Banking across borders ☆

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A R T I C L E   I N F O

A B S T R A C T

The international linkages between banks play a crucial role in today's global economy. Existing models explain these links largely on the basis of portfolio theory, in which banks diversify lending. These models have found limited empirical support and do not speak to several relevant dimensions of the data. They do not explain heterogeneity in the degree to which banks operate through foreign affiliates, fund their activities abroad or matter for local lending in foreign countries. This paper proposes a complementary theory of banking across borders that is based on elements of international trade theory. In the model, banking across borders arises because countries differ in their relative factor endowments and in the efficiency of their banking sectors. Based on these differences, the pattern of foreign bank asset and liability holdings emerges endogenously. This parsimonious model provides a rationale for the observed heterogeneity in foreign bank activities and is consistent with key patterns in the data.

1. Introduction

The financial crisis of 2007/2008 highlighted the pivotal role of international financial linkages between banks in the global economy.[1] Research in the cross-border banking literature predominantly relies on portfolio theory to explain these links.[2] Portfolio models assume that financial intermediaries invest abroad in order to diversify lending. There is, however, little empirical support for diversification in the data.[3] In addition, existing portfolio frameworks do not provide a rationale for the foreign liability holdings of banks and for the decisions of banks to operate cross-border or through foreign affiliates.[4] Accordingly, these models do not address three relevant dimensions of heterogeneity in the data. First, the extent to which banks operate through foreign affiliates varies substantially across banking sectors. Second, banking sectors differ in their foreign liability–asset gaps, a measure which has been related to the (in)stability of foreign bank operations. Third, there is considerable heterogeneity in foreign bank participation across countries, that is, foreign banks are differentially important in different countries.

This paper uses elements of international trade theory to propose a complementary conceptual framework explaining why and how international bank linkages are created. In the model, countries differ in their returns to capital as well as in the efficiencies of their banking sectors. These differences generate banking across borders through two mechanisms. First, banks channel capital to capital-scarce countries. At the same time, the more efficient banking sector expands by intermediating foreign deposits, whereas the less efficient banking sector contracts.

[1] Bank linkages matter for financial contagion and the transmission of macro shocks, for example. See Kaminsky and Reinhart (2000), Cetorelli and Goldberg (2012b), Kalemli-Ozcan et al. (2013) and Cetorelli and Goldberg (2012a).
[2] Exceptions are De Blas and Russ (2013), Ennis (2001), Eaton (1994), and Morrison and White (2009). These papers are discussed as part of the literature review in more detail.

[3] Aviat and Coeurdacier (2007) have found that banks invest more in countries that show a stronger positive correlation with domestic returns, a finding known as the "correlation puzzle".
[4] For example, recent work by Bruno and Shin (Forthcoming) based on portfolio theory explains cyclical fluctuations in international bank flows but does not address these aspects.

This way a cross-country pattern of bank foreign asset and liability holdings emerges endogenously.

This parsimonious model makes progress in several dimensions. First of all, it delivers a tractable theory of trade in banking services that endogenously pins down the cross-country exposures of banking sectors on both the asset and the liability side of banks' balance sheets.[5] The cross-sectional implications of the theory are consistent with conditional correlations in data from the Bank for International Settlements (BIS) and Deutsche Bundesbank. More efficient banking sectors hold more foreign assets and foreign liabilities in countries with less efficient banking sectors; and banks located in capital abundant countries hold less foreign liabilities relative to foreign assets in countries that are capital scarcer. Moreover, the model provides a common framework to explain heterogeneity in funding models, liability–asset gaps and foreign bank participation, aspects that have only been discussed from an empirical point of view. By deriving close theoretical equivalents to these objects observed in international banking data, it can guide future empirical research.

In the model, banks provide intermediation services, channeling capital from depositors to firms at a cost that reflects banking sector efficiency in the economy. Entrepreneurs who borrow from intermediaries have to pay this cost plus the interest rate paid out to depositors. The interest rate is endogenously determined by the capital–labor ratio and banking sector efficiency in the economy. In the open economy, two countries differ in relative factor endowments and banking sector efficiencies so that autarky interest rates and intermediation fees differ across countries.[6] Entrepreneurs have the option to borrow both from domestic and foreign banks. Banks in turn can raise deposits at home and abroad.

The model incorporates three additional elements. First, an entrepreneur who is served by a foreign bank has to pay a cost τ proportionate to the loan he takes. The lower τ is, the more freely capital can flow across borders: that is, the higher the degree of capital account openness. Second, if banks raise capital abroad, they incur cost t, which reflects the degree of banking sector liberalization. The lower the cost, the lower the barriers are to establishing a physical presence abroad. This interpretation implies that banks can extend loans cross-border/from home but can only raise deposits through foreign affiliates abroad. Finally, it is assumed that the more capital banks intermediate, the more capacity constrained and the less efficient they become.

Taking the additional cost of being served by a foreign bank into account, entrepreneurs minimize the cost of external funding, choosing the bank that offers the best combination of interest rate and service fee. When differences in efficiencies and endowments are large across countries relative to the transaction costs, trade in banking services occurs. In equilibrium, banking sectors invest and borrow across borders so that gross returns to capital and service fees are equilibrated.

It is useful to distinguish three types of banking across borders that can occur in equilibrium. If differences in returns are large, while there are no differences in efficiencies, the banking sector of the capital abundant country engages in *international banking*, investing domestic capital abroad. As a consequence it holds foreign assets but no foreign liabilities. If differences in banking sector efficiencies are large, but endowments are similar, the more efficient banking sector engages in *global banking*, raising capital abroad and investing this capital in the foreign market. In this case the banking sector holds both foreign assets and foreign liabilities. If a capital scarce country hosts a very efficient banking sector, its banks conduct *foreign sourcing*, raising capital abroad for investment at home. Accordingly, they hold foreign liabilities but no

foreign assets on their balance sheets. These three special cases illustrate how the model endogenously determines the cross-country foreign exposures of banking sectors. In general, banking sectors engage in two of the three activities simultaneously.

By theoretically deriving *global banking* and *international banking*, this paper rationalizes the empirical findings in McCauley et al. (2002) and McCauley et al. (2012), who show that different banking sectors follow the global and the international model to varying degrees.[7] At the same time, the model explains the two other dimensions of heterogeneity across countries that have been discussed by Cerutti (2013) and Claessens and Horen (2014a) for example: heterogeneity in foreign liability–asset gaps and in foreign bank participation. According to the model, banking sectors with intermediate efficiency that are located in capital abundant countries have the lowest ratio of foreign liabilities to assets. Foreign bank participation should be particularly high in capital scarce countries with inefficient banking sectors.

The model this paper proposes is simple, yet it yields rich predictions and provides a framework for thinking about banking across borders that is consistent with key correlations in the data. An extension shows that the predictions of the model are robust to allowing for interbank lending. The theory can serve as a basis for future research and can be used to develop models that incorporate additional features of the data, such as imperfect competition, bank heterogeneity and diversification.[8]

In addition to contributing to the literature on cross-border banking, the analysis also relates to the literature on international capital flows and financial frictions, highlighting two particular aspects.[9] First, the transaction costs banks face matter for equilibrium bank flows and for the allocation of capital across countries. Second, the relationship between openness as well as financial development of a country and capital flows is, in general, not linear. When a capital scarce country liberalizes its banking sector and domestic banks become more efficient, it can experience a capital outflow. This result depends on the market structure and the nature of the transaction costs banks face, micro-level aspects which deserve more consideration in future research.

1.1. More related literature

Most papers in the cross-border banking literature either rely conceptually on portfolio theory to explain banks' international linkages (Walter, 1981; Buch et al., 2014; Bruno and Shin, forthcoming) or the structure of foreign bank operations is exogenous (for example, Dell'Ariccia and Marquez (2006), Dell'Ariccia and Marquez (2010), Niepmann and Schmidt-Eisenlohr (2013). There are works that discuss different internationalization strategies of banks (see Aliber, 1984; Grubel, 1989; Williams, 1997; Berger, 2007) but only a few papers, in addition to this paper, propose alternative theoretical models that do not build on asset diversification to explain cross-border banking.

In De Blas and Russ (2013), a study of the impact of financial integration on loan pricing, firms send out loan applications randomly to a limited number of banks, also applying at foreign banks to minimize expected costs. In De Blas and Russ (2010), an earlier version, firms love variety in loans so that banks offer differentiated products just as manufacturing firms. In these papers, countries differ in the efficiency of their banking sectors but not in the return to capital. Ennis (2001) assumes that information problems are reduced when banks operate across regions. In Eaton (1994), financial centers emerge because authorities differ in their preferences for protecting debtors as opposed to creditors and in their need for seignorage revenues. In Morrison and White (2009), bank profits differ across countries due to differences in regulation so that banks seek to operate in the high-profit location.

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[5] This paper adds to the growing literature on services trade. See Francois and Hoekman (2010) for a review of recent developments in services trade research.
[6] This approach is close to Ju and Wei (2010), who are concerned with circular capital flows, a topic outside the scope of this paper. In their paper, financial underdevelopment of a country is circumvented in that capital leaves a country as investor capital and reenters as production FDI.

[7] See also McCauley et al. (2010).
[8] Niepmann (2013) introduces imperfect competition and bank heterogeneity into the framework developed in this paper.
[9] See, for example, Mendoza et al. (2009), Ju and Wei (2010) and Antras and Caballero (2009).