

The performance of foreign banks in Switzerland

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Abstract: The determinants of both profits and efficiency of foreign banks in Switzerland are modelled using extreme bounds analysis (EBA), with efficiency estimates being drawn from both stochastic frontier and data envelopment analysis (DEA). We find that profits in the host nation are largely determined by home nation characteristics, while controlling for time specific host (Swiss) effects efficiency is more the outcome of parent bank factors. Our results provide some support for the limited global advantage hypothesis of Berger, DeYoung, Genay and Udell, (2000). We argue that those foreign banks in Switzerland with larger parents are more likely to accept lower net interest margins in the hope of gaining market share and recouping lost profits at a later date. We also find that banks from more concentrated home nations are less likely to be profitable in Switzerland, while banks from more financially sophisticated nations are on average more profitable in Switzerland.

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1. Introduction

The multi-nationalisation of banking has resulted in a number of yet unanswered questions across several themes, one of which is: “What determines differences in foreign bank performance in the host nation?” The Swiss banking system has several valuable features for studying foreign banks. Switzerland is a developed European nation, yet not a member of the European Union; it has a long-held tradition of global banking with foreign banks and is an active participant in the global banking system. The term “Swiss banking” is a regularly used byword for privacy and secrecy in banking. Switzerland is a noted global banking centre (Brealey and Kaplanis, , 1996).¹ However, despite these attributes, studies of foreign banks in the Swiss banking system are relatively rare. Studies that consider European banking efficiency such as Altunbas, Gardener, Molyneux and Moore, (2001) or Cavallo and Rossi, (2001) have focused on EU members and did not include Switzerland in their sample. A study by Berger, (2007), excluding Switzerland, concludes that the market share of foreign banks is “... surprisingly weak in developed nations – particularly those in “Old Europe” ...” (pg 16). More recently Dietrich and Wanzenried, (2011) study the profits of Swiss banks, but do not directly address the issue of foreign banks. Dietrich and Wanzenried, (2011) also find that the number of studies on Swiss banking is limited, and as far as we are aware, there has not been a study to date which directly addresses the issue of multinational banks in Switzerland

We find this research gap surprising given the long-acknowledged role of Switzerland as an international financial centre and the economic importance of foreign banks in Switzerland. The foreign-owned banks in Switzerland account for 47% of the number of banks and 18% of all bank net income and contributed approximately 1.5% to Swiss GDP (Association of Foreign Banks in Switzerland, (2012)). An exception to this paucity of literature is provided by Rime and Stroh, (2003), who find for the 1996-1999 period that, on average, Swiss banks were relatively inefficient compared to the ‘best practice bank’ in Switzerland. Rime and Stroh, (2003, pg 2138) also find that foreign banks are, compared to the other Swiss banks, relatively cost-efficient, but relatively profit-inefficient. A benchmark survey by Berger, (2007) concluded that foreign banks are generally found to be less efficient than their

¹ Long Finance, (2015) ranks Zurich as the 6th most important global financial center in 2015, with a rating of 719 points out of a possible 1,000, New York, ranked #1, rated 785 points. Zurich as a financial center is classified by Long Finance, (2015) as a broad and deep global leader.

domestic competitors in developed nations and this result is worthy of further investigation. These findings provide a valuable starting point to expand upon previous studies by considering the source of differences in foreign bank efficiency and profitability in the Swiss banking system.

This paper will also offer the additional benefit of extending the seminal work of Sturm and Williams (2008, 2009, 2010), as well as Lensink, Meesters and Naaborg, (2008) and the subsequent work by Curi, Guarda, Lozano-Vivas and Zelenyuk, (2012). We will provide further evidence on those factors that determine differences in efficiency as well as profitability of foreign banks in the host market. For the reasons presented above, Switzerland provides a valuable environment to extend this research. As argued by Berger, (2007), single-country studies of this type provide the greatest potential to establish the reasons for differences in efficiency between domestic and foreign banks in a host nation. The recent study by Chen and Liao, (2011) considers the issues determining the differences in foreign bank net interest margins across a sample of 70 nations. This paper, with its focus upon efficiency as well as profitability (including net interest margins), also provides an opportunity to conduct a detailed examination of the issues raised by Chen and Liao, (2011) in a single-country study.

We find that the factors determining foreign bank profits and efficiency in Switzerland stem from different characteristics. Further, the characteristics determining foreign bank profits are dominated by home nation factors, especially home market concentration and GDP per capita. In contrast, foreign bank efficiency in Switzerland is primarily driven by parent bank characteristics, particularly parent size and parent net interest margins. This second result provides some confirmation for the limited global advantage hypothesis of Berger, DeYoung, Genay and Udell, (2000).

We also find that once home nation and parent bank characteristics are controlled for, the additional explanatory value of home nation dummy variables is limited. We argue that these results provide a valuable extension to the current multinational banking literature by providing an explicit test of which factors determine the performance of multinational bank in an important, (and comparatively under-researched), financial centre, Switzerland.

We also find evidence that foreign banks with larger parents are more likely to attempt to gain market share via lower net interest margins in the host nation, with an associated reduction in foreign bank efficiency. Our results suggest that such banks are seeking to increase market share at the cost of lower net interest margins. Consistent with Lepetit, Nys, Rous and Tarazi, (2008) such a strategy may be also associated with lower long term asset quality. We further argue that this lower profit and efficiency for banks with larger parents is due to the increased information asymmetries associated with size. We also find that banks from nations with a higher cost of financing (as measured by short-term interest rates) are likely to be more profitable in the host nation. We argue that this is due to such banks being more aware of the cost of inputs and being more vigilant in allocating resources globally and assessing the outcome of those investments.

Further, this paper finds that banks from more highly concentrated banking markets are less profitable in Switzerland. Thus, policies aimed at fostering national champions (via increased size and market concentration) are ineffective in the case of foreign bank profits in Switzerland. We also find that home nation financial sophistication is important in determining multinational bank performance in Switzerland. This result is in contrast to the Australian evidence of Sturm and Williams, (2008) and Sturm and Williams, (2009). Furthermore, banks with higher parent net interest margins tend to be less efficient in Switzerland. It is possible that this result represents either (i) the higher costs of and rarity of offering multinational retail banking (Guillen and Tschoegl, (1999) or (ii) higher parent bank risks and operating costs (Ho and Saunders, (1981). Given our other results we argue that the first of these alternatives is more likely.

The rest of this paper is structured as follows; the next section provides a focussed review of the literature relating to foreign bank efficiency as well as some profitability issues. Section 3 provides an overview of the Swiss banking system as well as a review of the limited number of studies on the Swiss banking system. Section 4 outlines the method to be used in estimating bank efficiency including the specification of bank inputs and outputs as well as the profitability measures that will be applied. Section 5 presents a discussion of the data. Section 6 discusses the results while the final section presents the conclusions.

2. Literature Review

The benchmark survey by Berger, DeYoung, Genay and Udell, (2000) finds that the body of evidence favours domestic banks over foreign banks in terms of efficiency in developed nations, whereas foreign banks are found to be more efficient than domestic banks in developing nations.² There are some exceptions to these findings: Beccalli, (2004) finds that UK and Japanese investment firms display superior efficiency to domestic investment banks in Italy. Berger, DeYoung, Genay and Udell, (2000) find that US banks are more efficient than domestic banks in three of five nations, and Sturm and Williams, (2004) conclude that foreign banks in Australia are more efficient than domestic banks. Berger, DeYoung, Genay and Udell, (2000) have developed two alternative hypotheses to explain these results (i) the home field advantage and (ii) the global advantage. Under the home field advantage hypothesis, foreign banks face diseconomies from factors such as cultural differences, geographical distance, staff monitoring and market structure.³ This explains the general outcome of inferior foreign bank efficiency. Alternatively, foreign banks can benefit from their global advantages. Under the first (general) form of the global advantage hypothesis, foreign banks from a number of nations are able to operate successfully in the host nation. However, the evidence to date has rejected this hypothesis. Under the ‘limited form of the global advantage hypothesis’ some banks from some nations are able to overcome the diseconomies resulting from the liability of foreignness and so operate effectively in the host nation. As discussed above, the results of some studies help to identify that a sub-set of banks from some nations operating in some locations are able to do so efficiently and profitably. The limited form of the global advantage hypothesis is therefore worthy of further investigation in alternative locations. Berger, (2007) indicates that the impact of home nation identity is important when considering foreign bank efficiency in host nations.

The studies by Sturm and Williams (2008, 2009, 2010) contribute to this literature by addressing the question “Why are some foreign banks able to overcome the diseconomies caused by the liabilities of foreignness?” These papers responded to the research agenda commenced by Berger, Buch, DeLong and DeYoung, (2004) (in the context of cross-border bank mergers) and extended the research to the issue of foreign bank efficiency in Australia. In each study the issues of host market, home market and parent bank characteristics were

² As will be discussed below Claessens and van Horen, (2012) argue that the results are a bit less uniform than this.

³ See Miller and Parkhe, (2002) for further discussion on the liability of foreignness.

considered within the theoretical frameworks offered by ‘comparative advantage’ and ‘new trade’ theories. Each paper addressed the question from different empirical perspectives, Sturm and Williams, (2008) apply parametric distance functions, principle component analysis and general-to-specific modelling; Sturm and Williams, (2009) adopt a method based around factor analysis and general-to-specific modelling, while Sturm and Williams, (2010) apply general-to-specific modelling and extreme bounds analysis. Sturm and Williams, (2008) find evidence that banks from the United States were less efficient in Australia. Parent credit-rating effects depended upon the specification of inputs and outputs when modelling bank efficiency. There was some inconsistency in findings with respect to the ‘defensive expansion (following client) hypothesis’ in that Sturm and Williams, (2009) find supporting evidence while Sturm and Williams, (2010) find that following clients reduced profit-creation efficiency.⁴ This contradictory evidence is most likely due to methodological differences. Evidence was found to support the limited global advantage hypothesis in the case of US banks (Sturm and Williams, 2009) and UK banks (Sturm and Williams, 2010). In all of these studies the incumbent banks’ market shares were found to act as a barrier to entry, reducing the foreign bank’s efficiency by requiring over-use of inputs to compete effectively with domestic banks. Given the inconclusive (and inconsistent) outcomes of these studies, it is worthwhile to extend this literature to different countries to provide a wider body of evidence in this area. Sturm and Williams, (2008) argue that there is a need for both additional in-depth single nation studies as well as multination studies before a more definitive conclusion can be drawn.

As surveyed by Claessens and van Horen, (2012), the literature comparing foreign and domestic bank performance focus on efficiency measures and to a lesser extent on profitability, and generally reports inconclusive results. Claessens and van Horen, (2012) argue that foreign bank heterogeneity is an important uncontrolled variable in these studies, but this criticism does not apply to the studies by Sturm and Williams as discussed above, which did control for bank heterogeneity.

Two studies have considered the impact of host governance conditions. Lensink, Meesters and Naaborg, (2008) find that higher host nation governance results in a lower negative impact on foreign bank efficiency than for banks from lower governance nations. Thus, the liability of foreignness is still present but reduced for higher governance nations. They also find that foreign banks from nations with lower institutional differences as compared to the

⁴ Williams, (2002), provides a survey of the defensive expansion hypothesis in banking.

host nation also have a lower liability of foreignness effect. In contrast, Claessens and van Horen, (2012) find that when host nation regulation is of lower quality, then, foreign bank performance is higher. This can potentially be explained by differences in the data sample, in that Claessens and van Horen, (2012) consider exclusively developing countries while Lensink, Meesters and Naaborg, (2008) have a wider (but not entirely apparent) sample.

In contrast, Curi, Guarda, Lozano-Vivas and Zelenyuk, (2012) focus on a single host nation (Luxembourg) and extend the themes established by Sturm and Williams for Australia. No evidence was found to support any host nation effects upon foreign bank efficiency in the host nation. Those banks with well capitalised and diversified parents tended to be more efficient in the host nation. It should be noted, however, that the Luxembourg banking system is unique as it is a developed economy with a banking system dominated by foreign banks, with few domestic banks which have a relatively small market share. This characteristic of Luxembourg stands in contrast to most other developed nations with a foreign bank presence; in that foreign banks tend to have a minority market share in developed nations (Berger, 2007b).

In contrast to the body of literature focusing upon foreign bank efficiency there are only few recent studies on profits of foreign banks. The most notable recent study is by Chen and Liao, (2011). Analysing the profitability of foreign banks in 70 nations they find that foreign bank profits in the host nation are a positive function of lower host competition and higher parent profits. Net interest-margins of foreign banks in the host nations were found to be improved by lower host GDP growth, higher host interest rates and higher host inflation rates, as well as host nation regulatory stringency.

The study by Chen and Liao, (2011) also provides some insights that were not explored previously by Sturm and Williams, (2009, 2010), in that it considers political variables such as control of corruption and regulator quality as well as bank supervision measures. It was found that banks from nations with high levels of legal and economic risk tend to be more profitable in the host nation, implying transfer pricing into less risky environments. It was also found that those banks from nations with a higher quality of home nation banking supervision tended to be more profitable in the host nation. Further, those banks from more concentrated/competitive banking systems were found to be more profitable in the host nation.

3. Swiss Banking

Overview of Swiss Banking

The Swiss banking system is based upon the principle of universal banking, which allows every bank to provide all banking services, including retail and corporate banking, asset management, underwriting and securities trading (including share trading). Within this system large universal banks with globally recognised brand names co-exist with smaller specialist niche and regional players. The Swiss National Bank classifies Swiss banks into ten categories: big banks, cantonal banks, regional and savings banks, Raiffeisen, and other banks; which are sub-divided into commercial banks, stock exchange banks, consumer credit banks, other banks and foreign banks. Lastly, there are private banks (Swiss National Bank, 2005).

The big banks are dominant players in the Swiss financial system in terms of both size and range of activities. In 2005 Credit Suisse and Credit Suisse First Boston merged their previously separate operations, leaving two big banks in Switzerland (see also Egli and Rime, 2000). The cantonal banks differ in size; with the largest offering a full range of financial services. They are state (canton) owned banks, most with a full state guarantee. Their activities are mainly focused on traditional savings and mortgage business in their home canton, although some have branches in other cantons or outside Switzerland. The regional and savings banks focus on traditional deposit taking and lending (both commercial and mortgage) in their home regions. The Raiffeisen banks are smaller rural co-operative banks that operate under the umbrella guarantee of the Swiss Union of Raiffeisen banks. Commercial banks are medium sized banks that offer universal banking services, including commercial loans, mortgage loans, asset management and investment banking. Stock exchange banks are smaller banks with a focus on brokerage, asset management and similar off-balance sheet activity. Consumer credit banks are small banks, that specialise in financing consumer durables, since 1999 there are only two of these banks (Swiss National Bank, , 2005, p 26). Other banks consists of a small group of banks which are heterogeneous in nature, with four such institutions in 2006 (Swiss National Bank, 2006).

Deposit insurance in Switzerland was established in 1984 as a private voluntary scheme with ex-post funding (Demirguc-Kunt, Karacaovlai and Laeven, (2008). The scheme initially covered the first CHF 30,000 of losses per depositor with no co-insurance. In 2005 this

scheme was made mandatory for all banks or securities dealers holding deposits. In 2008 the value insured was increased to CHF 100,000.⁵

Foreign banks are incorporated under Swiss law and as such are permitted to offer a full range of banking and financial services. Some foreign banks have chosen to take up this option, while others have selected more specialised operations. The main focus of foreign banks operating in specialised niches is either asset management or investment banking. Foreign banks with an asset management focus tend to have foreign clients. Private banks are not incorporated, and focus on asset management for both domestic and foreign clients. They are not required to publish financial statements and their owners are fully liable for the debts of the bank.

Swiss Bank efficiency

The most recent study of Swiss banking efficiency (Rime and Stiroh, 2003) focused on the issue of scale economies, particularly the different scale economies of larger and smaller Swiss banks. This was motivated in part by the consolidation of the Swiss banking system in the 1990s with the number of Swiss banks falling from 495 in 1990 to 372 in 1999 (Rime and Stiroh, 2003, p 2125). Further, traditional banking, earning net interest income, declined in comparison to fee-based activities such as underwriting, funds management and broking. Rime and Stiroh, (2003) employ three different specifications of inputs and outputs within the intermediation framework, considering both cost and profit efficiency. It was found that a broad definition of inputs and outputs that allowed for the universal nature of the Swiss banking system, including non-traditional activities, was the most appropriate. Rime and Stiroh, (2003) conclude that scale economies in Switzerland exist for small and medium sized banks, but not for larger banks, thus calling into doubt the economy-wide benefits from the larger universal banks. It was also concluded that the average Swiss bank efficiency scores demonstrates substantial inefficiency relative to the estimated best practice outcomes in Switzerland.

Studies prior to Rime and Stiroh, (2003) such as Sheldon and Haegler, (1993) and Sheldon, (1994) find evidence of economies of scale in Swiss banking, particularly for the smaller banks, and low average cost efficiency compared to the estimated Swiss banking best practice, decreasing with bank size. Rime and Stiroh, (2003) suggest that the prior findings of low average cost efficiency is due to the narrower definitions of inputs and outputs employed

⁵ Since 2012 the Swiss deposit insurance scheme has been administered by ESISUISSE (www.esisuisse.ch)

in previous studies that did not allow for the universal nature of Swiss banking and the importance of non-traditional income sources.

Swiss Bank Profits

The study by Dietrich and Wanzenried, (2011) considers the profits of Swiss banks, but did not focus on foreign bank efficiency or profitability in Switzerland. Their study finds that Swiss banks which are more operationally efficient are also more profitable. Interestingly they also find that those banks with above-average loan growth rates are more profitable in Switzerland⁶ and that higher funding costs reduce profits. Contrary to evidence such as from Stiroh, (2004) and Stiroh, (2006), Dietrich and Wanzenried, (2011) find that the banks which are less reliant on interest income are more profitable.⁷ Of particular relevance to this study is the finding that foreign banks in Switzerland, after controlling for all other effects, are less profitable than the domestic banks.⁸ Dietrich and Wanzenried, (2011) also demonstrate the pro-cyclicality of Swiss bank profits, consistent with the Greek results of Athanasoglou, Brissimis and Delis, (2008).

4. Model Development

Explanatory Variables

Based on the evidence above, this paper will consider the roles of both host and home nation characteristics in the determination of the efficiency and profitability of foreign banks in Switzerland. Sturm and Williams, (2008, 2009, 2010) considered the roles of both comparative advantage theory and new trade theory in the determination of foreign bank efficiency in the host nation, with somewhat mixed results. This paper will also propose variables that differentiate between these two theories. The traditional comparative advantage approach to international trade was first proposed by Ricardo, (1817) and has since become a standard framework for the consideration of cross-border transactions. In the context of this study, comparative advantage will be modelled primarily via consideration of the defensive

⁶ Kwan and Eisenbeis, (1997) argue that high growth rates in loans are associated with increased bank risk. Fahlenbrach, Prilmeier and Stulz, (2012) find that banks with higher growth rates are more likely to have performed badly in both of the financial crises considered in their study.

⁷ This result may reflect the findings of DeYoung and Rice, (2004) and Stiroh and Rumble, (2006) that higher levels of non-interest income are associated with higher bank risk.

⁸ The dummy variable representing foreign ownership was negative and significant. Unlike the current study Dietrich and Wanzenried, (2011) do not focus on modelling foreign banks specifically.

expansion hypothesis that banks follow their clients abroad. This paper will consider the role that home nation imports and exports have in the determination of foreign bank performance in the host nation. Generally the defensive expansion hypothesis is supported in the case of foreign bank size in the host nation, but not for profitability (Williams, 2002). In the case of foreign bank efficiency, the results, as discussed above, are somewhat less conclusive and one aim of this paper is to shed further light on this issue.

Host Nation:

The new trade theory approach to cross border-flows emphasises the importance of similarities in determining the home and host nation of international investment. Sturm and Williams, (2009, 2010) apply a number of measures of similarity, including differences between home and host GDP growth, an index of similarity of real GDP and an index of similarity of real GDP per capita. The two indices of similarity employ a method developed by Berger, Buch, DeLong and DeYoung, (2004), which measure (in the case of real GDP) similarity as $[1 - (\text{absolute value}(\text{home real GDP} - \text{real host GDP}) / \max [\text{home GDP}, \text{host GDP}])]$. This index has a value of between 0 and 1 with 1 indicating identical real GDP. As a further measure of similarity, a dummy variable to reflect commonality of language (including English) will also be employed.⁹

As a further test of the relevance of new trade theory to multinational banking this study will also include a measure of distance between home and host nation capitals in air miles (logged).¹⁰ Given that many nations which border Switzerland (France, Germany, Italy and Austria), also have languages that are official languages in Switzerland, some collinearity between the distance and language measures is to be expected.

Home Nation:

A number of home nation characteristics can have an impact on the multi-nationalisation of its banks and banking system. As a first broad measure, this study will employ the KOF Globalisation index (Dreher, 2006). It would be expected that banks from those nations that have higher globalisation scores are more likely to be successful (higher performing) in the host nation. The second home nation effect that will be considered in this study is the impact

⁹ Sturm and Williams, 2009, 2010) also consider a language dummy in their studies but found it to be highly collinear with nationality dummy variables. In the interests of examining the limited global advantage hypothesis Sturm and Williams, 2009, 2010) omit the language dummy variable from their models.

¹⁰ Note that Hondroyiannis and Papapetrou, (1996) find that this relationship was non linear.

of home nation currency volatility versus the Swiss Franc. As currency volatility increases the risk of receiving a required rate of return and also reduces the certainty of making the correct resource allocation decision ex-post, it would be expected that those banks from nations with higher currency volatility would have lower measured ex-post performance.

Chen and Liao, (2011) find that those banks from countries with high economic risks and poor economic and legal structures are less profitable in the host nation. Following this evidence we will examine the impact of parent country risk and governance on the efficiency of foreign banks in Switzerland. The World Bank Governance indicators (available at www.govindicators.org) provide an aggregate measure of country governance and rule of law and allow us to determine whether these parent nation characteristics have any important impact on measured efficiency in the host nation.

The efficiency studies of Sturm and Williams, (2008, 2009, 2010) find that the host nation bank market concentration acted as a barrier to entry to foreign banks in Australia. The multinational profit study of Chen and Liao, (2011) finds that those banks from less competitive banking markets were less profitable. From this evidence we will argue that the parent nation banking structure has an important influence on host nation performance. Accordingly, we will consider the impact of banking market concentration in the parent nation as measured by the market share of the ten largest banks in each home nation. As a further measure of home nation financial efficiency we will employ home GDP per capita. As argued by Buch and DeLong, (2004) and Berger, Buch, DeLong and DeYoung, (2004) those nations with higher levels of GDP per capita generally have more efficient financial systems and were more successful in exporting efficient financial practices into host nations via mergers and takeovers.

As an additional control for host nation effects, we will employ several alternative measures of host nation interest rates. These represent the opportunity cost of funds at the parent level. It is not entirely clear whether those banks with higher home nation opportunity costs of capital will demonstrate superior or inferior performance in the host nation. It may be that those banks from nations with a high cost of capital will be vigilant in their allocation of resources and so will outperform in the host nation. Alternatively, banks from nations with high costs of funds will suffer a cost disadvantage and so underperform when compared to other foreign banks. Also, as argued by Chen and Liao, (2011), banks from nations with high levels of country risk choose to transfer resources out of those home nations in order to reduce their exposure to negative events. In the same spirit, banks from nations with high opportunity

costs of capital may choose to allocate resources to those locations where costs are lower (but it should be noted that returns are also potentially lower). However, an opposite argument can also be made in that those banks with high costs of capital also have high levels of return on capital and in those cases parent banks may choose to allocate higher levels of resources to those locations where the level of returns are higher.¹¹

Taxation of Multinational Banks:

The issue of taxes paid by firms operating across borders has generated considerable attention and controversy. Studies that have focussed upon multinational banking have argued that differences in national tax rates results in differences in loan loss provisioning (Chiorazzo and Milani, (2011), Hemmelgarn and Teichmann, (2014)), export of tax burdens (Huizinga and Nicodeme, (2006)), tax burden shifting (Albertazzi and Gambacorta, (2010), Huizinga and Laeven, (2008), Demirguc-Kunt and Huizinga, (2001)) differences in organisational form (Miller and Parkhe, (1998), Cerutti, Dell'Aracca and Peria, (2005)) and differences in capital structure (Hemmelgarn and Teichmann, (2014), Gu, Mooij and Poghosyan, (2015)). Sadiq, (2014) argues that multinational banks are prominent users of tax havens. However, Berger, (2001, pg 101) argue against transfer pricing by multinational banks, and Gu, Mooij and Poghosyan, (2015) argue that tax shifting effects are smaller than the impact of tax deductibility of debt. Thus, there is some ambiguity about the impact of taxes upon the profits of foreign banks in host nations.¹² Given that Palan and Nesvetailova, (2013) have argued that Switzerland is a well-known tax haven, it is important to control for the potential impact taxes have upon the profitability and efficiency of foreign banks in Switzerland. This paper will follow the arguments presented by Lee and Swenson, (2012) that the different national rules defining taxable income are as important as the national nominal tax rate, and as a result the effective tax rate paid by the foreign bank is a more accurate measure of the effective tax burden. Accordingly we will include measures of both the effective tax rate paid in Switzerland as well as the effective tax rate paid by the parent of the foreign bank.

¹¹ As argued by Stiroh and Rumble, (2006) bank management may be more focused upon absolute levels of returns rather than risk-adjusted returns and so misallocate resources.

¹² Albertazzi and Gambacorta, (2010) argue that increased tax rates increase the loan rate but not the deposit rate, and the overall impact on net interest margins is indeterminate.

Performance Measures

This paper will consider both the efficiency and profitability of foreign banks in Switzerland. Profits will be considered using indicators such as return on assets (ROA), return on equity (ROE) and net interest margins (NIM). Efficiency will be estimated using both parametric frontier estimation as well as non-parametric data envelopment analysis (DEA). We will use the intermediation approach to bank production and, following Rime and Stiroh, (2003), include both intermediation-based and fee-based items as bank outputs. In the DEA model, banks will be considered as using deposits and personnel expenses to produce loans and contingent liabilities. This model can be considered as a parsimonious model that has the benefit of maximising the available data in terms of degrees of freedom. Following Maudos, Pastor, Perez and Quesada, (2002), cost of personnel will be measured as staff expenses as percentage of total assets. This approach has the advantage of increasing the available degrees of freedom. As discussed by Maudos, Pastor, Perez and Quesada, (2002), such a measure reflects the labour productivity adjusted labour cost per worker, and is a common formulation when employing *BankScope* data.¹³ The second measure of cost of inputs will be the cost of deposits; measured as interest expenses / total deposits. This differs from that used by Rime and Stiroh, (2003), but has the advantage of increasing the available degrees of freedom, and is closer to the measure employed by Maudos, Pastor, Perez and Quesada, (2002).

The efficiency estimates drawn from the stochastic frontier are based on using total deposits, personnel expenses and interest expenses as inputs, with the prices of personnel and deposits calculated in the same manner as for the DEA. Outputs will be measured as loans and contingent liabilities, consistent with the DEA-based estimates.

Method

Following Sturm and Williams, (2008, 2009, 2010), efficiency estimates will be calculated for all our sample banks operating in Switzerland (as detailed below), both foreign and domestic. This method will ensure that the efficiency estimates for the foreign banks fully represent the impacts of any negative externalities resulting from the liability of foreignness (Berger et al, 2000; Miller and Parkhe, 2002) . In the second stage of this study, foreign bank net interest margins, return on equity, return on assets and efficiency estimates (both parametric and non-

¹³ In contrast Rime and Stiroh, (2003) use labour cost divided by employee numbers. As pointed out by Maudos, Pastor, Perez and Quesada, (2002, page 43, footnote 10) the estimate of employee cost we apply in this study is usually applied when employing *BankScope* data.

parametric) will be used as dependent variables in extreme bounds analyses (EBA). The independent variables used in the EBA estimation will be based on the model development discussed previously.

Technique: Data Envelopment Analysis (DEA)

DEA is a non-parametric linear programming method, which does not require input or output prices in order for a best-practice production frontier to be identified. The best practice frontier is identified as a piece-wise linear composite of observed best practices, given the specification of inputs and outputs.¹⁴ The outcome is to produce a convex production frontier (Berger and Humphrey, 1997).¹⁵ DEA generates a within-sample efficiency score between 0 and 1, with 1 being most efficient. One benefit of applying DEA is that it does not require the assumption of a specific functional form in order to generate an estimate of bank efficiency. An additional benefit is that prices of inputs are not necessary to obtain a within-sample measure of each bank's relative efficiency. Furthermore, this method allows for firms to use multiple inputs to generate multiple outputs and so allows for the use of different production technologies to produce a set of outputs. Thus, unlike traditional ratio based performance analysis (such as net interest margins) it allows for the multi-product nature (and multiple product choices) of the banking firm. However, this benefit comes with a downside, as DEA will assume that all deviations from the observed best practice frontier to be inefficiency rather than random effects or errors.

Technique: Stochastic Frontier Analysis (SFA)

To allow for random errors and thereby distinguish between noise and inefficiency (Canhoto and Dermine, , 2003), we apply the parametric stochastic frontier approach developed by Battese and Coelli, (1992) that allows for time-varying technical efficiency to reflect the impact of technology shifts and other time-dependent effects. This approach applies maximum likelihood estimation to a translog production function using, in our case, multiple outputs, netputs¹⁶ and input prices. The panel-specific inefficiency term is thereby modelled as a truncated-normal random variable multiplied by a specific function of time. The idiosyncratic error term is assumed to have a normal distribution.

¹⁴ See, for example, Coelli *et al* (1998) Chapter 6.

¹⁵ Berger and Humphrey (1997) identified over 60 studies that have applied DEA to the banking industry.

¹⁶ Quasi fixed inputs or outputs.

Technique: Extreme Bounds Analysis (EBA).

When trying to explain the developments in these different measures of foreign bank performance in Switzerland, we have several different possible specifications – i.e. choices of explanatory variables – that we could employ. As discussed in previous studies such as Leamer, (1983), Levine and Renelt, (1992) and Sala-i-Martin, (1997), parameter results can be sensitive to the choice of variables included in the models. In this case we will proceed from the basis of a general model that includes controls for both year and country effects as well as the different organisational forms adopted by foreign banks in Switzerland. From this basis, an additional variable of interest will be added to the model. At this point the robustness of the additional variable's relationship with the dependent variable will be tested. In this method a vector of up to three additional explanatory variables, based on the model development above, will be added to the model (including the additional variable of interest), until all alternative combinations of explanatory variables have been exhausted. In this manner a robust relationship between the explanatory variables and the dependent variable(s) can be established.

As argued by Temple (2000), it is rare in empirical research that we can say with certainty that one model dominates all other possibilities in all dimensions. In these circumstances, it makes sense to provide information about how sensitive the findings are to alternative modelling choices. EBA provides a relatively simple means of doing exactly this. Still, the approach has been criticized in the literature. Sala-i-Martin (1997) argues that the test applied poses too rigid a threshold in most cases. Assuming that the distribution of β has at least some positive and some negative support, the estimated coefficient changes sign if enough different specifications are considered. Moreover, instead of analysing just the extreme bounds of the estimates of the coefficient of a particular variable, we follow Sala-i-Martin's (1997) suggestion to analyse the entire distribution. Following this suggestion, we report not only the unweighted parameter estimate of β , but also the unweighted cumulative distribution function (CDF(0)), that is, the fraction of the cumulative distribution function lying on one side of zero.¹⁷

¹⁷ Sala-i-Martin (1997) proposes using the (integrated) likelihood to construct a weighted CDF(0). However, the varying number of observations in the regressions due to missing observations in some of the variables poses a problem. Sturm and de Haan (2001) show that this goodness of fit measure may not be a good indicator of the probability that a model is the true model, and the weights constructed in this way are not equivariant to linear transformations in the dependent variable. Hence, changing scales results in rather different outcomes and

5. Data

The data on Swiss banks and the parents of foreign banks were obtained from the *BankScope* database.¹⁸ Following Rime and Stiroh, (2003) private banks and Raiffeisen banks are excluded from the sample due to (i) lower reporting obligations for private banks reducing the availability of data and (ii) the co-operative nature of Raiffeisen banks reducing their profit maximisation goals. Our data covers the period 1998 to 2010, with the ultimate holding company in Switzerland for each bank being included, it was required that each bank reports at least 1,000 Swiss Francs (CHF) in assets for at least one year, together with at least one employee for at least one year. This set of search criteria results in an initial sample of 275 banks, with a total of 2,985 bank-year observations. This includes 112 foreign banks with 1,193 bank-year-observations. In some cases a bank has switched between specialisation categories over time. This results in some inconsistencies between Tables 1 and 2. Details of the sample are provided in Tables 1 and 2.

Tables 1 and 2: (Banks by organisational type)

We consider a number of measures of foreign bank performance in this study, including profitability measures: ROE, ROA, NIM; and efficiency measures. Our efficiency measures are estimated using both stochastic frontier estimation and DEA estimation. Our DEA estimates include both input- and output-oriented DEA estimates. Panel A of Table 3 has the all sample dependent variables, while Panel B of Table 3 has the Foreign Bank only dependent variables. Table 4 details the inputs and outputs used in the efficiency estimates. The correlation matrices in Table 3 show a negative correlation between profit measures and DEA based efficiency estimates, which is consistent with the study by Athanasoglou, Brissimis and Delis, (2008) which finds that DEA based efficiency estimates and bank net interest margins were negatively related. It was argued that banks have responded to falling net interest margins by shifting their focus to improving efficiency.

conclusions. We thus restrict our attention to the unweighted version. Furthermore, for technical reasons – in particular our unbalanced panel setup – we are unable to use extensions of this approach, like Bayesian Averaging of Classical Estimates (BACE) or Bayesian Model Averaging (BMA).

¹⁸ The databases Zephyr and Osiris were used in some cases to clarify issues such ultimate parent bank and nationality.

Tables 3 and 4. (ROA, ROE, NIM, Efficiency estimates, inputs and outputs)

Table 5 details the national composition of the foreign bank parents. Unsurprisingly the most important countries of origin are Germany, 11.5% of bank year observations (10.2% of bank observations), and France (11.3% of bank-year observations and 12.7% of bank observations) followed by the United States (11.2% [bank-year] and 9.3% [bank]), then Italy (8% [bank-year] and 8.5% [bank]) the United Kingdom (6.9% [bank-year] and 5.9% [bank]), the Netherlands (6% [bank-year] and 6.8% [bank]) and Israel (6% [bank-year] and 5.9% [bank]).¹⁹

Table 5 (Nationality of origin: Foreign banks)

Table 6 details the home nation and parent bank characteristics that we will use in our model as well as the source of each variable.

Table 6 (Parent bank and home nation details.)

6. Results.

Impact of bank type and specialisation

Table 7 (Panel A) shows the average differences in our performance indicators between different organisation types of banks operating in Switzerland. Furthermore, it reports p-values of t-tests assuming unequal variances to determine whether these differences are significant. It is found that foreign banks overall are more profitable, but less efficient than the incumbent Swiss banks when using DEA estimates, but more efficient when using stochastic frontier estimates. There is some variation from this general result according to organisational type adopted by the incumbent bank. The finding that foreign banks in

¹⁹ In this case bank-year refers to the number of annual observations across all banks for that nation, while bank observations refers to the number of banks from that nation as a total of all banks in the sample.

Switzerland are significantly less efficient than the domestic incumbent banks (DEA) is in accord with the literature to date. The finding from the stochastic frontier estimates that foreign banks are more efficient in Switzerland is consistent with the earlier Swiss findings of Rime and Stiroh, (2003, pg 2138). The finding of higher profits explains why multinational banking persists in developed nations despite lower efficiency.

Table 7 about here.

Table 7 (Panel B) tests for the impact of specialist form a foreign bank can adopt once it operates in Switzerland. When operating in Switzerland a foreign bank can chose to operate in a specialised niche, with Commercial banking being the most common (50% of all foreign banks) the next most common business areas are Investment Banking (15%) and Private Banking (14.5%), see Table 2. It is generally found that these differences do not have an impact on profitability but have an impact on efficiency, although in some cases there is a difference in terms of net interest margins, with commercial banks yielding lower net interest margins possibly due to lower risk.²⁰

Extreme bounds analysis results

The results of the EBA are shown in Table 8. Examination of the results shows that home nation effects are most apparent for foreign bank profits and net interest margins. In contrast, foreign bank efficiency is mainly related to parent bank characteristics. In discussing these results, we will consider those results with a CDF(0) value of over 95% as having a strong relationship with our variables of interest, consistent with Sturm and Williams, (2010). As some authors such as Sala-i-Martin, (1997) suggest using a lower CDF(0) value of 90% we will consider those variables as having a suggestive relationship with our variables of interest, and as such are worthy of further consideration in additional studies using different countries and different statistical techniques.

We find that parent nation banking system concentration is negatively related to host nation profits (ROA and ROE). With a CDF(0) value of 94% the results also suggest that parent nation market concentration also has a negative relationship host nation net interest margins.

²⁰ Commercial banks are more likely to lend with the underlying security of real property versus Investment banks and security houses which are more likely to provide loans secured against more volatile market securities.

This would seem to indicate that banks from nations with a higher degree of incumbency are less able to export competitive expertise to the host nation. Thus, increased national incumbency (as measured by higher market concentration) generates reduced multinational banking competitiveness. Banks from nations with more financially sophisticated and developed financial systems (as proxied by log of GDP per capita), are more able to successfully export this expertise to the host nation and operate profitably generating higher ROE and ROA.²¹ With a CDF(0) value of 93%, banks from larger nations, as measured by log GDP, are also more profitable (ROA), but also potentially experience lower NIMs (CDF(0) = 90%).

Consistent with New Trade Theory economic similarity is positively related to host nation return on assets, and has a positive relationship with ROE at a suggestive CDF(0) level of 94%.²²

[Table 8 about here.](#)

Defensive expansion (following clients), as measured by Swiss imports from the home nation, are positively associated with host nation net interest margins. This indicates that following clients abroad reduces client-specific information asymmetry (Williams, (2002), resulting in a more profitable intermediation-based relationship. However, as will be discussed below, not all aspects of cross-border intermediation services increase observed performance in the host nation. Likewise host nation (Swiss) net interest margins are possibly higher for banks from nations with higher short term interest rates with a CDF(0) value of 93%. This result suggests the foreign banks operating in Switzerland are seeking to escape the negative impact of high home short term interest rates by raising lower cost liabilities offshore.

We also find that those foreign banks in Switzerland with a larger parent have lower NIMs and are less efficient (DEA). This result is consistent with the domestic net interest margin studies of Maudos and Guevara, (2004) and Williams, (2007). As discussed by Williams, (2007), there are several possibilities to explain this outcome, (i) banks experience declining returns to scale in terms of net interest margins globally, or (ii) larger banks are more willing

²¹ There is some evidence that the DEA efficiency of foreign banks in Switzerland is reduced by home nation GDP per capita (CDF = 94% and 94%)

²² Also supportive of New Trade Theory is the finding (CDF=91% and 90%) that increased distance from Zurich is associated with lower DEA efficiency. However, foreign bank net interest margins in Switzerland are increased by distance from Zurich (CDF= 91%). This last result may represent a distance related substitution effect between international and multinational banking as discussed in Williams, (2002)

to sacrifice net interest margins in the shorter run to achieve longer run market share. It is also possible, following the arguments of Lepetit, Nys, Rous and Tarazi, (2008) and Lepetit, Nys, Rous and Tarazi, (2008), that foreign banks operating in the host nation are willing to sacrifice net interest margins to obtain fee income and this outcome is more likely in the Swiss case for foreign banks with larger parents.

This argument is supported by the finding that those foreign banks in Switzerland who have parent banks with higher levels of loan loss reserves (lower asset quality) have lower DEA efficiency in Switzerland. This result also provides support for the strong possibility of decreasing returns to scale in multinational banking. It could well be that those multinational banks that are larger and therefore more complex, resulting in higher information asymmetries, suffer from reduced profitability and efficiency as an outcome of this complexity, which is also reflected in reduced asset quality. This argument may explain why the KOF index of globalisation is associated with reduced host nation efficiency (DEA). It would be expected that banks from nations which are more global in outlook are more likely to possess attributes that overcome the liabilities of foreignness. However, this study finds the opposite, in that banks from nations with higher levels of globalisation are less efficient in Switzerland. It may be that the globalisation index is reflecting some aspects of complexity due to globalisation. Further studies of the relationship between complexity, national globalisation and the performance of multinational banks in the host nation will be needed to bring clarity to this issue.

In the case of foreign bank efficiency in Switzerland we find that foreign banks with larger parents experience lower efficiency (DEA). This result provides some support for the previous discussion of decreasing returns to scale in multinational banking. It could well be that those multinational banks that are larger and therefore more complex, resulting in higher information asymmetries, suffer from reduced profitability and efficiency in their offshore operations as a result of this complexity. Likewise those banks with parents holding lower quality loan portfolios (higher loan loss reserves), are less efficient in Switzerland (DEA). Parent bank expertise in providing intermediation services in the home nation, as measured by home net interest margins, is negatively associated with efficiency (stochastic frontier) in the host nation. This result tends to confirm the arguments of Tschoegl, (1987) and Guillen and Tschoegl, (1999) that multinational retail banking is a relatively unusual. It is also possible that, consistent with the Ho and Saunders, (1981) model of net interest margins that parent banks with higher net interest margins are riskier or subject to higher costs (either operating cost or regulatory costs) and these factors reduce host nation efficiency. However, given that

we find no evidence that (i) parent bank operating costs or (ii) parent banks loan growth, acting as a proxy for parent bank risk (Kwan and Eisenbeis, (1997), Fahlenbrach, Prilmeier and Stulz, (2012)), are associated with performance in Switzerland, we will argue that the first possibility (barriers to multinational retail banking) is more likely.

Some parent bank attributes have a relationship with foreign bank performance in Switzerland that suggests further investigation is worthwhile. Foreign banks whose parent pay higher effective tax rates are marginally less efficient in Switzerland (CDF = 93%, stochastic frontier).²³ The results also suggest that years of experience in Switzerland translate into increased efficiency (stochastic frontier, CDF=94%; DEA, CDF= 91%). Supportive, but not conclusively so, of the limited global advantage hypothesis of Berger, DeYoung, Genay and Udell, (2000) is the finding that foreign banks with higher home ROE are also more profitable in Switzerland (ROE, CDF= 92%). Further banks whose parents earn higher levels of non-interest income at home are also more profitable in Switzerland (ROE, CDF=92%). Given the previous results indicating that expertise in providing intermediation services in the host nation are difficult to export, this study will argue that multinational banks with increased expertise in providing market based and advisory services, as measured by non-interest income are more likely to operate successfully as multinational banks. Overall, we argue that these results support the limited global advantage hypothesis of Berger, DeYoung, Genay and Udell, (2000), in that a positive parent-specific characteristic can be successfully exported to the host nation, and negative parent characteristics can reduce observed performance in the host nation.

While Sturm and Williams, (2008) found no evidence of significant national effects (as measured by dummy variables) once all other factors were controlled for, nationality effects (once all other factors were controlled for) were found by Sturm and Williams, (2009; Sturm and Williams, (2010). Sturm and Williams, (2009) found banks from the United States, the United Kingdom and Japan to display superior revenue creation efficiency in Australia. Sturm and Williams, (2010), using a different empirical method, found banks from the United Kingdom to display superior efficiency in Australia (again once all other factors had been controlled for), while banks from the United States were found to be less efficient.

²³ Overall we find limited evidence of effective tax rates at either the home bank or host nation levels impacting upon foreign bank performance in Switzerland. It may be that any tax effect have their impact at the transaction rather than organisational level.

Following from this prior evidence, Table 9 examines the impact of bank specialisation, nationality and year effects, again using extreme bounds analysis (EBA). It should be noted that the results in Table 9 are drawn from the same regressions as shown in Table 8 and are not the result of separate estimations. Again it should be noted that EBA establishes the existence of a robust relationship between the dependent variable (performance) and the variable of interest after controlling for all other factors of interest.

Table 9 about here.

Panel A of Table 9 shows the impact of the different organisational forms that a foreign bank in Switzerland can choose. In each case commercial banking was chosen as the benchmark for this evaluation as it is the most common choice made by foreign banks in Switzerland (see Table 2). In general once all factors have been controlled for this organisational choice has limited impact upon performance in the host nation, with the exception that Investments Banks and Securities Houses as a joint category have marginally higher net interest margins.²⁴ This paper argues that differences between organisational types of multinational banks are best contextualised by controlling for other environmental and ownership factors, as this paper has done.

Panel B of Table 9 considers the impact of year specific effect on foreign bank performance in Switzerland, again using EBA to control for all other effects. It is found that in 2003 foreign banks in Switzerland experienced lower net interest margins, with no other significant year effects found.

Panel C of Table 9 considers the impact of nationality upon foreign bank performance using EBA. Foreign banks from Hong Kong, Russia and Sweden are found to be more profitable. Foreign banks from Denmark and Sweden are found to be more efficient, while foreign banks from Hong Kong and Kuwait are found to be less efficient. Examination of Table 5 shows that in each case these nations have few banks operating in Switzerland (generally one bank with the exception of Russia). This paper argues that these residual nation-specific effects most likely reflect bank specific idiosyncratic factors. As such, the results of this paper are

²⁴ As previously discussed this difference could be explained the higher risk of the assets used as security by Investment Banks and Security Houses.

consistent with those of Sturm and Williams, (2008), in that once nation and bank specific effects are controlled for, residual national effects represented by dummy variables become of marginal importance. This result is generally supportive of the limited global advantage hypothesis of Berger, DeYoung, Genay and Udell, (2000), in that parent-specific and nation-specific characteristics can be used to overcome the liabilities of foreignness.

7. Conclusions.

This paper finds that foreign banks profits and efficiency in the host nation (Switzerland) are the result of different factors. Foreign banks profits are found to be driven more by home nation characteristics, particularly market concentration and GDP per capita, while the results suggest that home nation cost of capital is also potentially important. We argue that higher levels of GDP per capita is associated with increased host nation financial sophistication and as such banks from these nations are better equipped to meet the challenges of banking operations in an established multinational banking centre such as Switzerland. Economic similarity is found to result in higher ROA, supportive of the relevance of New Trade Theory to modelling multinational banking. In contrast, foreign bank efficiency is found to be primarily a function of parent bank characteristics, particularly size and profits (parent NIMs), which is supportive of the limited global advantage hypothesis of Berger, DeYoung, Genay and Udell, (2000). We argue that once the appropriate mix of home nation and parent bank characteristics are controlled for, dummy variables representing nationality of origin have limited additional explanatory power when modelling multinational bank performance. We consider this result indicates that a robust analysis of the relationship between foreign bank performance and a combination of both home nation and parent bank characteristics yields superior insights into the factors determining the performance of multinational bank, as well as demonstrating the relevance of adopting the appropriate theoretical framework to model multinational banking.

This paper also finds that not all aspects of intermediation-based services can be successfully exported. Supportive of comparative advantage theory is the finding that following clients (defensive expansion) results in higher host nation profits. While this particular type of intermediation relationship can be exported to the host nation, (in this case Switzerland), banks with higher home nation net interest margins (indicating higher expertise or profits from intermediation) experience lower efficiency in the host nation.

Furthermore, we find evidence of decreasing returns to scale and complexity in multinational banking. Those foreign banks with larger parents experience lower net interest margins and

efficiency in the host nation. We argue that as well as decreasing returns to scale, these results could also represent buying market share via lower NIMs or a trade-off between fee income and margin income (Lepetit, Nys, Rous and Tarazi, (2008; Lepetit, Nys, Rous and Tarazi, (2008). However, consistent with Lepetit, Nys, Rous and Tarazi, (2008), such a strategic choice may not be efficiency enhancing or revenue increasing in the longer run. It is also found that expertise in providing fee for service financial products (as opposed to intermediation services) is more likely to be associated with successful multinational banking. This result is supportive of the arguments of Guillen and Tschoegl, (1999; Tschoegl, (1987) that multinational retail banking tends to be the exception rather than rule. As we have found results suggesting that parent non-interest income is associated with higher host nation return on equity (CDF = 92%), the relationship between bank scale, revenue composition, complexity and asset quality in multinational banking would be a valuable extension of this study.

Further, our results suggest that those nations that allow increased banking market concentration in the interests of fostering national champions capable of operating globally is in fact ineffective, at least in the case of foreign banks wishing to operate in Switzerland. We find that in contrast, those banks from more concentrated banking systems tend to be less profitable (ROE).

Overall, this study has considered the case of a single host nation (Switzerland) and considered a range of measures of multinational bank performance in the host nation. We have related these measures to a variety of home nation and parent bank characteristics, applying extreme bounds analysis. In common with Sturm and Williams, (2008) and Sturm and Williams, (2009), we find that home nation financial sophistication is an important factor in determining multinational bank performance and home nation banking market concentration leads to inferior multinational bank performance. Extending the previous works in this vein, we also establish the role of parent bank characteristics in multinational bank performance, thus providing some further structure to the limited form of the global advantage hypothesis of Berger, DeYoung, Genay and Udell, (2000). Again, we follow our earlier work (Sturm and Williams, (2008, 2009, 2010) and argue that these results are the outcome of a focused study of a single nation and that further studies will be needed across a variety of nations and economic circumstances to conclusively identify those factors underlying the limited global advantage hypothesis in multinational banking.

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Tables

Table 1: Banks in Switzerland by bank type

	bank-year obs.		bank obs.*	
	Number	Share	Number	Share
Cantonal Banks	288	9.7	23	8.4
Commercial Banks	85	2.9	1	0.4
Foreign Banks	1,193	40.0	112	40.7
Major Banks	19	0.6	2	0.7
Merchant Banks	454	15.2	48	17.5
Other Institutes	205	6.9	32	11.6
Regional and Savings Banks	741	24.8	57	20.7
	2,985		275	

Table 2: Banks in Switzerland by specialisation type

	All Banks		Foreign Banks		Share of Foreign Banks in All Banks
	Number	Share	Number	Share	
	Bank-year observations				
Commercial Banks	1,590	53.3	737	61.8	46.4
Cooperative Banks	60	2.0	12	1.0	20.0
Investment Banks/Securities Houses	384	12.9	217	18.2	56.5
Private Banks and Asset Mgt Companies	285	9.6	214	17.9	75.1
Real Estate and Mortgage Banks	39	1.3	0	0.0	0.0
Savings Banks	312	10.5	0	0.0	0.0
Specialised Govt Credit Institutes	315	10.6	13	1.1	4.1
	2,985		1,193		40.0
	Bank observations*				
Commercial Banks	187	50.1	80	53.0	42.8
Cooperative Banks	6	1.6	2	1.3	33.3
Investment Banks/Securities Houses	57	15.3	32	21.2	56.1
Private Banks and Asset Mgt Companies	54	14.5	36	23.8	66.7
Real Estate and Mortgage Banks	7	1.9	0	0.0	0.0
Savings Banks	37	9.9	0	0.0	0.0
Specialised Govt Credit Institutes	25	6.7	1	0.7	4.0
	373		151		40.5

In cases where a bank switches between bank types it treated as a different bank, resulting in in some differences between Tables 2 and 3.

Table 3: Descriptive statistics for and correlations between output performance measures of banks in Switzerland

Panel A: All banks	Descriptive statistics					Correlation matrix					
	Obs	Mean	Std Dev	Min	Max	1	2	3	4	5	6
Return on Assets	2985	1.62	2.83	-19.24	76.14	1.00					
Return on Equity	2985	10.37	13.30	-137.83	200.12	0.76	1.00				
Net Interest Margins	2985	1.56	0.69	0.00	8.83	0.14	0.02	1.00			
Efficiency: Stochastic Frontier	2985	0.81	0.08	0.48	0.98	0.09	0.05	0.00	1.00		
Efficiency: DEA - Output Oriented	2985	0.63	0.31	0.00	1.00	-0.32	-0.26	0.23	-0.13	1.00	
Efficiency: DEA - Input Oriented	2985	0.64	0.29	0.01	1.00	-0.31	-0.28	0.27	-0.16	0.98	1.00

Panel B: Foreign banks	Descriptive statistics					Correlation matrix					
	Obs	Mean	Std Dev	Min	Max	1	2	3	4	5	6
Return on Assets	1193	2.14	3.48	-19.24	76.14	1.00					
Return on Equity	1193	11.53	13.78	-80.76	200.12	0.79	1.00				
Net Interest Margins	1193	1.55	0.95	0.00	8.83	0.14	0.01	1.00			
Efficiency: Stochastic Frontier	1193	0.84	0.09	0.56	0.98	-0.01	0.02	0.00	1.00		
Efficiency: DEA - Output Oriented	1193	0.46	0.23	0.00	1.00	0.00	-0.01	0.35	0.19	1.00	
Efficiency: DEA - Input Oriented	1193	0.48	0.23	0.01	1.00	-0.01	-0.06	0.39	0.11	0.95	1.00

In cases where a bank switches between bank types it treated as a different bank, resulting in in some differences between Tables 2 and 3.

Table 4: Descriptive statistics for variables used in the efficiency analyses

	Descriptive statistics				
	Obs	Mean	Std Dev	Min	Max
Operating and interest expenses	2985	551.46	5,570.28	1.20	139,238.00
Total liabilities	2985	11,872.65	114,530.00	3.30	2,290,587.00
Total equity	2985	545.99	3,384.15	3.90	55,353.00
Personnel expenses	2985	147.85	1,371.86	0.20	25,515.00
Interest expenses	2985	314.06	3,614.67	0.10	103,775.00
Deposits	2985	6,745.96	58,201.50	0.30	1,368,143.00
Customer loans	2985	4,040.96	27,158.59	0.01	570,462.00
Contingent liabilities	2985	1,863.52	29,987.73	0.01	1,190,083.00
Wage share (personnel expenses as % of assets)	2985	2.30	2.37	0.17	15.80
Interest share (interest expenses as % of deposits)	2985	2.33	1.84	0.02	44.93

Table 5: Parent country of foreign banks in Switzerland

	bank-year obs.		bank obs.*	
	Number	Share	Number	Share
Algeria	13	1.1	1	0.8
Austria	13	1.1	2	1.7
Belgium	55	4.6	6	5.1
Brazil	22	1.8	2	1.7
Canada	13	1.1	1	0.8
Denmark	13	1.1	1	0.8
France	135	11.3	15	12.7
Germany	137	11.5	12	10.2
Hong Kong	5	0.4	1	0.8
India	14	1.2	1	0.8
Ireland	7	0.6	1	0.8
Israel	71	6.0	7	5.9
Italy	96	8.0	10	8.5
Japan	33	2.8	4	3.4
Jordan	13	1.1	1	0.8
Kuwait	12	1.0	1	0.8
Lebanon	27	2.3	2	1.7
Liechtenstein	17	1.4	2	1.7
Luxembourg	41	3.4	4	3.4
Netherlands	71	6.0	8	6.8
Pakistan	23	1.9	2	1.7
Russia	36	3.0	3	2.5
Slovakia	7	0.6	1	0.8
Spain	31	2.6	3	2.5
Sweden	8	0.7	1	0.8
Turkey	26	2.2	2	1.7
United Kingdom	82	6.9	7	5.9
United States	134	11.2	11	9.3
Venezuela	11	0.9	1	0.8
unknown	27	2.3	5	4.2
	1193		118	

In cases where a bank switches between bank types it treated as a different bank, resulting in some differences between Tables 2, 3 and 5.

Table 6: Descriptive statistics on parent-country and parent-bank characteristics

	Obs	Mean	Std Dev	Min	Max	Source
Variables reflecting parent-country characteristics						
Share of Swiss imports from parent country in total Swiss imports	1101	7.98	9.55	0.00	33.33	IMF Direction Of Trade Statistics
Economic similarity based on distance between parent and Swiss GDP per capita	1105	0.74	0.23	0.06	1.00	IMF World Economic Outlook / DeYoung (1997)
Log distance from financial center to Zurich, Switzerland (in km)	1166	7.07	1.18	4.36	9.17	timeanddate.com - distance calculator
KOF Index of Globalization	1144	77.16	10.92	35.22	92.37	KOF Swiss Economic Institute
Coefficient of variation of monthly exchange rate vis-a-vis CHF	1093	0.03	0.03	0.00	0.43	IMF International Financial Statistics
International Country Risk Guide - Composite Risk Rating	1149	78.00	8.15	49.74	92.46	The PRS Group - International Country Risk Guide
Worldwide Governance Indicators (first principal component)	863	0.00	2.33	-7.72	2.33	World Bank - Worldwide Governance Indicators
Concentration of largest 10 banks in parent country (based on balance sheet totals)	1148	0.70	0.19	0.27	1.00	Bankscope
log GDP per capita (PPP)	1105	10.13	0.61	7.39	11.33	IMF World Economic Outlook
log GDP (PPP)	1105	6.86	1.58	2.64	9.58	IMF World Economic Outlook
Money market interest rate	734	5.17	9.03	0.00	91.95	IMF International Financial Statistics
Long-run government bond yield	915	4.72	2.24	1.01	38.51	IMF International Financial Statistics
Credit market regulations	1115	8.55	1.39	1.19	10.00	Fraser Institute - EFW 2012 Report
Tax rate foreign bank in Switzerland	1165	21.11	16.74	-50.00	100.00	Bankscope
Variables reflecting parent-bank characteristics						
Return on average assets	535	0.88	2.18	-7.95	36.29	Bankscope
Return on average equity	535	10.98	15.26	-134.91	112.54	Bankscope
Profits as % of equity	518	13.68	24.86	-366.47	122.34	Bankscope
Profits as % of assets	519	1.39	3.90	-9.18	46.16	Bankscope
Net interest margin	528	2.54	7.02	-3.94	68.16	Bankscope
Total assets	520	9.81	3.34	1.34	15.21	Bankscope
Cost to income ratio	525	67.65	31.46	2.69	511.95	Bankscope
Non-interest expenses as % of assets	528	3.86	11.35	0.10	113.37	Bankscope
Loan loss reserves as % of gross loans	444	2.97	2.13	0.00	18.61	Bankscope
Non-interest income as % of gross revenues	513	48.62	51.22	-96.10	952.90	Bankscope
Growth of gross loans	481	12.45	43.11	-99.20	725.30	Bankscope
Regulatory capital ratio	372	12.82	4.18	5.00	36.35	Bankscope
Years of experience in Switzerland (log)	796	3.50	0.79	0.69	5.49	Bankscope / websites
Tax rate parent bank	337	24.87	16.78	-50.00	100.00	Bankscope

Table 7: Tests of differences between organisational type (assuming unequal variances)

Return on Assets	Return on Equity	Net Interest Margins	Efficiency: Stochastic Frontier	Efficiency: DEA - Output	Efficiency: DEA - Input
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Panel A

Foreign vs. Non-Foreign Banks	0.87 0.0%	1.92 0.0%	-0.01 62.7%	0.04 0.0%	-0.29 0.0%	-0.28 0.0%
Foreign vs. Cantonal Banks	1.63 0.0%	5.74 0.0%	0.05 7.8%	0.03 0.0%	-0.46 0.0%	-0.44 0.0%
Foreign vs. Commercial Banks	0.66 0.0%	-0.39 78.6%	-0.25 0.0%	0.02 0.1%	-0.21 0.0%	-0.19 0.0%
Foreign vs. Major Banks	-1.78 0.0%	-5.68 52.5%	-0.98 0.0%	-0.10 0.0%	0.39 0.0%	0.33 0.0%
Foreign vs. Merchant Banks	1.24 0.0%	7.18 0.0%	-0.09 3.8%	-0.02 0.0%	-0.15 0.0%	-0.12 0.0%
Foreign vs. Other Institutes	-1.61 0.0%	-4.52 0.0%	0.10 0.2%	-0.01 8.7%	0.44 0.0%	0.43 0.0%
Foreign vs. Regional and Savings Banks	-1.66 0.0%	-5.47 0.0%	0.08 0.6%	-0.07 0.0%	0.45 0.0%	0.43 0.0%

Panel B

Other Foreign Banks vs. Foreign Commercial Banks	-0.01 93.7%	-0.71 35.8%	0.33 0.0%	-0.01 25.2%	0.03 1.0%	0.05 0.0%
Other Foreign Banks vs. Foreign Cooperative Banks	0.14 62.6%	0.91 36.6%	0.15 28.8%	-0.11 0.0%	0.15 0.0%	0.14 0.0%
Other Foreign Banks vs. Foreign Investment Banks/Securities Houses	0.57 1.4%	1.58 8.9%	-0.10 9.9%	-0.02 0.0%	-0.03 8.8%	-0.02 15.6%
Other Foreign Banks vs. Foreign Private Banks and Asset Mgt Companies	-0.58 0.1%	-0.15 87.8%	-0.43 0.0%	0.05 0.0%	-0.03 4.5%	-0.06 0.0%
Other Foreign Banks vs. Foreign Specialised Govt Credit Institutes	0.24 43.2%	-4.98 0.0%	-0.18 32.2%	-0.07 0.0%	-0.08 33.1%	-0.01 86.7%

Table 8: Summary EBA results: Parent Nation and parent bank effects

Average beta coefficient						CDF(0)					
Return on Assets	Return on Equity	Net Interest Margins	Efficiency: Stochastic Frontier	Efficiency: DEA - Output	Efficiency: DEA - Input	Return on Assets	Return on Equity	Net Interest Margins	Efficiency: Stochastic Frontier	Efficiency: DEA - Output	Efficiency: DEA - Input

Variables reflecting parent-country characteristics

Concentration largest banks in parent country	-14.59	-47.57	-1.53	-0.11	-0.45	-0.40	98	98	94	84	93	91
log GDP per capita (PPP)	42.63	115.90	-0.87	0.01	-0.69	-0.65	100	100	94	65	94	94
Economic similarity	29.30	80.10	-1.09	0.22	-0.52	-0.41	96	94	86	84	83	81
Log distance from financial center to Zurich	-0.25	-3.58	0.30	0.00	-0.05	-0.04	84	86	91	81	91	90
log GDP (PPP)	8.17	20.92	-1.06	-0.03	-0.19	-0.27	93	88	90	68	86	88
KOF Index of Globalization	0.09	0.61	0.01	0.00	-0.02	-0.02	83	88	76	65	97	94
Share of Swiss imports from parent country	-0.02	0.39	0.10	-0.01	-0.01	-0.01	67	80	95	79	73	81
International Country Risk	0.01	0.21	-0.00	0.00	0.01	0.00	80	82	77	64	86	83
Worldwide Governance Indicator	-1.30	-2.38	0.03	0.03	0.03	0.04	83	72	65	89	79	83
Money market interest rate	0.28	0.83	0.07	-0.00	0.01	0.01	79	77	93	63	75	78
Tax rate foreign bank in Switzerland	0.01	0.01	0.00	0.00	0.00	0.00	78	70	72	91	79	71
Credit market regulations	-0.11	0.61	-0.03	-0.00	-0.01	-0.01	72	75	79	64	84	83
Long-run government bond yield	-0.04	-1.10	0.04	0.01	-0.01	0.00	63	66	74	82	67	67
Coefficient of variation of exchange rate	-1.29	-26.51	0.61	-0.01	-0.04	-0.21	65	70	66	58	68	67

Variables reflecting parent-bank characteristics

Years of experience in Switzerland (log)	-0.34	-1.08	-0.08	0.04	0.04	0.03	77	84	81	94	89	91
Total assets	-0.01	0.43	-0.05	0.00	-0.00	-0.02	65	86	97	79	77	97
Loan loss reserves as % of gross loans	-0.02	-0.47	-0.01	0.00	-0.02	-0.01	66	77	76	83	97	97
Return on average equity	0.01	0.10	0.00	-0.00	-0.00	-0.00	78	92	69	78	87	90
Non-interest expenses as % of assets	-0.02	-0.04	0.00	0.00	0.00	0.00	64	78	87	90	87	88
Non-interest income as % of gross revenues	0.00	0.03	-0.00	0.00	-0.00	-0.00	76	92	84	83	75	75
Cost to income ratio	-0.01	-0.02	-0.00	0.00	-0.00	-0.00	81	77	67	73	92	89
Return on average assets	-0.02	0.34	-0.02	0.00	0.00	-0.00	65	76	81	80	83	84
Profits as % of equity	0.01	0.05	0.00	0.00	0.00	0.00	82	84	82	84	67	69
Growth of gross loans	0.01	0.04	0.00	0.00	0.00	0.00	77	85	74	84	73	71
Profits as % of assets	-0.03	-0.02	0.02	0.00	0.01	0.01	66	74	85	79	81	79
Net interest margin	-0.05	-0.20	0.01	-0.00	-0.00	0.00	68	59	83	97	71	77
Regulatory capital ratio	0.09	0.17	0.01	0.00	-0.00	-0.00	77	72	87	65	81	71
Tax rate parent bank	0.02	0.00	0.00	-0.00	-0.00	0.00	75	61	72	93	67	74

Table 9: Summary EBA results: Specialisation, Year and Nationality Effects.

Average beta coefficient							CDF(0)						
Return on Assets	Return on Equity	Net Interest Margins	Efficiency: Stochastic Frontier	Efficiency: DEA - Output	Efficiency: DEA - Input		Return on Assets	Return on Equity	Net Interest Margins	Efficiency: Stochastic Frontier	Efficiency: DEA - Output	Efficiency: DEA - Input	

Specialisation (baseline: Commercial Bank)

Cooperative Bank	0.12	1.57	0.08	-0.10	0.06	0.03	61	63	68	91	77	72
Investment Bank/Securities House	0.78	2.94	0.11	0.02	0.03	0.02	87	85	95	93	88	84
Private Banking & Asset Mgt Companies	0.08	0.04	0.05	0.02	0.03	0.01	63	71	87	86	87	83
Specialised Governmental Credit Inst.	15.01	42.07	-0.28	-0.02	-0.49	-0.39	85	84	77	78	88	86

Year (baseline: 1997)

1998	0.35	3.60	0.05	0.01	0.01	0.01	68	77	68	70	69	71
1999	-0.31	2.03	-0.35	0.02	0.04	0.04	66	70	93	78	86	85
2000	-0.09	3.17	0.13	0.02	0.06	0.05	69	81	81	77	87	86
2001	-1.02	-3.02	0.14	0.02	0.11	0.10	72	75	86	81	93	92
2002	-1.23	-5.44	-0.28	0.02	0.08	0.08	77	87	90	81	90	91
2003	-1.63	-6.37	-0.53	0.03	0.10	0.10	82	88	96	87	90	90
2004	-1.99	-7.56	-0.50	0.04	0.08	0.09	83	89	94	90	89	90
2005	-1.91	-5.33	-0.40	0.04	0.12	0.12	77	79	92	90	91	91
2006	-1.45	-3.27	-0.20	0.05	0.11	0.11	71	74	91	91	90	90
2007	-1.00	-0.34	0.03	0.05	0.14	0.14	76	82	80	91	93	93
2008	-0.66	-1.34	-0.09	0.06	0.04	0.03	81	82	88	91	79	79
2009	-3.43	-12.41	-0.69	0.06	-0.03	-0.03	88	91	93	93	84	86
2010	-4.24	-12.49	-0.70	0.06	0.05	0.04	88	85	92	90	81	79

Country (baseline: Austria)

Belgium	1.46	8.29	0.12	0.04	0.00	0.01	83	87	81	85	74	73
Brazil	1.05	10.27	-0.09	0.01	-0.22	-0.23	78	84	69	80	89	91
Canada	1.36	3.22	0.51	0.06	-0.11	-0.10	88	84	89	87	89	90
Germany	-1.65	-0.35	-0.03	-0.01	-0.08	-0.05	77	85	76	77	90	90
Denmark	0.18	1.28	0.48	-0.07	0.39	0.36	75	76	90	89	97	97
Algeria	7.23	18.91	-0.31	-0.03	-0.26	-0.19	82	82	80	80	85	82
Spain	1.57	5.78	-0.03	0.06	0.08	0.06	87	87	79	86	78	76
France	-2.33	-3.05	-0.08	0.06	0.12	0.11	78	77	79	87	79	77
United Kingdom	-1.74	-4.11	0.32	0.02	0.07	0.08	74	75	83	74	74	75
Hong Kong	9.77	14.58	1.26	-0.20	-0.15	-0.05	100	88	97	98	80	62
Ireland	1.52	3.08	0.02	0.02	0.03	0.01	83	79	78	77	71	71
Israel	1.34	3.58	-0.08	0.04	0.06	0.05	83	83	80	80	86	85
India	1.87	5.71	0.28	-0.02	-0.03	-0.02	82	78	79	85	74	69
Italy	-1.39	-3.11	0.24	0.00	0.11	0.13	78	79	84	78	83	83
Jordan	9.56	32.17	-1.77	0.03	-0.40	-0.45	87	85	85	80	90	92
Japan	-2.95	-16.22	0.60	-0.00	-0.18	-0.16	80	86	87	78	92	93
Kuwait	3.10	6.16	-0.20	-0.19	0.17	0.20	87	81	76	98	91	94
Lebanon	7.21	20.48	0.19	0.11	-0.10	-0.13	84	82	90	89	89	87
Liechtenstein	-1.49	-8.07	-0.24	0.02	-0.20	-0.19	71	79	70	73	90	90
Luxembourg	1.93	11.83	0.50	-0.05	-0.05	-0.07	84	90	92	80	80	80
Netherlands	-1.08	4.27	0.22	-0.01	-0.00	-0.02	72	85	80	71	76	78
Pakistan	7.95	29.92	0.03	0.08	-0.26	-0.13	83	83	89	80	79	75
Russia	12.79	31.35	2.49	0.15	0.16	0.16	95	92	96	92	90	89
Sweden	0.59	-0.35	2.52	-0.02	0.41	0.41	73	70	100	76	100	100
Slovakia	-0.70	-7.38	0.87	-0.09	-0.17	-0.02	90	89	90	88	81	81
Turkey	6.56	22.98	0.05	-0.03	-0.03	-0.05	88	88	86	81	76	75
United States	-3.85	-10.65	0.02	0.00	0.13	0.14	80	80	85	79	80	79
Unknown*	0.54	10.03	1.36	-0.06	0.27	0.28	60	87	93	95	92	87
Venezuela	4.91	19.92	0.07	-0.05	-0.41	-0.39	81	82	84	83	92	92

* Results are based on only 3 regressions and therefore not representative.

