is a dummy that takes the value of 1 if a bank was taken over by a foreign bank during the sample period and 0 otherwise. Explanatory variables are the ROA, the cost to income ratio, and the cost to asset ratio together with further bank characteristics. Table A.2 in the Appendix shows that banks that were taken over were not selected based on competitiveness or performance. Columns 1-3 include all bank-year observations, in columns 4-6 we collapse the data on the bank level. Neither the bank's ROA, nor the cost to income or the cost to asset ratio seem to have an impact on the probability with which a domestic bank is taken over by foreign entrants. We find, however, that foreign banks took over larger banks and more liquid banks on average.

Next, we investigate whether our results are driven by the mode of entry chosen by foreign banks. It could be that domestic banks in markets where foreign banks entered mostly by taking over domestic banks are affected differently than domestic banks in markets where foreign banks entered via greenfield investments. To test this, we calculate the share of domestic banks that were taken over by foreign banks in each market and divide our sample into the countries where this share is lower than median and countries where it is higher than median. Columns 1 and 2 of Table A.3 in the Appendix show that the differential effect for banks of differing levels of competitiveness is present in both subsamples. Hence, the competitiveness of domestic banks at liberalization seems to be more important than the mode of entry chosen by foreign banks.

5.2 Endogeneity concerns regarding the event

Another issue concerns the potential endogeneity of liberalization reforms. It could be that countries opened their banking sectors when growth prospects were good and the need for capital was high. Alternatively, it could be that countries were forced to open their banking sectors when they had crises in their domestic banking markets. In both cases, liberalization would not actually be causal for the documented effects on loan supply and industry output. Our identification strategy in all sections took these issues into account, as we documented differential effects for banks of varying degrees of competitiveness or industries and firms with varying degrees of external financial dependence. Political processes and external pressures applied by the IMF or the World Bank should also help to mitigate these concerns.

In column 3 of Table A.3 we re-estimate Equation 1 and include the vector of macro control variables from the country-level regressions. While the sample size is significantly reduced, the coefficient for the interaction between liberalization and *D(competitive bank)*

remains significantly positive. To further address reverse causality issues, we study the dynamic effects of liberalization reforms on the loan supply of domestic banks. In columns 4 and 5 of Table A.3 we replace the liberalization index with four variables: $Before_0$ takes the value of the $Event$ variable in the reform year and the pre-reform value of the $Event$ variable in all other years. $Before_1$ is equal to $Before_0$ forwarded by one year, and $After_1$ is equal to $Before_0$ lagged by one year. Finally, $After_2$ is equal to the $Event$ variable lagged by two years. If the liberalization reforms were endogenous to the development within the domestic banking sector, we should see significant changes in the lending behavior of domestic banks prior to the reform. Table A.3 shows that this is not the case: The coefficient for $Before_1$ is insignificant for both uncompetitive (column 4) and competitive (column 5) domestic banks.[30] Hence, the decision to liberalize was not driven by current developments in the domestic banking sector, which assuages any remaining concerns of biases driven by endogeneity.

5.3 Concerns regarding alternative events

We also control for other reforms that took place in our sample countries that might have an influence on our results. We include indices for creditor rights and capital account liberalization that are obtained from papers by Djankov et al. (2007) and Abiad et al. (2010), respectively. Column 6 of Table A.3 provides estimation results for the bank-year observations where both indices are available. As expected, the coefficient for creditor rights is positive and significant at the 1 %-level. Improvements in the protection of creditors induce an increase in the individual bank's supply of credit. In contrast, capital account liberalization does not have an influence on the loan supply of the average domestic bank, as indicated by the negative but insignificant coefficient. Importantly, the inclusion of the two indices does not affect our results on the competitiveness of domestic banks; the interaction remains significant at the 1 %-level.

5.4 Concerns regarding the efficiency classification of domestic banking markets

A potential concern with using ROA as a measure for a bank's ability to compete could be that this measure is influenced by market concentration. I.e., banks operating in markets that are highly regulated or highly concentrated earn a higher margin and, therefore, a higher ROA. We accounted for this possibility by including the HHI index as a control variable in our main specifications. Nevertheless, as a final robustness check, we use alternative criteria to classify banks prior to liberalization. As shown in Table 1, Panel C, we obtain two variables from the World Bank's Global Financial Development Database: The aggregate cost-to-income ratio and the non-performing loan (NPL) ratio of each banking sector of our sample countries. We

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[30]As before we define a domestic bank as competitive if it has an ROA in the top quartile of all banks in our sample in the year prior to liberalization.

use the values of these variables in the year before liberalization in the respective country and split our sample into countries with a higher than median cost-to-income ratio or NPL ratio and those with a lower than median ratio.

Results for the country-level regressions with these alternative classification criteria are presented in Table A.4. Panel A shows that changes in financial structure are more pronounced in countries with a relatively high cost-to-income ratio, i.e., countries where domestic banks perform worse at the time of liberalization. While aggregate lending evolves similarly in both groups of countries (columns 1 and 2), those with a higher cost-to-income ratio see a greater decline in domestic lending (columns 3 and 4), and—correspondingly—a greater increase in the foreign market share (columns 5 and 6). In Panel B we use the aggregate non-performing loans ratio as a classification criterion. Again, we find that changes in financial structure are more pronounced in countries where bank performance at liberalization is rather low, i.e., countries where the non-performing loans ratio is relatively high. These countries see a much greater decline in domestic lending following the event, which translates into a higher increase in the foreign market share.

6   Conclusion

In this paper we posit and empirically demonstrate that the structure of a country's financial system impacts its industry structure through its influence on the allocation of credit to firms within and across industries. We exploit variation in domestic banks' ability to compete with foreign entrants at the time of liberalization across 26 emerging economies to generate significant changes to the structure of financial system – market share of foreign banks – in an economy. We then use within-country, cross-sectional variation at the bank level, at the industry level, and at the firm level to test our hypothesis. Following liberalization, arm's length foreign capital crowds out domestic lending in countries with weak domestic banking sector. In contrast, there is an increase in the aggregate supply of credit in countries with better developed domestic banks. We show that these differential changes in financial structure significantly affect the allocation of credit. There is a higher growth rate and lower growth volatility for industry sectors in economies with better developed domestic banks. These results are driven by more credit flowing to industries that are reliant on external financing and to smaller firms. In contrast, industry growth is lower and growth volatility is higher in countries with uncompetitive domestic banks. These results are driven by small firms. Thus, the timing of liberalization of credit markets interacts with the development of the incumbent domestic banking sector, and the change in financial structure it induces has implications on the allocation of credit and economic growth. Overall, our findings illustrate that only countries with sufficiently developed domestic institutions are able to harness the benefits

from liberalization.

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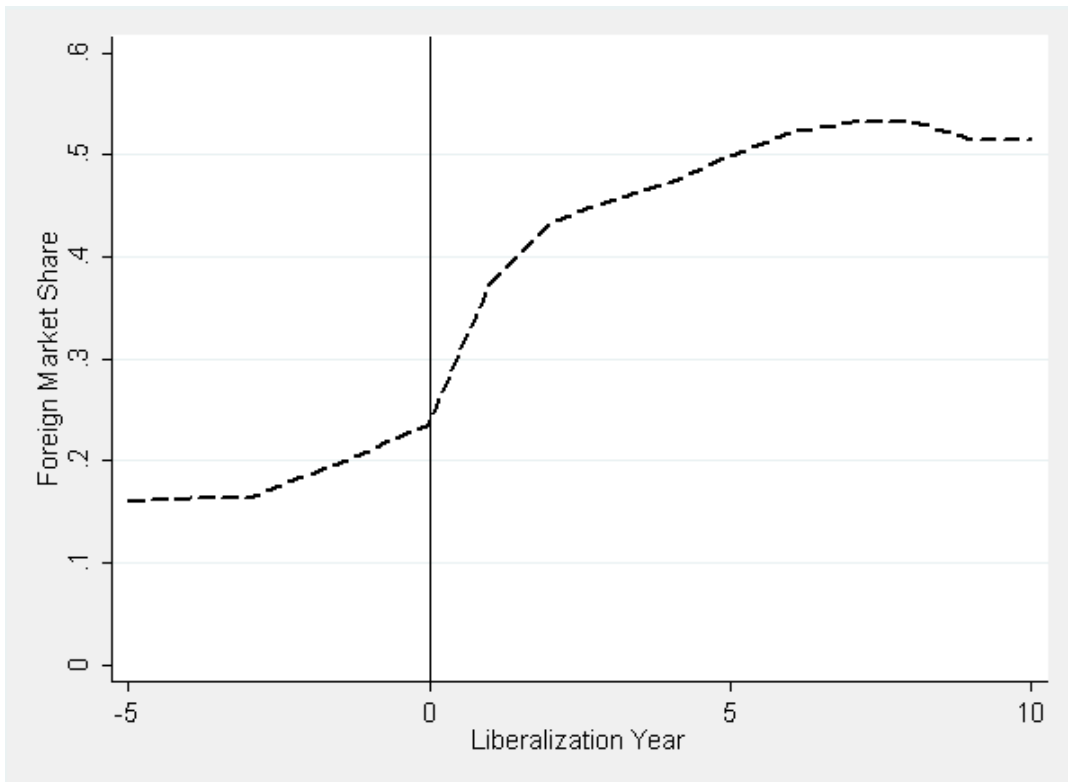
Figure 1: Impact of liberalization on financial structure

The figure align countries around their respective liberalization event (inidcated by the vertical line) and shows the development of foreign banks' market share in the average sample country.
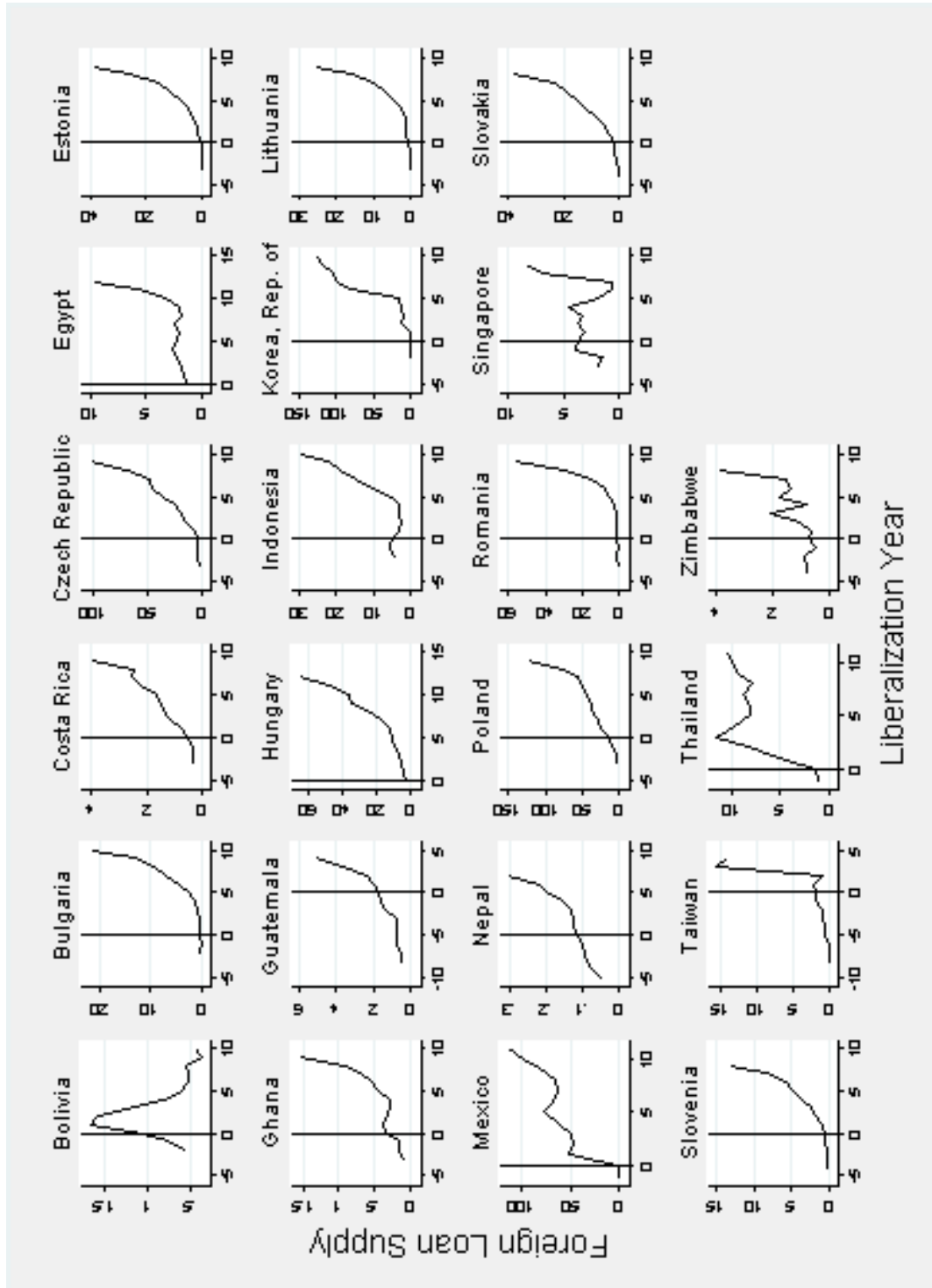
Figure 2: Impact of liberalization on foreign loan supply

The figure shows the development of foreign banks' loan supply within our sample countries around the liberalization events (indicated by the vertical lines). All values are in billions of U.S. dollars.
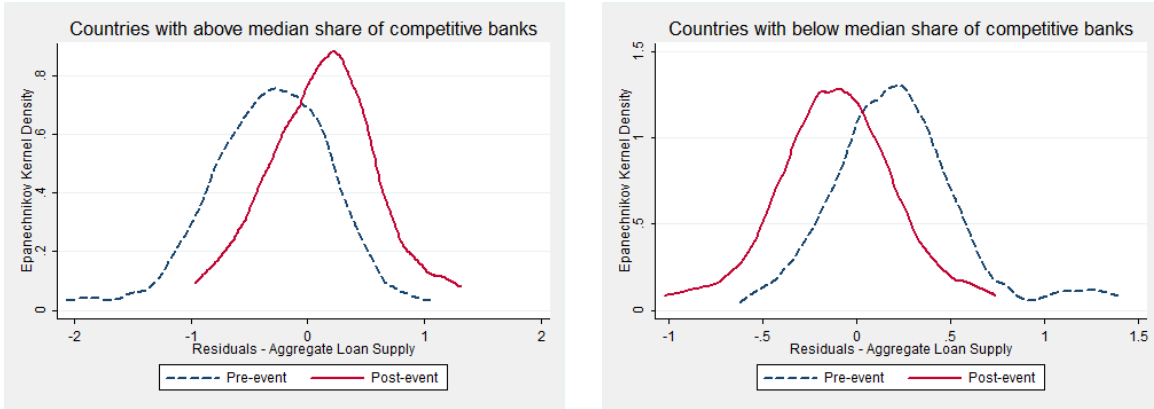
Figure 3: Aggregate loan supply

The figure plots Epanechnikov kernel densities of residuals from an estimation of the following equation: $\text{Log}(loansupply)_{jt} = \alpha_j + \alpha_t + \psi_k' C_{jt} + \epsilon_{jt}$, where $Log(loansupply)_{jt}$ is the logarithm of aggregate lending within a country-year, α_j and α_t are country and time fixed effects, respectively, and C_{jt} is a vector of macro control variables that includes GDP growth, inflation and the Hirschman-Herfindahl Index. The left panel shows countries with a higher than median share of competitive domestic banks at liberalization ($D(Initial\ ROA)=1$), and the right panel shows countries with a lower than median share ($D(Initial\ ROA)=0$).
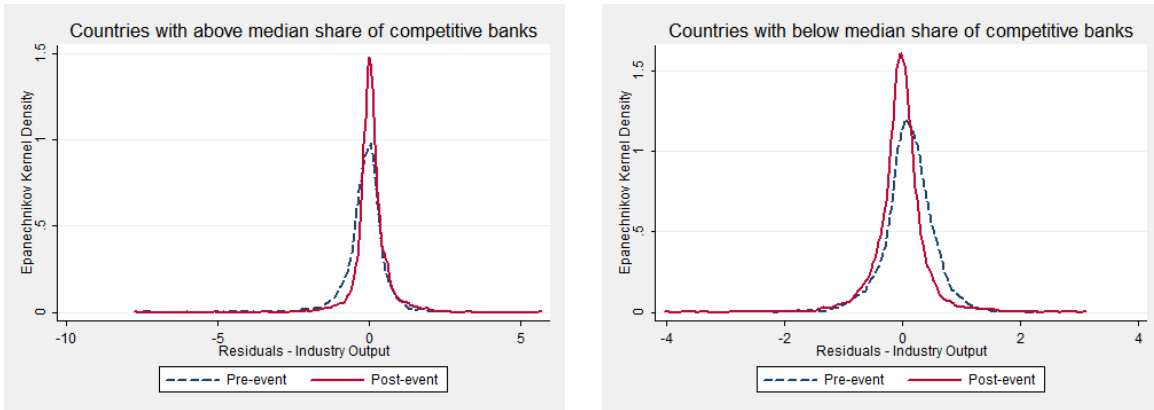
Figure 4: Industry output

The figure plots Epanechnikov kernel densities of residuals from an estimation of the following equation: $\log(Y)_{ijt} = \alpha_{ij} + \alpha_t + \epsilon_{ijt}$, where $log(Y)_{ijt}$ is the logarithm of country-industry output in a certain year, and α_{ij} and α_t are country-industry and time fixed effects, respectively. The left panel shows countries with a higher than median share of competitive domestic banks at liberalization ($D(Initial\ ROA)=1$), and the right panel shows countries with a lower than median share ($D(Initial\ ROA)=0$).

Table 1: Descriptive statistics

Panel A: Sample countries and liberalization events

|	Event Year	Index Value	Description	Source
Bolivia	1998	1→2	limitation of voting power of majority shareholders of foreign banks eliminated	Abiad/Mody
Brazil	—	1	—	Abiad/Mody
Bulgaria	1998	1→2	privatization process of former state-owned banks with particular focus on foreign investors	Miller/Petranov
Costa Rica	1999	0→1	establishment of fully-owned foreign subsidiaries allowed; establishment of branches of foreign banks still forbidden	Abiad/Mody
Czech Republic	1999	1→2	privatization process of government banks; large stakes sold to foreign banks	Bekaert/Harvey
Egypt	1996	1→2	49 percent limit on foreign investors' share in joint-venture banks removed	Abiad/Mody
Estonia	1999	1→2	consolidation of the banking market, large stakes of former state-owned banks sold to foreign investors	Bekaert/Harvey
Ghana	1999	1→2	majority foreign ownership of banks allowed	Abiad/Mody
Guatemala	2004	0→1	foreign banks allowed to establish local subsidiaries subject to the conditions of the Monetary Board	Abiad/Mody
Hungary	1996	1→2	foreign investors in the banking sector granted treatment equivalent to that given domestic financial institutions	Bekaert/Harvey
India	—	1	—	Abiad/Mody
Indonesia	1998	1→2	controls on foreign bank branching lifted, up to 85 percent equity participation allowed	Abiad/Mody
South Korea	1998	1→2	banks being restructured exempted from foreign ownership restrictions	Abiad/Mody
Lithuania	1999	1→2	removal of restrictions on foreign investment	Bekaert/Harvey
Malaysia	—	1	—	Abiad/Mody
Mexico	1997	1→2	removal of all restrictions on foreign bank entry	Hernndez-Murillo
Nepal	2001	1→2	limit on foreign ownership of banks increased from 49 percent to 66 percent	Abiad/Mody
Pakistan	—	1	—	Abiad/Mody
Poland	1999	1→2	national treatment for financial institutions from OECD member countries; removal of restrictions on purchase of bigger stock blocks by foreign investors	Bekaert/Harvey
Romania	1999	1→2	all credit operations extended by nonresidents to residents with a maturity exceeding one year were liberalized; privatization of former state-owned banks with focus on foreign investors	Bekaert/Harvey
Singapore	1999	1→2	40 percent limit on foreign investors total shareholding in local banks lifted	Abiad/Mody
Slovakia	2000	1→2	branches of foreign financial institutions allowed to acquire real estate to operate their business	Bekaert/Harvey
Slovenia	2000	1→2	relaxation of rules on foreign investment; foreign banks allowed to open branches	Bekaert/Harvey
Taiwan	2003	1→2	banking restrictions relaxed to make it easier for foreign banks to set up branches; foreign banks are accorded national treatment to enable them to compete with domestic banks on an equal footing	Abiad/Mody
Thailand	1997	1→2	limits of 25 percent of equity participation of banks by nonresidents raised to 100 percent based on case-by-case approach of the MOF's approval	Abiad/Mody
Zimbabwe	2000,2002	0→1→2	entry criteria objectified by the Banking Act amendment	Abiad/Mody

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Table 5.1 continued...

Panel B: Bankscope data

Country	Banks	Observations	Total assets	Total loans	Market share	ROA	$\frac{\text{Equity}}{\text{Total assets}}$	$\frac{\text{Liquid assets}}{\text{Total assets}}$
Bolivia	10	90	348	221	0.098	0.22	0.11	0.16
Brazil	78	581	4,086	1,381	0.014	2.13	0.34	0.22
Bulgaria	9	76	504	261	0.017	1.86	0.44	0.17
Costa Rica	25	182	311	174	0.054	2.34	0.16	0.21
Czech Republic	15	85	3,755	1,604	0.050	-0.28	0.36	0.10
Egypt	19	201	2,945	1,292	0.053	1.11	0.32	0.09
Estonia	7	27	1,964	1,431	0.072	1.58	0.26	0.13
Ghana	6	56	169	68	0.079	3.36	0.44	0.14
Guatemala	22	251	283	140	0.026	-0.64	0.18	0.10
Hungary	7	53	2,106	1,257	0.080	0.87	0.3	0.13
India	63	740	5,448	2,620	0.017	0.83	0.19	0.07
Indonesia	61	336	1,820	841	0.021	-0.25	0.31	0.11
Korea Rep. of	29	226	30,695	19,260	0.047	0.01	0.11	0.05
Lithuania	6	40	949	621	0.067	-0.30	0.3	0.14
Malaysia	25	200	6,369	3,850	0.050	1.09	0.27	0.10
Mexico	14	87	4,871	2,888	0.027	0.23	0.28	0.22
Nepal	7	78	168	79	0.092	1.39	0.27	0.07
Pakistan	17	192	1,723	848	0.048	0.60	0.26	0.09
Poland	17	124	2,800	1,376	0.024	1.25	0.22	0.14
Romania	8	56	1,227	605	0.063	0.63	0.43	0.17
Singapore	16	119	14,851	7,368	0.103	1.40	0.24	0.20
Slovakia	6	27	1,906	829	0.019	0.37	0.37	0.10
Slovenia	15	148	1,321	738	0.066	1.01	0.25	0.13
Taiwan	44	487	17,080	9,672	0.023	0.38	0.15	0.10
Thailand	9	90	9,763	6,531	0.093	-0.92	0.13	0.11
Zimbabwe	7	52	663	225	0.080	7.12	0.25	0.11

Table 5.1 continued...

Panel C: Macro data & efficiency estimates

Country	Initial ROA	D(initial ROA)	Initial cost to income ratio	Initial NPL ratio	Herfindahl index	Log(inflation)	GDP growth
Bolivia	0.00	0	0.66	0.05	0.13	1.75	3.62
Brazil	0.22	1	0.76	0.10	0.08	2.23	2.97
Bulgaria	0.36	1	0.69	0.27	0.14	2.78	3.47
Costa Rica	0.06	1	0.77	0.03	0.17	2.59	5.07
Czech Republic	0.01	0	0.67	0.22	0.16	1.57	3.47
Egypt	0.08	1	0.54	0.14	0.14	1.86	4.79
Estonia	0.95	1	0.81	0.02	0.46	1.97	7.32
Ghana	1.00	1	0.38	0.13	0.20	3.07	4.91
Guatemala	0.04	0	0.73	0.07	0.09	2.13	3.97
Hungary	0.03	0	0.61	0.05	0.14	2.34	3.76
India	0.02	0	0.60	0.14	0.08	1.92	6.99
Indonesia	0.01	0	0.88	0.49	0.10	2.43	3.76
Korea Rep. of	0.00	0	1.13	0.07	0.10	1.48	4.98
Lithuania	0.06	1	0.76	0.13	0.25	0.91	6.34
Malaysia	0.00	0	0.37	0.19	0.10	1.26	5.46
Mexico	0.08	1	0.73	0.11	0.16	2.34	2.97
Nepal	0.50	1	0.37	—	0.17	1.87	3.94
Pakistan	0.02	0	1.40	0.20	0.14	2.01	4.48
Poland	0.07	1	0.66	0.13	0.10	1.90	4.81
Romania	0.51	1	0.46	0.08	0.19	3.25	3.36
Singapore	0.00	0	0.35	0.05	0.24	0.64	6.57
Slovakia	0.00	0	0.70	0.14	0.17	1.99	5.31
Slovenia	0.05	1	0.53	0.07	0.19	1.98	4.35
Taiwan	0.01	0	—	—	0.06	0.74	4.79
Thailand	0.02	0	0.49	0.43	0.13	1.39	3.70
Zimbabwe	0.17	1	0.32	—	0.26	4.98	-2.65

Table 5.1 continued...

Panel D: List of ISIC Rev. 3 industries and corresponding characteristics

ISIC	Sector	External Dependence	SME Share	ISIC	Sector	External Dependence	SME Share
151	Meat, fish, fruits, vegetables	0.14	0.0382	261	Glass and glass products	0.53	0.0505
152	Dairy products	0.14	0.0382	269	Non-metallic mineral products	0.06	0.1417
153	Grain mill products, starches, animal feeds	0.14	0.0382	271	Basic iron and steel	0.09	0.0162
154	Other food products	0.14	0.0382	272	Basic non-ferrous metals	0.01	0.0476
155	Beverages	0.08	0.0404	281	Structured metal products	0.24	0.0998
160	Tobacco products	-0.45	0.0030	289	Other metal products	0.24	0.0998
171	Spinning, weaving, finishing of textiles	0.4	0.0281	291	General purpose machinery	0.45	0.1368
172	Other textiles	0.4	0.0281	292	Special purpose machinery	0.45	0.1368
173	Knitted and crocheted fabrics	0.4	0.0281	300	Office, accounting, computing machinery	1.06	0.0285
181	Wearing apparel except fur	0.03	0.0818	311	Electric motors, generators, transformers	0.77	0.0344
182	Dressing and dyeing of fur	0.03	0.0818	312	Electricity distribution and control apparatus	0.77	0.0344
191	Tanning, dressing and processing of leather	-0.14	0.1045	313	Insulated wire and cable	0.77	0.0344
192	Footwear	-0.08	0.0161	314	Accumulators, primary cells, batteries	0.77	0.0344
201	Saw milling and planing of wood	0.28	0.2137	315	Lighting equipment, electric lamps	0.77	0.0344
202	Wood products	0.28	0.2137	319	Other electrical equipment	0.77	0.0344
210	Paper and paper products	0.18	0.0303	321	Electronic valves, tubes	1.04	0.0309
221	Publishing	0.2	0.1632	322	TV/radio transmitters	1.04	0.0309
222	Printing	0.2	0.1632	323	TV/radio receivers	1.04	0.0309
231	Coke oven products	0.33	0.0926	341	Motor vehicles	0.39	0.0228
232	Refined petroleum products	0.33	0.0926	351	Shipbuilding	0.46	0.0656
241	Basic chemicals	0.205	0.0121	359	Transport equipment	0.31	0.0121
242	Other chemicals	0.22	0.0580	361	Furniture	0.24	0.0909
251	Rubber products	0.23	0.0315	369	Other manufacturing	0.47	0.1695
252	Plastic products	1.14	0.0609		Average	0.37	0.0707

Table 5.1 continued...

Panel E: Amadeus data

Country	Period	Observations	Firms	Assets	Debt	$\frac{Debt}{Assets}$	Sales	Tangibility	$\frac{Ebit}{Assets}$	D(small)	D(young)	D(exdep)
Bulgaria	1995-2004	2,823	627	11,300	2,546	0.22	11,400	0.53	0.06	0.71	0.24	0.50
Czech Republic	1995-2005	9,788	1,926	20,900	4,042	0.20	24,900	0.47	0.07	0.40	0.72	0.66
Estonia	1995-2006	1,044	175	7,816	2,325	0.28	10,300	0.52	0.09	0.63	0.58	0.58
Hungary	1995-2007	1,516	576	30,800	3,980	0.17	198,000	0.48	0.08	—	—	0.51
Lithuania	1995-2008	706	199	7,178	2,089	0.26	8,066	0.51	0.07	0.73	0.91	0.56
Poland	1995-2009	7,554	1,919	15,200	3,788	0.24	22,200	0.50	0.08	0.43	0.25	0.51
Romania	1995-2010	5,402	1,414	9,615	1,883	0.18	8,396	0.47	0.15	0.67	0.31	0.52
Slovakia	1995-2011	1,656	392	27,500	3,994	0.18	32,500	0.49	0.05	0.28	0.57	0.52

Panel A provides information on our sample countries and the coding of our event variable. Our sample period is from 1995 to 2007. Information on liberalization events is obtained from an extended version of the financial liberalization database used by Abiad and Mody (2005), the Bekaert and Harvey (2004) database on important financial, economic and political events in emerging markets and papers by Hernandez-Murillo (2007) and Miller and Petranov (2001). The liberalization variable takes values between 0 and 2, with 0 indicating tight restrictions on foreign entry, 1 indicating partial liberalization and 2 indicating full liberalization. Four of our sample countries (Brazil, India, Malaysia and Pakistan) were partially liberalized in 1995 and had no reform during our sample period. Panel B reports mean values of balance sheet and income statement items obtained from the Bankscope database. Values are in millions of U.S. dollars. Panel C shows estimates for the competitiveness of domestic banks on the country level that are calculated as follows: We first define a dummy that takes the value of 1 if the bank has—in the year prior to liberalization—an ROA in the top quartile of all banks in our sample ($D(competitive\ bank)$). We then calculate the share of competitive domestic banks at liberalization as the market share (in terms of total assets) of domestic banks that are competitive according to the definition above (column 1). We divide our sample into countries with lower and countries with a higher than median value of this variable (column 2). Instead of ROA, we alternatively use the initial cost to income ratio (column 3) or the initial non-performing loans ratio (column 4) as obtained from the World Bank. The panel further provides mean values for macro control variables by country. Panel D reports two industry characteristics used in the regression analysis. Column 1 reports the aggregated value of capital expenditures minus cash flow from operations over capital expenditures for U.S. industries in the 1980s as calculated in Rajan and Zingales (1998). Column 2 shows the share of total employment of companies with less than 20 employees within U.S. industries in the early 1990s as reported by Beck et al. (2006). Panel E reports mean values for for the firm balance sheet and income statement items as obtained from the Amadeus database. Values are in thousands of U.S. dollars. We report mean values for total assets, total debt, the ratio between the two, total sales, a measure of tangibility as defined by fixed assets to total assets, the ratio of EBIT to total assets and three dummy variables: $D(small)$ takes a value of 1 if the average firm size (as measured by total assets) prior to liberalization is lower than median, $D(young)$ takes a value of 1 if the average firm age prior to liberalization is lower than median, and $D(exdep)$ takes a value of 1 if the firm is an industry with a higher than median value of external financial dependence according to Rajan and Zingales (1998).

Table 2: Bank-level loans

	(1)	(2)	Log(loans) (3)	(4)	(5)	(6)
Event	-0.200	-0.292	-0.350*	-0.226		
	(0.185)	(0.177)	(0.181)	(0.161)		
Interaction (Event $\times$ Initial bank ROA)		0.100*				
		(0.053)				
Interaction (Event $\times$ D(competitive bank))			0.846***	0.496**	0.470**	0.316*
			(0.199)	(0.185)	(0.217)	(0.182)
Observations	4604	4604	4604	4604	4604	4604
Distinct banks	542	542	542	542	542	524
R-squared	0.245	0.253	0.261	0.340	0.430	0.602
Year effects	YES	YES	YES	YES	—	—
Bank effects	YES	YES	YES	YES	YES	YES
Country trends	NO	NO	NO	YES	—	—
Year-country interactions	NO	NO	NO	NO	YES	YES
Bank controls	NO	NO	NO	NO	NO	YES

The table reports coefficients for different specifications of the following equation: $Log(loans)_{ijt} = \alpha_i + \alpha_{jt} + \phi'B_{it} + \delta \times Initial\ bank\ ROA_i \times Event_{jt}) + \epsilon_{ijt}$, where i denotes the individual bank, j country and t time. Dependent variable in all regressions is the logarithm of the loan supply of private domestic banks. Variables of interest are the event variable, an interaction between liberalization and the bank's initial ROA (column 2) and and interaction between liberalization and a dummy variable taking a value of 1 if the bank has an ROA in the top quartile of all banks in the year before liberalization (columns 3-6). We use bank and year fixed effects, country-specific trends, or a full set of year-country interactions in order to control for both observed and unobserved heterogeneity. Time varying bank control variables include the bank's market share within the country, a solvency measure defined as equity over total assets and a liquidity measure defined as liquid assets over total assets. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Table 3: Aggregate, domestic and foreign lending

	Log(aggregate loans)			Log(foreign loans)			Log(domestic loans)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All countries	D(initial ROA)= 0	D(initial ROA)= 1	All countries	Less competitive	D(initial ROA)= 1	All countries	D(initial ROA)= 0	D(initial ROA)= 1
Event	0.054	-0.318**	0.419	0.654***	0.600*	0.705*	-0.428*	-0.978**	0.111
	(0.190)	(0.131)	(0.286)	(0.224)	(0.289)	(0.350)	(0.241)	(0.331)	(0.209)
Observations	338	169	169	328	162	166	337	168	169
Distinct countries	26	13	13	26	13	13	26	13	13
R-squared	0.69	0.683	0.721	0.698	0.684	0.705	0.425	0.412	0.502
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macro controls	YES	YES	YES	YES	YES	YES	YES	YES	YES

The table shows the impact of liberalization on aggregate (columns 1-3), foreign (columns 4-6) and domestic (columns 7-9) loan supply at the country level. Columns 1, 4, and 7 include the whole sample, columns 2, 5, and 8 include only the countries with a lower than median share and columns 3, 6, and 9 include only the countries with a higher than median share of competitive domestic banks at liberalization. Country and year fixed effects control for observed and unobserved heterogeneity across countries and over time. Furthermore, all regressions include GDP growth, inflation and the Hirschman-Herfindahl Index as time-varying macro control variables. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Table 4: Financial structure

	Foreign market share			Foreign bank ratio		
	(1)	(2)	(3)	(4)	(5)	(6)
	All countries	D(initial ROA)= 0	D(initial ROA)= 1	All countries	D(initial ROA)= 0	D(initial ROA)= 1
Event	0.164***	0.237**	0.094*	0.102***	0.145**	0.060**
	(0.057)	(0.102)	(0.048)	(0.034)	(0.062)	(0.027)
Observations	338	169	169	338	169	169
Distinct countries	26	13	13	26	13	13
R-squared	0.621	0.507	0.698	0.532	0.594	0.502
Year effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES
Macro Controls	YES	YES	YES	YES	YES	YES

The table shows the impact of liberalization on financial structure. The dependent variable is the market share of foreign banks (measured as the share of bank assets owned by foreign banks divided by all bank assets in the country) in columns 1-3 and ratio of foreign banks to all banks in columns 4-6. Columns 1 and 4 include the whole sample, columns 2 and 5 only the countries with a lower than median and columns 3 and 6 only the countries with a higher than median share of competitive domestic banks at the time of liberalization. We use country and year fixed effects in order to control for observed and unobserved heterogeneity across countries and over time. Furthermore, all regressions include GDP growth, inflation and the Hirschman-Herfindahl Index as time-varying macro control variables. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Table 5: Industry output

| | Log(output) | | | | | | | | |
| | All countries | | | D(initial ROA) = 0 | | | D(initial ROA) = 1 | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Event	0.096			-0.250*			0.463**		
	(0.164)			(0.138)			(0.196)		
Interaction (event × external dependence)		0.454***			0.473**			0.434**	
		(0.120)			(0.198)			(0.145)	
Interaction (event × SME share)			-0.014			-1.235***			1.364**
			(0.492)			(0.301)			(0.574)
Observations	10,520	8,799	8,606	5,690	4,742	4,634	4,830	4,057	3,972
Distinct country-industries	1,132	942	921	637	527	515	495	415	406
R-squared	0.334	0.485	0.466	0.365	0.511	0.493	0.336	0.464	0.449
Year effects	YES	—	—	YES	—	—	YES	—	—
Country-industry interactions	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-country interactions	NO	YES	YES	NO	YES	YES	NO	YES	YES
Differential (75th vs. 25th perc.)	—	16.1 %	-0.1 %	—	19.7 %	-7.3 %	—	15.4 %	8.8 %

The table shows how industry output is affected by bank liberalization. The dependent variable in all regressions is the logarithm of country-industry output. Columns 1-3 report results for the whole sample, columns 4-6 include only countries with a lower than median share of competitive domestic banks at liberalization, and columns 7-9 include only the countries with a higher than median share. Columns 1, 4, and 7 show estimation results for the following equation: $Log(Y)_{ijt} = \alpha_{ij} + \alpha_t + \delta \times Event_{jt} + \epsilon_{ijt}$, where i denotes industry, j country and t time. Country-industry interactions and time fixed effects account for both observed and unobserved heterogeneity. The remaining columns show how liberalization affects industries with different levels of external financial dependence and different shares of small and medium enterprises. Columns 2, 5, and 8 provide results for the following equation: $Log(Y)_{ijt} = \alpha_{ij} + \alpha_{jt} + \delta \times (External\ dependence_i \times Event_{jt}) + \epsilon_{ijt}$, whereas columns 3, 6, and 9 estimate the following equation: $log(Y)_{ijt} = \alpha_{ij} + \alpha_{jt} + \delta \times (SME\ share_i \times Event_{jt}) + \epsilon_{ijt}$. In addition to country-industry interactions these regressions include also year-country interactions that control for country-specific developments within a certain year (and absorb the event coefficient itself). Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Table 6: Growth volatility

	Output fluctuation		
	(1)	(2)	(3)
	All countries	D(initial ROA)= 0	D(initial ROA)= 1
Event	0.019	0.094**	-0.071*
	(0.036)	(0.036)	(0.034)
Observations	8,936	4,784	4,152
Distinct country-industries	957	520	437
R-squared	0.022	0.013	0.034
Year effects	YES	YES	YES
Country-industry interactions	YES	YES	YES

The table shows estimation results for the following equation: $Fluctuation_{ijt} = \alpha_{ij} + \alpha_t + \delta \times Event_{jt} + \epsilon_{ijt}$, where i denotes industry, j country and t time. The dependent variable is the fluctuation in the growth rate of industry output. All regressions include country-industry interactions and time fixed effects to account for both observed and unobserved heterogeneity. Column 1 report results for the whole sample, column 2 includes only countries with a lower than median share of competitive domestic banks at liberalization, and column 3 includes only the countries with a higher than median share. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Table 7: Firm-level evidence

	Log(debt)					Debt to asset ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Event	-0.388***	-0.560***	-0.490**	-0.534**	-0.437*	-0.046**	-0.056**	-0.051**	-0.050	-0.041
	(0.109)	(0.159)	(0.157)	(0.198)	(0.185)	(0.018)	(0.022)	(0.021)	(0.031)	(0.030)
Interaction (event × D(initial ROA))		0.313***	0.225***	0.151*	0.166*		0.019**	0.010**	0.009	0.007
		(0.063)	(0.060)	(0.071)	(0.072)		(0.006)	(0.004)	(0.005)	(0.004)
Interaction (event × D(exdep))			-0.115***					-0.009***		
			(0.014)					(0.001)		
Interaction (event × D(exdep) × D(initial ROA))			0.142**					0.017**		
			(0.048)					(0.006)		
Interaction (event × D(small))				0.031					-0.012*	
				(0.024)					(0.006)	
Interaction (event × D(small) × D(initial ROA))				0.261***					0.022**	
				(0.041)					(0.007)	
Interaction (event × D(young))					-0.123***					-0.021***
					(0.009)					(0.004)
Interaction (event × D(young) × D(initial ROA))					0.293**					0.011
					(0.110)					(0.017)
Log(sales)	0.476***	0.469***	0.470***	0.574***	0.580***	-0.007	-0.008	-0.008	-0.009	-0.008
	(0.050)	(0.050)	(0.051)	(0.061)	(0.058)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)
Tangibility	0.819***	0.822***	0.822***	0.724**	0.722**	0.027	0.027	0.028	0.014	0.016
	(0.213)	(0.213)	(0.213)	(0.237)	(0.244)	(0.032)	(0.032)	(0.032)	(0.034)	(0.036)
EBIT/Assets	-1.751***	-1.698***	-1.697***	-1.689***	-1.698***	-0.193***	-0.190***	-0.190***	-0.175***	-0.174***
	(0.066)	(0.069)	(0.069)	(0.121)	(0.113)	(0.013)	(0.015)	(0.015)	(0.016)	(0.016)
Observations	30,489	30,489	30,489	17,020	17,020	30,489	30,489	30,489	17,020	17,020
Distinct firms	7,228	7,228	7,228	2,755	2,755	7,228	7,228	7,228	2,755	2,755
R-squared	0.088	0.092	0.092	0.108	0.106	0.042	0.043	0.043	0.042	0.042
Firm effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

In this table we examine how firm debt taking and corporate capital structure are affected by liberalization. The dependent variable is the logarithm of a firm's total debt in columns 1-5 and the ratio of total debt to total assets in columns 6-10. Regressions include an interaction between liberalization and a dummy variable taking the value of 1 for countries with a higher than median share of competitive domestic banks at liberalization. Further, we define three dummy variables that take the value of 1 for firms a) in industries with above median external financial dependence according to the measure defined by Rajan and Zingales (1998); b) with above median average size (measured by total assets) prior to liberalization; c) with below median age prior to liberalization. These dummies are interacted with the event and the dummy indicating competitive markets. Furthermore, we include a measure of size (the logarithm of total assets), a measure of profitability (ROA), and a measure of tangibility (tangible assets over total assets) as time-varying firm controls. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Appendix

Table A.1: Firm level evidence—Robustness

	Debt to initial assets					Log(debt)	Debt to assets	Debt to initial assets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event	-0.157***	-0.223**	-0.221**	-0.220**	-0.213**	-0.557***	-0.057**	-0.223**
	(0.050)	(0.082)	(0.080)	(0.081)	(0.081)	(0.158)	(0.021)	(0.083)
Interaction (event × D(initial ROA))		0.137***	0.157***	0.068***	0.103***	0.309***	0.022***	0.136***
		(0.018)	(0.027)	(0.011)	(0.014)	(0.071)	(0.006)	(0.014)
Interaction (event × D(exdep))			-0.003					
			(0.008)					
Interaction (event × D(exdep) × D(initial ROA))			-0.039					
			(0.025)					
Interaction (event × D(small))				-0.012				
				(0.017)				
Interaction (event × D(small) × D(initial ROA))				0.127**				
				(0.038)				
Interaction (event × D(young))					-0.014*			
					(0.006)			
Interaction (event × D(young) × D(initial ROA))					0.095**			
					(0.039)			
Log(sales)	0.268***	0.264***	0.263***	0.257***	0.257***	0.467***	-0.007	0.262***
	(0.059)	(0.059)	(0.058)	(0.057)	(0.058)	(0.047)	(0.005)	(0.056)
Tangibility	0.382**	0.385**	0.382**	0.379**	0.375**	0.821***	0.032	0.408***
	(0.119)	(0.117)	(0.116)	(0.116)	(0.118)	(0.214)	(0.031)	(0.113)
EBIT/Assets	-0.591***	-0.554***	-0.554***	-0.549***	-0.552***	-1.662***	-0.188***	-0.550***
	(0.038)	(0.040)	(0.041)	(0.040)	(0.039)	(0.102)	(0.016)	(0.050)
Observations	17,020	17,020	17,020	17,020	17,020	30,489	30,489	17,020
Distinct firms	2,755	2,755	2,755	2,755	2,755	7,228	7,228	2,755
R-squared	0.215	0.224	0.225	0.228	0.226	0.143	0.093	0.283
Firm effects	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry-year interactions	NO	NO	NO	NO	NO	YES	YES	YES

This table provide robustness checks for the firm level results. Columns 1-5 repeat the the estimations shown in Table 7 and use the ratio of total debt to total *pre-event* assets as a dependent variable instead. Columns 6-8 include industry-year interactions in addition to firm and year indicators. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

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Table A.2: Selection of takeover banks

			D(takeover)			
	(1)	(2)	(3)	(4)	(5)	(6)
ROA	-0.006			-0.000		
	(0.006)			(0.021)		
Cost to income ratio		-0.005			-0.031	
		(0.011)			(0.047)	
Cost to asset ratio			0.156			-0.594
			(0.206)			(0.575)
Log(assets)	0.135**	0.129**	0.133**	0.167**	0.167**	0.156**
	(0.062)	(0.060)	(0.061)	(0.069)	(0.066)	(0.068)
Market share	-0.013	0.030	-0.002	0.002	-0.027	0.088
	(1.152)	(1.139)	(1.150)	(1.420)	(1.417)	(1.416)
Solvency	0.004	0.003	0.003	0.005	0.005	0.004
	(0.004)	(0.003)	(0.003)	(0.007)	(0.006)	(0.006)
Liquidity	0.056	0.059	0.059	0.820*	0.828*	0.798*
	(0.245)	(0.246)	(0.245)	(0.464)	(0.467)	(0.464)
Observations	6,452	6,440	6,452	760	760	760
Pseudo R-Squared	0.154	0.154	0.154	0.129	0.129	0.130
Year effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES

The table reports estimated coefficients and standard errors from probit models estimated with maximum likelihood. The dependent variable *D(takeover)* is a dummy that takes the value of one if a bank is taken over by a foreign bank during the sample period and zero otherwise. Columns 1-3 include all bank-year observation and the value of the explanatory variables in the respective year. In columns 4-6 we collapse the data on the bank level and use mean values of the explanatory variables. Standard errors adjusted for clustering at the bank level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Table A.3: Bank-level loans—robustness

	Log(loans)					
	(1) Mostly greenfield	(2) Mostly takeover	(3) All banks	(4) D(competitive bank)= 0	(5) D(competitive bank)= 1	(6) All banks
Event	-0.322	-0.405	0.045			-0.177
	(0.255)	(0.245)	(0.155)			(0.157)
Interaction (event	0.988***	0.654**	0.534**			0.722***
× D(competitive bank))	(0.292)	(0.233)	(0.221)			(0.189)
Before$_1$				-0.104	-0.253	
				(0.138)	(0.221)	
Before$_0$				-0.04	-0.28	
				(0.182)	(0.193)	
After$_1$				0.181	0.05	
				(0.179)	(0.131)	
After$_2$				0.227	0.323*	
				(0.271)	(0.186)	
Capital account liberalization						-0.015
						(0.074)
Creditor rights						0.850***
						(0.172)
Observations	2,474	2,130	2,742	2,065	677	3,477
Distinct banks	280	262	409	320	89	497
R-squared	0.257	0.278	0.486	0.528	0.556	0.129
Year effects	YES	YES	YES	YES	YES	YES
Bank effects	YES	YES	YES	YES	YES	YES
Macro controls	NO	NO	YES	YES	YES	NO
Bank controls	NO	NO	YES	YES	YES	NO

The table reports additional robustness checks for the bank level results reported in Table 2. In columns 1 and 2 we distinguish between markets were foreign banks entered mostly via greenfield investments and markets where foreign banks entered mostly via takeover. The specification in column 3 includes macro and time varying bank control variables, and in columns 4 and 5 we use lags and leads of the event variable in order to investigate the dynamics around liberalization, where column 4 includes only inefficient and column 5 includes only efficient domestic banks. Finally, column 6 controls for capital account liberalization and creditor rights. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.

Table A.4: Measures of bank efficiency—robustness

Panel A: Cost-to-income Ratio

	Log(aggregate loans)		Log(domestic loans)		Foreign market share	
	(1)	(2)	(3)	(4)	(5)	(6)
Event	0.226	0.243	-0.673	-0.090	0.289**	0.107**
	(0.341)	(0.168)	(0.409)	(0.234)	(0.094)	(0.044)
Observations	156	169	155	169	156	169
Distinct countries	12	13	12	13	12	13
R-squared	0.654	0.704	0.407	0.487	0.711	0.444
Year effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES
Macro controls	YES	YES	YES	YES	YES	YES

Panel B: NPL ratio

	Log(aggregate loans)		Log(domestic loans)		Foreign market share	
	(1)	(2)	(3)	(4)	(5)	(6)
	High NPL	Low NPL	High NPL	Low NPL	High NPL	Low NPL
Event	-0.027	0.279	-1.110**	-0.150	0.331***	0.154***
	(0.301)	(0.301)	(0.366)	(0.335)	(0.096)	(0.049)
Observations	156	143	155	143	156	143
Distinct countries	12	11	12	11	12	11
R-squared	0.669	0.656	0.427	0.511	0.669	0.650
Year dummies	YES	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES	YES
Macro controls	YES	YES	YES	YES	YES	YES

This table provides results for different definitions of the bank efficiency variables. Panel A uses the aggregate cost-to-income ratio while Panel B uses the non-performing loans ratio, where both variables are obtained from the World Bank and measured in the year before liberalization in the respective country. The dependent variable is the logarithm of aggregate loans in columns 1 and 2, the logarithm of total loans from domestic banks in columns 3 and 4, and the foreign market share in columns 5 and 6. Standard errors adjusted for clustering at the country level are reported in parentheses. * indicates statistical significance at the 10%-level, ** at the 5%-level and *** at the 1%-level.