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INTERNATIONAL BANKING: THE ISOLATION OF THE EURO AREA

Vincent Bouvatier
EconomiX-CNRS and Université de Paris Ouest

Anne-Laure Delatte
CNRS-EconomiX, OFCE-Sciences Po and CEPR

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International Banking:

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Vincent Bouvatier* Anne-Laure Delatte†

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Abstract

We assess the evolution of international banking integration at the light of gravity equations on banks' bilateral consolidated foreign claims data. Our estimates on a panel of 14 reporting countries and their 186 partners between 1999 and 2012 reveal: 1) the forward march of banking integration has reversed only as far as euro area countries are concerned as source or destination countries. 2) Euro area banks have reduced their international exposure inside and outside the euro area to a similar extent. 3) This decline is not a correction of previous overshooting but a marked desintegration. 4) In the rest of the world, the banking integration has strenghtened since the financial crisis.

Key Words : international banking, gravity model, banking integration.
J.E.L Classification: F34, F36.

*EconomiX - CNRS, Université de Paris Ouest. *Corresponding author*: Université de Paris Ouest- Nanterre La Défense, 200 Avenue de la République, 92001 Nanterre, France. E-mail: vbouvatier@u-paris10.fr

†CNRS-EconomiX, OFCE, and CEPR. E-mail: annelaure.delatte@sciencespo.fr

1 Introduction

A massive reversal of international capital flows has taken place during the Great Recession: in 2013, cross-border capital flows were 40% of their 2007 level.[1] While the reversal was in all broad categories of flows (Forbes and Warnock (2012)), the sharpest decline in activity was in international bank loans extended cross-border or by local affiliates (Milesi-Ferretti and Tille (2011)), a fact that has been a prominent driver of contraction in the real economy (Cetorelli and Goldberg (2011) and Cetorelli and Goldberg (2012)). As a consequence of this massive retrenchment, gross external positions have changed dramatically during this period (Gourinchas et al. (2012)). In this paper, we document the dynamics of international banking activities with the benefit of hindsight and show that the forward march of banking integration has reversed only as far as euro area countries are concerned as source or destination countries. In the rest of the world, the decline of international banking activity in the aftermath of the financial crisis was entirely due to temporary frictions. In sharp contrast with euro area, the banking integration has in fact strenghtened. Our findings are timely in the context of the banking union and new banking regulations set implemented in the euro area.

Our measure of banking integration draws on recent contributions in two different aspects. First, the debate about global imbalances has made it clear that *gross* positions are important to grasp the degree of financial integration (Milesi-Ferretti et al. (2010), Shin (2012)). This is because *net* positions can hide massive *gross* positions. For example, from the end of the nineties, European banks have been net lenders to the US corporate sector and a net recipient of interbank and deposits from the US at the same time. As a consequence, the European external position towards the US was balanced, contrary to emerging surplus countries, implying that the growing role of European banks in intermediating US savings has been overlooked by regulators (McGuire and Von Peter (2009) and Baba et al. (2009)). In this work, we focus on the asset side of banks to document the adjustment of their foreign claims across time. Second, understanding the overall structure of foreign claims positions requires estimates of bilateral positions. In fact, recent work emphasizes the influence of bilateral differences of information and bilateral institutional linkages on the allocation decision of investors (Portes et al. (2001), Portes and Rey (2005), Martin and Rey (2004) and Okawa and Van Wincoop (2012)). The reason is that traditional agency problems develop in foreign lending decisions, implying that the quality and access to information matter. Recent works show that

[1] See McKinsey Global Institute, "Financial globalization: Retreat or reset?", march 2013.

agency problems and information asymmetry result in geographical credit rationing, i.e. a negative relationship between geographical distance and asset holdings. In the context of the Great Recession, De Haas and Van Horen (2013) and Albertazzi and Bottero (2014) find that foreign banks have restricted credit more than domestic banks and that bank lending during the crisis was declining in the functional distance to the headquarters. As far as institutional linkages are concerned, common regulatory, legal and monetary framework influence the allocation decision because they lower transaction costs in trading assets. Indeed, exploiting bilateral bond portfolio data, De Santis and Gerard (2009) show that the European Monetary Union enhanced regional financial integration in the euro area while Coeurdacier and Martin (2009) find a positive influence of euro on cross-border asset holdings inside the euro zone, including banking assets. In this work, we compute a measure of international banking integration which controls for standard gravity factors, including distance, size and institutional factors. Our approach allows us a comparative analysis across different regions and across time with the objective to identify deviations from a benchmark. As a consequence, our measure informs us on the current state of banking (des)integration in different geographical areas.

More specifically, we use gravity equations initially developed to analyze the determinants of bilateral trade flows, which have later shown to do a good job fitting bilateral financial flows.[2] Gravity equations are a model of bilateral interactions in which "mass" and "resistance" terms enter multiplicatively. Simply put, bilateral financial flows rise proportionately with the economic size of both countries ("mass") and are negatively correlated with frictions mentioned before, including information asymmetry proxied by physical distance as well as different language, currency and legal system ("resistance"). This approach has two main advantages. First, the model is based on bilateral data at the country level, meaning that we have granular data on source and destination of funds to draw an accurate picture of international banking activities. Second, it controls for frictions as well as time-varying factors that affect banking activity. For example, when an economy is hit by a severe financial crisis and falls in recession, the size of its economy decreases and its international banking activities adjust downward. This size effect should however not be considered as a desintegration of banking sectors. We define banking integration as the changes in international banking activities which are not driven by standard gravity factors. Therefore, after controlling for gravity factors, we include a time-trend that precisely measures international banking integration. We allow the trend

[2] Head and Mayer (2013) review of gravity models.

to be nonlinear to account for reversals across time. A spline function (i.e., a smooth polynomial function that is piecewise-defined) is used to allow a maximum of flexibility but we show that our findings are robust to alternative non-linear functional forms. We run our estimates on 14 countries (vis-à-vis around 186 partner countries) including 7 euro area members over the period 1999-2012. We find that the decline in banking activities observed after the crisis was due to temporary frictions in all countries outside the euro area. In contrast, the economic downturn faced by the euro area since 2008 is not sufficient to account for the massive retrenchment of international banking activities. Euro area banks have reduced their international exposure inside and outside the euro area to a similar extent. We also find that this decline is not a correction of previous overshooting but a marked disintegration.

This work is related with the recent papers documenting the massive retrenchment of international financial flows during the crisis (Forbes and Warnock (2012), Milesi-Ferretti and Tille (2011), Lane and Milesi-Ferretti (2012)). Unlike most of these papers which investigate aggregate flows, our paper relies on bilateral positions. Some recent papers estimate bilateral dynamics too, including Galstyan and Lane (2013) and Gourinchas et al. (2012) for portfolio data and De Haas and Van Horen (2013) for foreign bank loans. All these papers focus on the shifts that took place during the great recession to explain their drivers (geographic distance and other information-sensitive factors) or measure the wealth transfers across regions. And they cover an estimation period before the financial fragmentation in the euro area became visible in the data implying that all advanced countries are treated similarly. Relatively to these papers, our longer period of estimation allows us to document the full adjustment of bank activities and emphasize that there was no such thing as banking disintegration outside the euro area in the aftermath of the financial crisis.

Our work is also related with less recent papers examining cross-border integration among the euro area countries (Kalemli-Ozcan et al. (2010), Lane (2006), Coeurdacier and Martin (2009)).[3] These papers all document unambiguous positive effects of euro on cross-border financial integration while we provide a quantitative measure of this integration: we find that bank activities inside euro were 42% higher than the level justified by the gravity factors.

Last, our work hopefully complements the new synthetic indicator of financial integration (SYNFINT) developed by the European Central Bank which tracks the overall level of financial integra-

[3]See Papaioannou (2009) for a literature review.

tion inside the euro-area over time (ECB (2014). While their indicator suggests that fragmentation reaches levels similar to those seen before the euro was introduced, a fact that our measure confirms, we quantify the magnitude of bank fragmentation: activities of euro area banks inside the euro are 37% lower than what gravity factors would predict. Our approach uncovers two additional patterns compared to the ECB indicator : first, this desintegration is due to a massive retrenchment of euro area banks only, as we find that non euro area banks exposition inside the euro area is precisely at the benchmark level. Second, the well-documented banking fragmentation inside the euro-area is only one side of a broader disintegration of euro area banks. In fact, banks are getting more and more isolated vis-a-vis the rest of the world with a level of activity 33% lower than the benchmark level. Overall our results raise the questions of a transfer of international banking activities from the euro area to non euro area countries. Future investigation is required to understand the drivers of these important patterns.

The next Section provides a first picture of the evolution of international banking activities based on descriptive statistics. In Section 3, we present our empirical strategy which draws on gravity equations. Estimation results are presented in Section 4 which also provides a graphical analysis of our banking (des)integration measure. Section 5 summarizes our findings and concludes.

2 Overview of international banking activities

2.1 Data

We consider the evolution of the consolidated foreign claims reported by 14 countries at the BIS over the 1995-2012 period.[4] Half of these reporting countries are currently in the euro area: Austria, Belgium, Germany, Spain, France, Italia and the Netherland. The seven other reporting countries are: Canada, Switzerland, Denmark, the United Kingdom, Japan, Sweden and the United States.

The BIS publishes consolidated and locational banking statistics. In this paper, we use the consolidated data because they capture the country risk exposure of banks and they represent the broadest picture of international banking activities.[5] In fact, consolidated foreign claims represent foreign

[4]In 1995, statistics on international banking activity were reported by 15 countries. However, we exclude Finland from the analysis because no statistics were available by Finland over the 2004-2009 period.

[5]We use the data published in Table 9B of the BIS Quarterly Review under the title "The consolidated foreign claims of reporting banks."

financial claims reported by domestic bank headquarter, including the exposures of their foreign affiliates (i.e., branches and subsidiaries) and netting out intragroup positions.[6] These data provide a breakdown by vis-à-vis countries (also called partner or recipient countries), a fact that will allow us to distinguish euro area and non euro area members. The foreign claims are comprehensive: they are made up of outstanding loans, holding of securities, banks derivatives and contingent claims on different economic sectors (banks, public sector and non-bank private sector) and on an immediate borrower basis.

The consolidated foreign claims of the 14 reporting countries are spread out over a large number of recipient countries. Since the end of the nineties, the number of recipient countries has been quite stable at the agregate level around 196 from 2000 to 2012 (see Table 1). In addition, Table 1 shows that the number of vis-à-vis countries is quite similar for the subset of euro area reporting countries and the subset of non euro area reporting countries.

2.2 Global trends in the consolidated foreign claims

Before proceeding to the estimation of our measure of banking integration, we comment raw statistics in order to get a preliminary picture. Figure 1-a represents the aggregated evolution of the consolidated foreign claims of the 14 reporting countries vis-à-vis all countries during the 1995-2012 period (solid line). The aggregated evolution is also split between the euro area reporting countries and the non euro area reporting countries (dashed and dotted lines respectively).

First, Figure 1-a shows a level shift in 1999 due to a change in methodology. Indeed, reporting countries started to report claims vis-à-vis each other from 1999. Before this change in methodology, reported claims were mainly vis-à-vis developing countries and offshore centres. Second, Figure 1-a indicates a fast expansion in international banking activities from 1999 to 2007. The consolidated foreign claims amounted 7,833 billion of USD in 1999 and increased by 238% from 1999 to 2007. The euro area and the non euro area reporting countries expanded their international banking activities in a similar extent, excepted in 2007 when the increase was significantly higher in the euro area reporting countries (dotted line). Third, the global financial crisis dealt international banking a

[6] More precisely consolidated foreign claims represent claims on non-residents of the reporting country and are calculated as the sum of cross-border claims and local claims (in all currencies) of reporting banks' foreign affiliates. Foreign claims are therefore larger than international claims calculated as the sum of cross-border claims in any currency and local claims of foreign affiliates denominated in non-local currencies.

serious blow. In 2008, the consolidated foreign claims decreased significantly and have been stable afterwards. However, the aggregate situation hides two opposite evolution. International banking activities reported by non euro area countries were severely hit in 2007 but recovered quickly as the international banking activities of non euro area reporting countries has displayed an upward trend since 2008 (dashed line). On the contrary, the banking activity of euro area reporting countries has not recovered since the global financial crisis and international banking activities show a downward trend. As a result, the share reported by the euro area countries in claims vis-à-vis all countries has decreased from 51.77% in 2005 to 40.33% in 2012 (see Table.1). This decline develops inside and outside the euro area. On the one hand, their positions represented 63.24% of the total position vis-à-vis euro area countries in 2005 and 55% in 2012. On the other hand, the euro area reporting banks reduced their relative importance in non euro area countries too from 46.78% of the consolidated foreign claims vis-à-vis non euro area countries in 2005 to 34.29% in 2012.

2.3 The euro area as recipient area

Figure 1-b focuses on the consolidated foreign claims vis-à-vis euro area countries to highlight the situation of the euro area as recipient area. Figure 1-b shows that the consolidated foreign claims vis-à-vis euro area countries were 2, 232 billion of USD in 1999 and increased by 302% from 1999 to 2007. The consolidated foreign claims vis-à-vis euro area countries represents 28.11% of the total in 1999 and this proportion has slightly increased until 2007 (see Table 1). In sum, the dotted line in Figure 1-b illustrates the unambiguous rise in banking internationalization of the euro area over the 1999-2007 period. In turn, the euro area banks have reduced by 38% their expositions to the euro area from 2007 to 2012. This shift in the behavior of the euro area reporting countries contrasts with the behavior of the non euro area reporting countries which continue to expand their international banking activities vis-à-vis euro area countries.

2.4 Non euro area countries as recipient countries

Figure 1-c plots the consolidated foreign claims vis-à-vis non euro aera countries. The activity by non euro area banks has declined on a very short period in 2008 and recovered with a slope similar to the pre-crisis trend. In turn, the activity by euro area banks has kept on declining since 2007. More precisely, the euro area banks reduced their consolidated claims in countries outside of the euro area

by 35% from 2007 to 2012. In sum, the retrenchment of euro area banks also concerns their activity outside the euro area.

In total, raw statistics suggest an overall massive retrenchment of European banks. European countries have faced sequential crisis episodes since 2008 and the euro area is now one of the few areas where the economy has not yet recovered. Can the heterogeneous situation just described be entirely attributed to the contrasting economic context inside and outside the euro area? During the previous decade, rising institutional linkages have unambiguously accelerated the financial integration in the euro area. Are we observing a correction after the tremendous acceleration of banking integration inside the euro area? How does the European situation compare with the rest of the world? Aggregated data and graphical representations inform us on raw activity only. In the following we present our empirical approach to measure banking integration.

3 The gravity model

We define banking integration as the changes in international banking activities which are not driven by standard gravity factors. It requires to identify time trends in the consolidated foreign claims by controlling for, among others, the time-varying size of countries, the distance between countries and the financial openness of countries. Doing so, we isolate the "natural" factors and we can more precisely assess the evolution in the degree of integration (or disintegration) of banking sectors. In the following, we describe our baseline and augmented specifications, our strategy to include time trends and the estimation methodology. We draw on previous works in the gravity model literature to specify our models.

3.1 The gravity factors

3.1.1 The baseline specification

The baseline specification includes a narrow set of explanatory variables. More precisely, we focus only on the standard gravity variables in the baseline specification in order to maximize the number of observations in the estimates. The baseline specification is given by:

$$\ln CFC_{ijt} = \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln D_{ij} + \beta_4 L_{ij} + \beta_5 Legal_{ij} + \beta_6 Contig_{ij} + \beta_7 EIA_{ijt} + \beta_8 EU_{ijt} + \beta_t + \mu_{ij} + \varepsilon_{ijt}, \tag{1}$$

where the subscripts refer to reporter country i that has banking activities in partner country j in year t. The BIS databases provide consolidated foreign claims expressed in nominal US dollar terms. Variable CFC_{ijt} is expressed in real terms using the US GDP deflator index as a deflator.

The real GDPs of the reporter and partner countries (Y_{it} and Y_{jt}) are used as economic mass variables in the gravity specification. These data are collected from the United Nations Statistics Division. Coefficients β_1 and β_2 are expected to be positive. The standard gravity variables also include a set of bilateral country variables that proxy frictions. In the baseline specification, we include the geographical distance (D_{ij}) and binary variables indicating the presence of a common language (L_{ij}), a common legal origin ($Legal_{ij}$), a common border ($Contig_{ij}$), the signature of an Economic Integration Agreement (EIA_{ijt}) and the European Union membership (EU_{ijt}). These variables, except EIA_{ijt} and EU_{ijt}, come from the CEPII distance database. In the gravity specification, the distance is considered to be the main friction so coefficient β_3 is expected to be negative. However, the effect of distance can be overestimated for neighboring countries because countries sharing a common border have generally more relationships. Coefficient β_6 associated with the contiguity dummy variable is therefore expected to be positive. Furthermore, the variables L_{ij}, $Legal_{ij}$, EIA_{ijt} and EU_{ijt} should positively affect the consolidated foreign claims. Indeed, the same official language makes international banking activities easier and a common legal origin can ease the assessment of the institutional framework of the partner country. In addition, EIAs are made to promote trade in services activities, including financial services, therefore allowing a deeper exploration of the liberalization process at the bilateral or multilateral level.[7] Finally, the variable EU_{ijt} is used to control for the specific situation of the European Union (EU) members. Several specific regulations of financial services activities are in force in Europe including the Financial Services Action Plan (FSAP), adopted in 1999 by the EU that led to a large set of measures to complete the single market in financial services.

[7] The variable EIA_{ijt} is constructed by Guillin (2013). According to WTO terminology, EIAs correspond to Regional Trade Agreements (RTAs) for services (see the RTA database, http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx).

Finally, a time fixed effect (β_t) and a bilateral term (μ_{ij}) are included in the specification as control variables. The bilateral term is included to account for the time-invariant unobservable characteristics such as the financial center status of the dyad's countries for example.

3.1.2 Augmented specifications

Two main limits can be pointed out in the baseline specification. First, equation (1) does not control for time-varying frictions as financial openness. Second, the size of each country is captured only by the real GDP. This measure can be imprecise when the gravity model is applied to a specific sector or activity. Our augmented specifications address both limitations with the caveat that additional control variables reduces the sample size due to data availability.

The augmented specification controls for the size of the banking sector by including the credit to GDP normalized by year, $Credit_{it}$ and $Credit_{jt}$ for countries i and j respectively, obtained from the Global Financial Development (GFD) database of the World Bank.[8] The coefficients associated with these two variables are expected to be positive because $Credit_{it}$ and $Credit_{jt}$ act as economic mass variables.

The augmented specification includes 3 additional variables to control for time-varying frictions. More precisely, we include the Chinn-Ito index ($Kaopen_{jt}$), the legal structure and property rights index form the Fraser Institute ($Property_{jt}$), and the bank concentration indicator from the GFD database and the Financial Development and Structure database of the World Bank. The Chinn-Ito index is based on the restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. It measures the degree of capital account openness (Chinn and Ito (2006), Chinn and Ito (2008)) and should therefore positively affect the consolidated foreign claims. The legal structure and property rights index controls for the quality of the legal system and the security of property right in the partner country as poor legal and property rights institutions can impede international banking activities as lending or holding of securities. This composite index is higher when countries have more secure property rights and when countries have legal institutions that are more supportive of the rule of law. Therefore, the

[8] More precisely $Credit_{it} = (X_{it} - \bar{X}_{.t})/\sigma_t$ where X_{it} is the credit to GDP ratio for country i at year t, $\bar{X}_{.t}$ and σ_t are the average and the standard deviation respectively of the credit to GDP ratio at year t computed on the whole set of countries available in the GFD database. In sum, the variable $Credit_{it}$ annually ranks countries by the size of their banking sector.

coefficient associated with variable $Property_{jt}$ is expected to be positive. Finally, we control for the concentration in the banking sector of the partner country with the variable $Concentration_{jt}$, computed as the share of the assets of three largest commercial banks in total commercial banking assets. If a limited number of players dominate the banking sector in the partner country, banks from the reporting country might be impeded from entering the market. Therefore, the coefficient associated with variable $Concentration_{jt}$ is expected to be negative.

The augmentted specification is given by:

$$\begin{aligned} \ln CFC_{ijt} &= \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln D_{ij} + \beta_4 L_{ij} + \beta_5 Legal_{ij} + \beta_6 Contig_{ij} \\ &\quad + \beta_7 EU_{ijt} + \beta_8 Credit_{it} + \beta_9 Credit_{jt} + \beta_{10} Kaopen_{jt} + \beta_{11} Property_{jt} \\ &\quad + \beta_{12} Concentration_{jt} + \beta_t + \mu_{ij} + \varepsilon_{ijt}. \end{aligned} \quad (2)$$

3.2 Trends in international banking activities

We extend our specifications to include a spline function that captures a non-linear time-trend interpreted as the banking integration. Non-linearity allows us to account for a possible reversal in the banking integration following the global financial crisis.

A spline function is defined as a smooth polynomial function that is piecewise-defined and therefore provides a flexible tool to capture a non-linear relationship. More precisely, the spline function depends on the time trend (T_{ijt}), marking the number of years since the beginning of the sample (i.e., 1999), and is embodied by two variables (called $Basis0$ and $Basis1$). These two variables are incorporated as a building-block into the gravity model instead of the time fixed effect (β_t). Computational details are reported in Appendix A and a general presentation of spline functions can be found in Harrell (2001). We rely on spline functions rather than a quadratic or a cubic time-trend because, as indicated by Harrell (2001), "*polynomials have some undesirable properties (e.g., undesirable peaks and valleys, and the fit in one region of X can be greatly affected by data in other regions) and will not adequately fit many functional forms*" (p.18). More particularly, we do not want to constraint the functional form fitting the evolution of the banking integration and spline functions allow to impose lower restrictions on the shape of the banking integration than a quadratic or a cubic time-trend.

Furthermore, we allow the spline functions to be different for each group. We spread out the dyads in four groups according to the membership to the euro area and we introduce a specific spline function for each group. More precisely, the four groups are made from claims: (1) reported by euro area countries vis-à-vis euro area countries (EA-EA); (2) reported by euro area countries vis-à-vis non euro area countries (EA-NEA); (3) reported by non euro area countries vis-à-vis euro area countries (NEA-EA); (4) reported by non euro area countries vis-à-vis non euro area countries (NEA-NEA).

The augmented specification including spline funtions is the following:

$$\begin{aligned}\ln CFC_{ijt} &= \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln D_{ij} + \beta_4 L_{ij} + \beta_5 Legal_{ij} + \beta_6 Contig_{ij} \\ &\quad + \beta_7 EU_{ijt} + \beta_8 Credit_{it} + \beta_9 Credit_{jt} + \beta_{10} Kaopen_{jt} + \beta_{11} Property_{jt} \\ &\quad + \beta_{12} Concentration_{jt} + \sum_{k=1}^{4} \alpha_k Basis0^g_{ijt} + \sum_{k=1}^{4} \alpha_{4+k} Basis1^g_{ijt} + \mu_{ij} + \varepsilon_{ijt}.\end{aligned} \tag{3}$$

where $Basis0^g_{ijt}$ and $Basis1^g_{ijt}$ are the basis variables obtained from a natural cubic spline function if the dyad ij belong to group g and 0 otherwise. The four different groups are $g = EA$-EA, EA-NEA, NEA-EA or NEA-NEA.

3.3 Estimation methodology

We consider the fixed effect (FE) estimator and the Hausman and Taylor (1981) (HT) estimator to estimate the model. Due to the panel structure of the data, the fixed effect (FE) estimator can be a natural choice to estimate the model. However, using fixed effects to account for the time-invariant unobserved heterogeneity (μ_{ij}) makes it impossible to identify the coefficients associated with the observed fixed effects such as the distance variable.

Switching to the random effect (RE) estimator allows to identify all the coefficients associated with equations (1), (2) and (3) but this estimator is generally not relevant for gravity models. This is because the RE estimator includes the time-invariant unobserved individual effects within the error term and assumes that the unobserved individual effects and the explanatory variables are not correlated. This hypothesis is however generally not supported by the data and leads to inconsistent estimated coefficient. We will use the Hausman (1978) test to check if the RE estimator is inconsistent.

The alternative Hausman and Taylor (1981) estimator can provide a more satisfactory approach. The HT estimator is based on several steps (including auxiliary regressions, data transformations and an instrumental variable approach) to tackle the inconsistency generally characterising the RE estimator.[9] Furthermore, this estimator requires the partition of the explanatory variables into exogenous and endogenous variables. The exogenous variables are assumed to be uncorrelated to the unobserved individual effects, whilst the endogenous variables are correlated with these effects.[10] Baltagi et al. (2003) and Baltagi (2005) suggest using a Hausman test on the difference between the FE estimator and the HT estimator to validate the partition of explanatory variables. When the partition is validated, the HT estimator preserves the consistency of the estimates characterising the FE estimator, allows to include the observed fixed effects and provides more efficient estimates.

Lastly, the sample used in the estimates will be unbalanced. This characteristic can lead to a selection bias. We use the methodology proposed by Verbeek and Nijman (1992) as in Carrère (2006) to tackle this selection bias. Verbeek and Nijman (1992) suggest including three variables in the estimated specifications to test and correct the selection bias: $PRES_{ij}$, the number of years of presence of the country-pair ij; DD_{ij}, a dummy variable equal to one if the country-pair ij is observed in all periods; and PA_{ijt}, a dummy variable equal to one if the country-pair ij was present in the previous period.[11]

4 Results

4.1 Estimation results

The baseline sample contains 14 reporting countries and 186 partner countries during the period 1999-2012. resulting in an unbalanced panel data set of 22,192 observations.[12] The descriptive statistics concerning the variables used in the estimates are reported in Table 2.[13] We check pairwise correlations and variance inflation factors and detect no multicollinearity issues.

[9] See Greene (2003) and Baltagi (2005) for a detailed presentation of the HT estimator. This estimator has been used by Carrère (2006) and McPherson and Trumbull (2008) for gravity models estimated on goods and Walsh (2008) and Bouvatier (2014) for gravity models estimated on services.

[10] The distinction between time-variant variables and time-invariant variables is also made in the implementation of the HT estimator. Time-variant and time-invariant variables are treated differently in the four steps of the HT estimator.

[11] Variable PA_{ijt} is set to zero for the first year of the sample.

[12] To make sure that estimations do not account for partner countries rarely observed, we restrict the sample to countries with at least 10 observations, hence 186 instead of 196 partners as in the initial data set.

[13] The group EA-EA represents 5.38% of the full sample (i.e., 1194 observations), EA-NEA,49.64% (i.e., 11016 observations), NEA-EA,5.58% (i.e., 1238 observations) and NEA-NEA 39.40% (i.e., 8744 observations).

The estimates of the baseline specification are reported in Table 3. The model is firstly estimated without the basis variables in columns (1) and (2) with the FE estimator and the HT estimator respectively.[14] The main standard gravity factors are significant and with the expected sign: consolidated foreign claims positively depend on the economic size in source and destination countries and negatively on physical distance. This is because a larger economic size implies larger banking sectors, thus justifying the expansion of international banking activities while the distance proxies information frictions (Portes and Rey (2005)). In addition, as expected, sharing a common language boosts the consolidated foreign claims, as well as the membership to the European Union of both source and destination countries. In turn, the common legal origin and the contiguity dummy variable are not significant. The positive effect of the existence of an Economic Integration Agreement is more difficult to identify. The coefficient associated with the variable EIA_{ijt} is not significant in columns (1) and (2) of Table 3 but turns significant at the 5% or 10% level when the basis variables are included and when the augmented specifications are considered. Finally, the high value of the Hausman statistic in column (1) confirms that the RE estimator is not appropriate while the low value of this statistics in column (2) suggests that the HT estimator is consistent and more efficient than the FE estimator.

The basis variables are included in columns (3) and (4) of Table 3. It is worth observing that the estimated coefficients associated with the standard gravity factors are not noticeably modified, a fact that suggests the stability of our results. Similarly, the estimates of the augmented specifications reported in Table 4 confirm that he standard gravity factors are significant.

Focusing on the additional variables considered in the augmented specification reported in Table 4, the variables $Credit_{it}$ and $Credit_{jt}$, included to better control for the size of the banking sectors, are firstly added in the estimates reported in columns (1) and (2). These variables have a positive and significant effect as expected. Note, however, that the inclusion of these variables imply that the sample falls to 17,819 observations. In columns (3) and (4) of Table 4, the remaining variables are added to the estimated specification and the sample falls to 14,264 observations. Higher financial openness in the partner country (proxied by the variable $Kaopen_{jt}$) positively and significantly affects consolidated foreign claims. In addition, the positive and significant coefficient associated with variables $Property_{jt}$ indicates that consolidated foreign claims are higher if the partner country

[14] In the baseline specification, the variables $\ln Y_{it}$ and $\ln Y_{jt}$ are considered as endogenous when the HT estimator is implemented.

has more secure property rights and legal institutions that are more supportive of the rule of law. Finally, the degree of concentration in the banking sector of the partner country impedes consolidated foreign claims as suggested by the negative and significant coefficient associated with variable $Concentration_{jt}$.

Given the stability of the estimates accross the different specifications, we are confident with our measure of international banking integration. Recall that it is captured by the basis variables obtained from a spline function and included in the specifications. In order to draw international comparisons and document specific patterns to the euro area, we distinguish four different groups. First important remark: the basis variables are overall significant after controlling for gravity factors (see Tables 3 and 4), a fact that suggests that banking integration has significantly changed during the period. Second important result: the coefficients associated with variables $Basis0^{g}_{ijt}$ and $Basis1^{g}_{ijt}$ are quite different across groups and can even have opposite signs. This suggest that the evolution of the international banking activities has different pattern depending on the groups. However, the value of the coefficients associated with spline functions do not give rise to a particular interpretation. In order to get an accurate picture of banking integration and draw comparisons across regions, we plot the trends fitted by the basis variables.

4.2 Graphical analysis

The estimated trends with the augmented specification (equation 3) are plotted in Figure 2.[15] Before commenting the evolution of banking integration in the different groups, it is worth observing that all trends implying the euro area as recipient or source countries are downward sloping after the crisis (Figures 2-a, 2-b and 2-c) contrary to the trend in the rest of the world (Figure 2-d).

First, before the crisis, the euro area was the most attractive destination. In fact, the trends of claims towards the euro area (Figures 2-a and 2-c) are significantly steeper than the trends towards the rest of the world (Figures 2-b and 2-d). The exposure of foreign banks in the euro area countries have increased by more than what size and friction factors imply during the pre-crisis period. In sum, after the enforcement of the monetary union in 1999, we do not only observe that the banking integration inside the euro area has boosted but also that the attractiveness of the euro area's for

[15] The estimated trends with the baseline specification lead to similar graphical analysis. Graphs are available upon request.

the other reporting countries was magnified[16]. It is interesting to note that descriptive statistics are misleading as they show a much more balanced picture: the share of claims vis-à-vis euro area to claims vis-à-vis all the world has increased from 27.33% to 30.28% only between 1999 and 2005 (see Table 1).

Since the crisis, it is striking that the benefits have been entirely lost inside the monetary union (Figure 2-*a)*, a result which confirms the marked fragmentation of the euro area observed by Schildbach (2011), Schoenmaker (2013), Acharya and Steffen (2014) and measured by the SYNFINT financial integration index of the ECB. In turn, the trend in banking activities from non euro area reporting countries to euro area have slowed down but the decline is much less sizeable (Figure 2-*b)*.

If we turn now to the foreign bank exposition to non euro area countries, the trends of our 14 developed reporting countries are parallel between 1999 and 2004 and diverge afterwards (Figures 2-*b* and 2-*d*).From 2006, a gap emerges between euro area and non euro area reporting countries that keeps widening onward: we find a massive retrenchment by euro area banks on the one hand and a growing integration of non euro area countries on the other hand. In sum, our estimates suggest that non euro area banks benefited from the European retrenchment and gained international market shares.

In total, we obtain useful information on the evolution of banking integration. The forward march of banking integration has paused only as far as euro area countries are concerned, as recipient or source countries. In the rest of the world, the decline of international banking activity in the aftermath of the financial crisis was entirely due to temporary frictions. Now, we would like to assess the magnitude of these patterns and compare their evolution with a benchmark, i.e. the level of foreign claims justified by gravity factors. To do so, we proceed to an overshooting analysis.

4.3 Overshooting analysis

We measure the deviations from the benchmark level to quantify the magnitude of the contraction in Europe and the forward march of banking integration in the rest of the world. From a methodological perspective, it requires to compute the fitted value of consolidated foreign claims (i.e. forecasting them with our estimated model) and assess the contribution of time trends. We compute an overshooting

[16] This is consistent with the positive influence of euro on the attractiveness of euro assets due to lower transaction costs documented in Coeurdacier and Martin (2009)

measure at the group level (see Appendix A for the precise methodology). The overshooting measures obtained from the augmented specification are plotted in Figure 3.[17]

It is striking that the banking integration inside the euro area (Figure 3-a) has experienced the strongest and fastest growth across the four groups during the first half of the 2000s. In fact, consolidated foreign claims with euro area as a source and destination were 47% below their benchmark level in 1999, a level that they have caught up in four years only and greatly exceeded : in 2006, the euro area banks' exposure to the Eurozone was 42% higher than the level justified by the benchmark. In comparison, the exposition to the Eurozone of banks from reporting countries outside the euro area was 37% below their benchmark level in 1999 and have increased slightly more progressively: at the peak in 2006-2007, it was 20% above what standard gravity factors would imply.

Our computation reveals the extent of the post-crisis banking fragmentation inside the euro area: according to our estimates, intra-euro area banking activities are 37% below the benchmark level in 2012. In sum, the economic downturn faced by the euro area since 2008 is far from being sufficient to account for the decline of international banking activities between euro area members, a fact suggesting that the trend will not unwind when the economic activity recovers. In addition, the retrenchment vis-a vis members of the Eurozone is much more sizable by euro area banks than reporting banks outside the euro area. Indeed, in 2012, foreign claims from non euro area with destination the euro area are at the benchmark level (the overshooting is -1% in 2012). In sum, the international financial crisis has wiped out the pre-crisis 20% overshooting described earlier but not generated a banking desintegration in the rest of the world.

Now, considering the consolidated foreign claims from the euro area to the rest of the world, we observe that the presence of euro area banks was relatively strong in 1999, almost 13% above what size and friction factors imply. Then, euro area banks have reduced their activities outside the area in the benefit of inside the area. In sum, the creation of the Eurozone has been followed by a readjusment of international activities towards partner countries inside of the euro area.

Our computation allows us to measure the extent of the retrenchment characterising reporting banks from the euro area and observed in the previous section. Figures 3-a and 3-b reveal that the retrenchment behavior with regards to partners inside and outside the euro area is similar: in 2012, the international banking integration of euro area reporting banks vis-à-vis non euro area partners

[17]The overshooting measures obtained with the baseline specification lead to similar conclusions. Graphs are available upon request.

and euro area partners is 33% and 37% below its benchmark level respectively.

Last, it is interesting to observe that non euro area countries among our 14 developed reporting countries have maintained a level of international banking activities with non euro area countries 13% below the benchmark level during the first half of the 2000s. In 2006, the amount of their foreign claims was closed to the benchmark level and it has exceeded it by 37% since then. In sum, banking integration has never declined and, on the contrary, the trend is even steeper after the crisis. Again, the simultaneity of the European retrenchment and of the expansion of international banking activities of non euro area members raises the questions of a transfer of international banking activities from the euro area to non euro area countries.

4.4 Robustness checks

The stability of our results has been evaluated with several alternative specifications of the empirical model.

Functional form of the time trends

In order to minimize the prior on the shape of the time-trend, we use a spline function that provides flexibility to capture a non-linear relationship. *A posteriori*, given the shape of the estimated trends on Figure 2, quadratic functions may also have fitted these evolutions. So to check the stability of our results, we run estimates using quadratic time-trends which lead to similar conclusions.

Alternative augmented specifications

We report the estimates of the baseline specification and the estimates of an augmented specification in the main body of the paper but much more alternative specifications could have been used. For example, in a preliminary work, we also considered the inclusion of dummies to control for banking crisis periods relying on the Laeven and Valencia (2012) database. These additional variables do not alter our conclusions. Furthermore, the results reported in Table 4 show that the GDP variable of the source country ($\ln Y_{it}$) turns non-significant when the augmented specification is estimated with the FE estimator.[18] The smaller sample used to estimate the augmented specification and the variable $Credit_{it}$ included to better control the size of the source country can both explain that the variable $\ln Y_{it}$ turns non significant. To disentangle these two explanations, we have esti-

[18]The variable $\ln Y_{it}$ remains significant at the 1% level when the HT estimator is used. Indeed, the Hausman test reported in Table 4 indicate that the HT estimator is consistent and more efficient than the FE estimator.

mated the augmented specification without the variable $Credit_{it}$. The results show that the variable $\ln Y_{it}$ remains significant at the 10% level. Consequently, the smaller sample used to estimate the augmented specification does not impact our results and the size effect is properly captured by the variable $Credit_{it}$.

Choice of the benchmark in the overshooting analysis

Last, the overshooting evaluation requires several methodological choices, in particular concerning the definition of the benchmark level (see Appendix B). In the main body of the paper, the model is re-estimated without the trend variables to compute the benchmark levels. For robustness check, we also considered as benchmark the fitted values of the dependent variable when all the coefficients associated with trend variables (i.e., the α_k in equation (3)) are shut down to 0. This approach does not require to re-estimate the model and provides similar conclusions concerning the overshooting evaluation.

5 Conclusion

We assess the evolution of international banking activity at the light of gravity equations which allow us to contol for standard determinants in order to draw international banking (des)integration trends. Our estimates on a panel of 14 reporting countries and their 186 partners during the period between 1999 and 2012 uncover several important stylized facts.

First, the forward march of banking integration has reversed only as far as euro area countries are concerned as source or destination countries. In the rest of the world, the decline of international banking activity in the aftermath of the financial crisis was entirely due to temporary frictions. As a consequence we find no banking desintegration between non euro area countries.

Second, as far as the activity by non euro area banks with euro area countries is concerned, the international financial crisis has only wiped out the pre-crisis overshooting, i.e. in 2012, the activity was back to the benchmark level. In turn, according to our estimates, international banking activities inside the zone are 37% below the benchmark level in 2012. In sum, the economic downturn faced by the euro area since 2008 is not sufficient to account for the massive fragmentation.

Finally, euro area banks have reduced their international exposure inside and outside the euro area to a similar extent. This decline is not a correction of previous overshooting but a marked desintegration.

These results hopefully call for future investigations. First, the simultaneity of the European retrenchment and of the expansion of international banking activities of non-euro area members raises the question of a transfer of international banking activities from the euro area to non-euro area countries. To test this transfer hypothesis, it would require to gather and examine the data of non euro area banks market shares after 2007. Second, it would be interesting to test whether the disintegration uncovered in our work is partly driven by the conditions imposed to the banks by the European Commission to receive state aid. Indeed, in counterpart of state aid, the European Commission requested banks to downsize and focus on domestic economy. This hypothesis could be tested in a bank-level investigation.

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Appendix A: Spline function

A restricted cubic spline (also referred to as a natural cubic spline) is defined as a smooth polynomial function that is piecewise-defined. This function depends on the time trend (T) marking the number of years since the beginning of the sample in 1999 (with $T = 1, 2, ..., 14$). The places where the polynomial pieces connect are referred to as knots and allow one to introduce changes in the relationship between the endogenous variable and the time trend (T).

Considering $n + 2$ knots at $k_{\min} < k_1 < ... < k_n < k_{\max}$, an unrestricted cubic spline function is written as follows (Royston and Sauerbrei (2007)):[19]

$$\begin{aligned} S(T) &= \beta_{00} + \beta_{10}T + \beta_{20}T^2 + \beta_{30}T^3 \\ &\quad + \sum_{j=1}^{n} \beta_j (T - k_j)_+^3 + \beta_{k_{\min}} (T - k_{\min})_+^3 + \beta_{k_{\max}} (T - k_{\max})_+^3 \end{aligned}$$

where the *plus function* $(T - k)_+$ is defined as

$$(T - k)_+ = \begin{cases} T - k \text{ if } T \geqslant k \\ 0 \ \text{ otherwise} \end{cases}$$

The terminology "restricted cubic spline" (or natural cubic spline) refers to the constraints imposed on $S(T)$, which imply linearity beyond the boundary knots ($k_{\min}$ and $k_{\max}$).[20] This requirement tends to avoid wild behavior near the extremes values of the data. Then, the restricted cubic spline function is written as (see Royston and Parmar (2002) (p.2194) for the algebraic details):

$$S(T) = \gamma_0 + \gamma_1 Basis_0 + \gamma_2 Basis_1 + ... + \gamma_{n+1} Basis_n$$

with $\gamma_0 = \beta_{00}$, $\gamma_1 = \beta_{10}$, $\gamma_{j+1} = \beta_j$ for $j = 1, ..., n$ and

$$\begin{aligned} Basis_0 &= T \\ Basis_j &= (T - k_j)_+^3 - \lambda_j (T - k_{\min})_+^3 - (1 - \lambda_j)(T - k_{\max})_+^3 \quad \text{for } j = 1, ..., n \end{aligned}$$

with $\lambda_j = \dfrac{k_{\max} - k_j}{k_{\max} - k_{\min}}$.

Then, the basis variables ($Basis_0, ..., Basis_n$) can be added to the regressors in the gravity model to capture a non-linear time-trends that embody the evolution in the banking integration. However, the basis variables have been orthogonalized before being included in the estimated specification, as suggested by Royston and Sauerbrei (2007). Without any transformation, the basis variables are highly correlated.

The main issue related to restricted cubic splines concerns the choice of the number of knots and their locations. Harrell (2001) recommends placing knots at equally spaced percentiles of the duration variable. In applied use, the number of knots generally varies between three and seven. We use three knots (from which two basis variables are obtained) because the sample covers a limited number of years (i.e.14 years). When three knots are considered, the default percentiles provided by

[19] $k_{\min}$ and $k_{\max}$ are the boundary knots and will not be placed at the extremes of T, as suggested by Harrell (2001).

[20] For example, the linearity constraint below $k_{\min}$ (i.e. when $T < k_{\min}$) requiers that quadratic and cubic terms must vanish, and hence, $\beta_{20} = \beta_{30} = 0$.

Harrell (2001) are 10%, 50% and 90%. The lower and higher knots are then placed near the extreme values, and the remaining knots are placed so that the proportion of observations between the knots is constant.

Appendix B: Overshooting measure

The overshooting measure at the group level is computed in four steps.

First, we compute the fitted values of the dependent variable (defined as $\widehat{\ln CFC}_{ijt}$) and the fitted values of the dependent variable when the model is re-estimated without the trend variables (defined as $\widehat{\ln CFC}^{*}_{ijt}$).[21] The variables $\widehat{\ln CFC}_{ijt}$ and $\widehat{\ln CFC}^{*}_{ijt}$ correspond to predictions of the logarithm of the consolidated foreign claims.

Second, we face a retransformation problem because we are interested in the fitted values of the level of the consolidated foreign claims rather than their logarithm. Taking the exponential of $\widehat{\ln CFC}_{ijt}$ and $\widehat{\ln CFC}^{*}_{ijt}$ is incorrect because the error term (ε_{ijt}) does not vanish in the retransformation procedure (see Cameron and Trivedi (2009), p.103). We follow Duan (1983), and assuming that ε_{ijt} is independent and identically distributed, we compute the fitted values of the consolidated foreign claims as:

$$\begin{aligned}
\widehat{CFC}_{ijt} &= \exp\left(\widehat{\ln CFC}_{ijt}\right) . \overline{\exp(\varepsilon_{ijt})}, \\
\widehat{CFC}^{*}_{ijt} &= \exp\left(\widehat{\ln CFC}^{*}_{ijt}\right) . \overline{\exp(\varepsilon_{ijt})},
\end{aligned}$$

where $\overline{\exp(\varepsilon_{ijt})}$ is the sample average of the exponential transformation of the error terms.

Third, we define the overshooting at the dyad level as:

$$OS_{ijt} = \frac{\widehat{CFC}_{ijt} - \widehat{CFC}^{*}_{ijt}}{\widehat{CFC}^{*}_{ijt}}.$$

The denominator $\widehat{CFC}^{*}_{ijt}$ corresponds to the level of consolidated foreign claims justified by the gravity factors (i.e. the benchmark level) and the numerator measures the gap from the benchmark due to the trend variables.

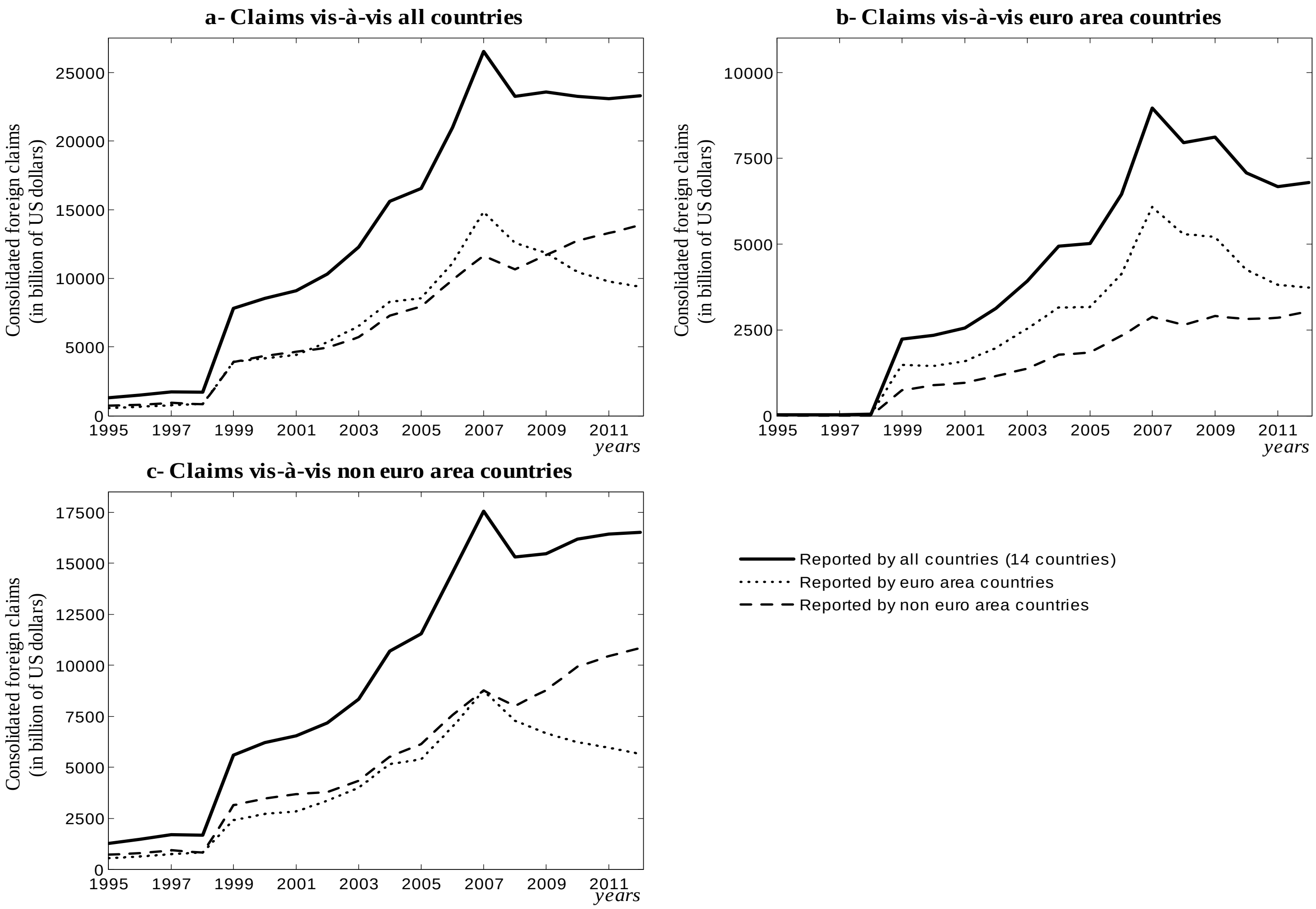
Last, we compute the overshooting at the group level because trend variables are defined at the group level. Considering only the dyads belonging to group g, we compute the overshooting measure for this group as a weighted average:

$$OS_t^{(g)} = \frac{\ln CFC_{ijt}}{\sum\limits_{ij} \ln CFC_{ijt}} \sum_{ij} OS_{ijt},$$

where $g = EA\text{-}EA, EA\text{-}NEA, NEA\text{-}EA$ or $NEA\text{-}NEA$.

[21] The fitted values of the dependent variable when all the coefficients associated with trend variables (i.e., the α_k in equation (3)) are shut down to 0 have also been considered to compute $\widehat{\ln CFC}^{*}_{ijt}$. This alternative approach to compute $\widehat{\ln CFC}^{*}_{ijt}$ leads to similar conclusions.

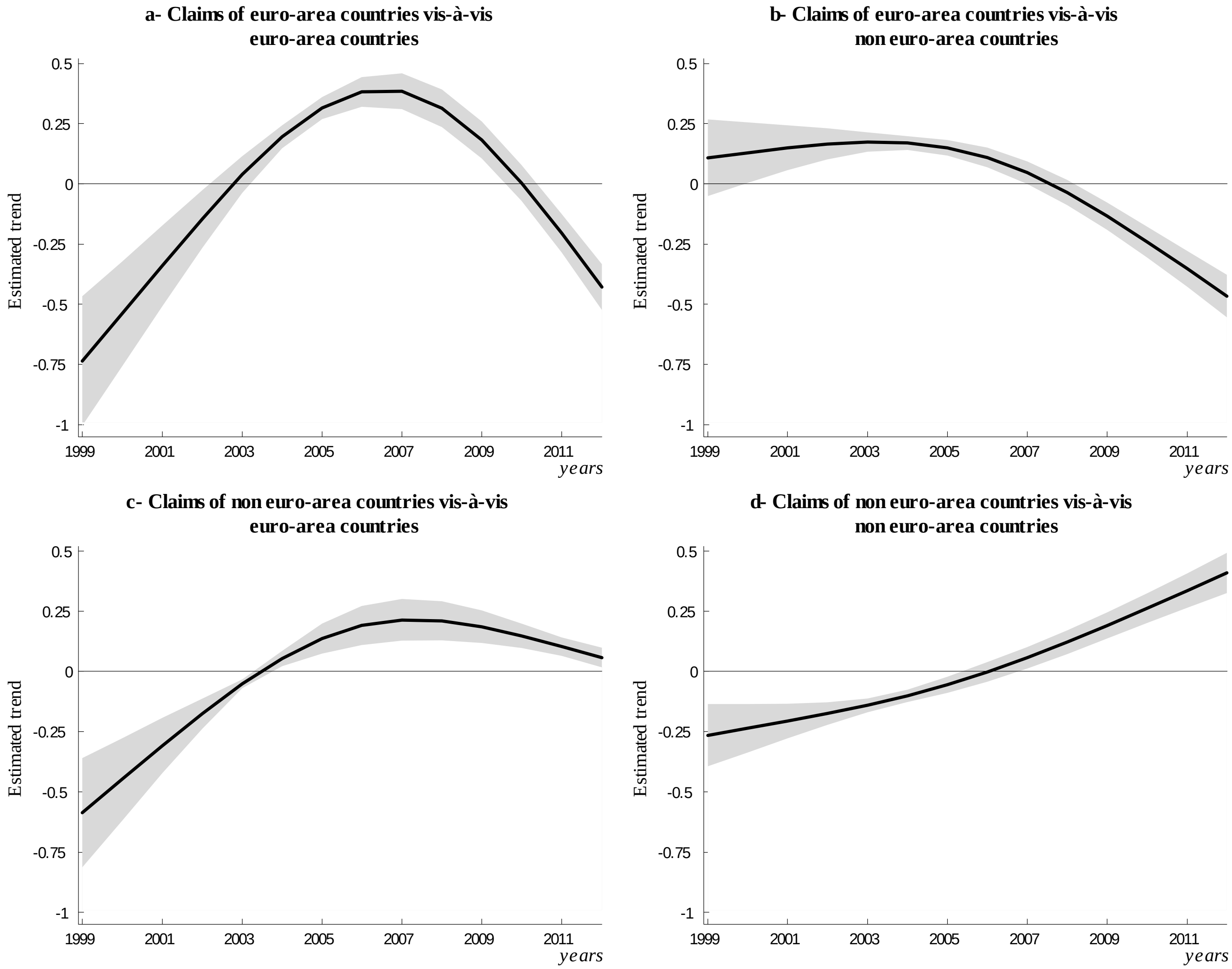
Figure 1: Consolidated foreign claims over the 1995-2012 period



Note: 14 reporting countries are used. The euro area countries are: Austria, Belgium, Germany, Spain, France, Italia and the Netherland. The non euro area countries are: Canada, Switzerland, Denmark, the United Kingdom, Japan, Sweden and the United States.

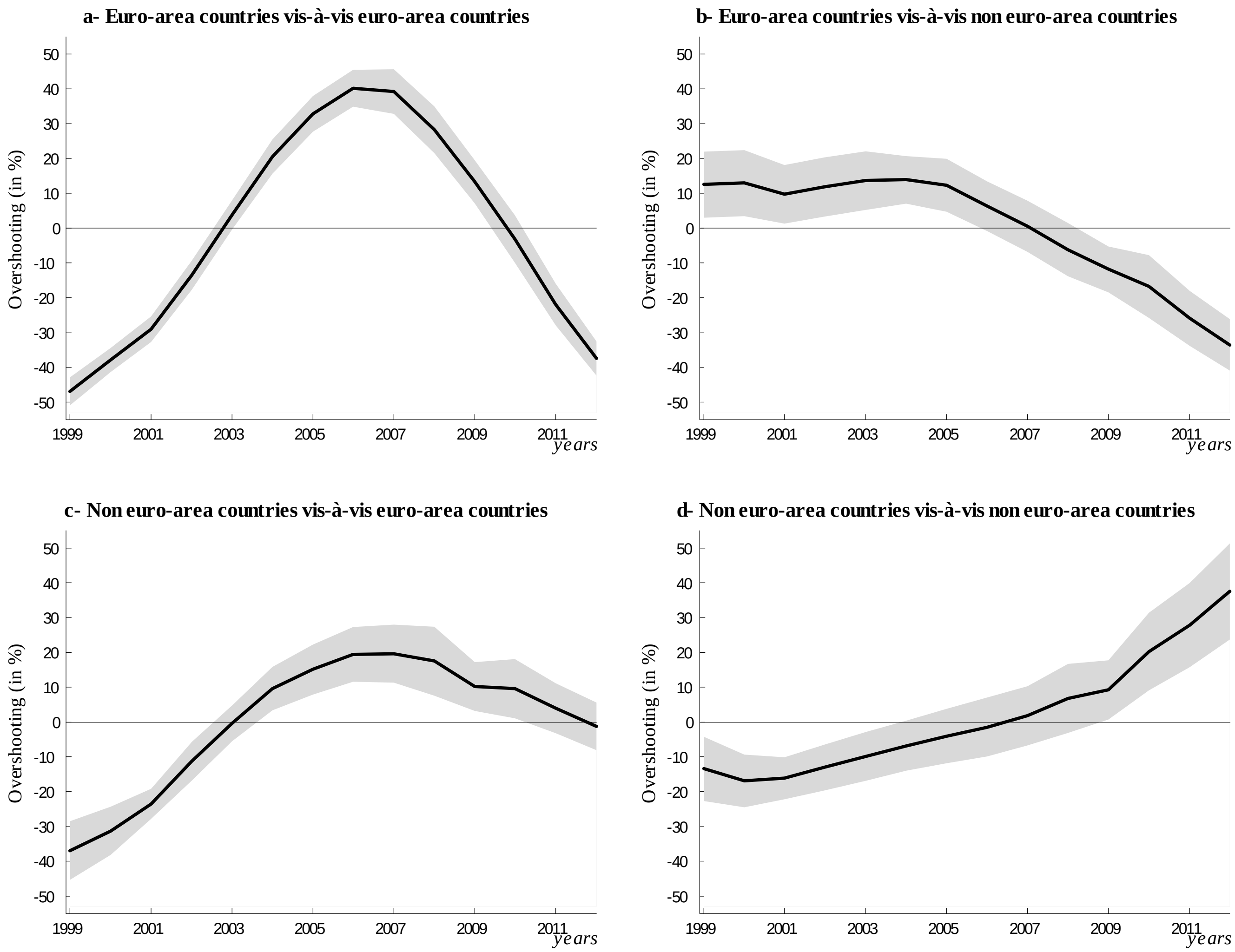
Data source: BIS consolidated banking statistics (Table 9B, Foreign claims by nationality of reporting banks, immediate borrower basis)

Figure 2: Trends in international banking activities



Note: The trend for the dyads belonging to group g (T_t^g) is given by: $T_t^g=\alpha_k Basis0_t^g+\alpha_{k+1} Basis1_t^g$. The grey area corresponds to the 95% confidence interval given by $T_t^g \pm 1.96\sigma_t^g$ with $\sigma_t^g=[\,(Basis0_t^g)^2.\sigma^2_{\alpha_k} + (Basis1_t^g)^2.\sigma^2_{\alpha_{k+1}} + 2.Basis0_t^g.Basis1_t^g.cov(\alpha_k,\alpha_{k+1})\,]^{1/2}$.

Figure 3: Overshooting in international banking activities



Note: The overshooting at the group level is defined in Appendix B. The grey area corresponds to the one-standard error band. The standard error for a given group in a given year is computed from the overshooting measures of the dyads belonging to this group.

Table 1: Descriptive statistics on consolidated foreign claims

Year	1995	2000	2005	2010	2012
Number of partners (i.e., number of vis-à-vis countries):					
reported by the 14 countries	167	196	197	194	196
reported by the 7 euro area countries	160	190	194	189	190
reported by the 7 non euro area countries	149	177	187	183	188
Share reported by the 7 euro area countries (in %):					
in claims vis-à-vis all countries	43.59	48.85	51.77	45.14	40.33
in claims vis-à-vis euro area countries	67.66	62.14	63.24	60.10	55.00
in claims vis-à-vis non euro area countries	43.03	43.86	46.78	38.59	34.29
Share of claims vis-à-vis euro area countries in claims vis-à-vis all countries (in %):					
reported by the 14 countries	2.26	27.33	30.28	30.43	29.14
reported by the 7 euro area countries	3.51	34.76	37.00	40.52	39.75
reported by the 7 non euro area countries	1.29	20.23	23.07	22.13	21.97
Coverage rate (in %)	99.74	98.32	96.78	93.52	93.28

Note: the coverage rate represents total claims reported by the 14 countries in our sample divided by total claims reported by all the countries reporting consolidated banking statistics at the BIS.

Data source: BIS consolidated banking statistics.

Table 2: Descriptive statistics on the variables used in the estimates

Variable	Obs	Mean	Std. Dev.	Min	Max
$\ln CFC_{ijt}$	22192	5.54	3.15	-0.13	13.95
$\ln Y_{it}$	22192	27.85	1.14	26.18	30.28
$\ln Y_{jt}$	22192	24.49	2.16	16.86	30.28
$\ln D_{ij}$	22192	8.41	0.93	4.09	9.88
$Language_{ij}$	22192	0.14	0.34	0	1
$Legal_{ij}$	22192	0.24	0.43	0	1
$Contig_{ij}$	22192	0.03	0.17	0	1
EIA_{ijt}	22192	0.10	0.29	0	1
EU_{ijt}	22192	0.12	0.33	0	1
$Credit_{it}$	17819	1.73	0.82	-0.15	4.48
$Credit_{jt}$	17819	0.22	1.06	-1.02	4.48
$Kaopen_{jt}$	14264	0.83	1.57	-1.86	2.43
$Property_{jt}$	14264	5.92	1.70	1.60	9.60
$Concentration_{jt}$	14264	67.78	19.85	21.40	100

Table 3: Baseline specification

	(1)		(2)		(3)		(4)	
Estimator:	FE		HT		FE		HT	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
$\ln Y_{it}$	1.0878*	(0.5690)	0.8931***	(0.2534)	0.7939*	(0.4314)	0.9834***	(0.2113)
$\ln Y_{jt}$	1.0520***	(0.1342)	1.0363***	(0.1160)	1.3940***	(0.1380)	1.3340***	(0.1134)
$\ln D_{ij}$			-0.4232***	(0.1120)			-0.3922***	(0.1072)
$Language_{ij}$			1.2106***	(0.1877)			1.5296***	(0.1983)
$Legal_{ij}$			0.0220	(0.1149)			0.0091	(0.1209)
$Contig_{ij}$			0.2804	(0.3448)			-0.3919	(0.3621)
EIA_{ijt}	0.1044	(0.1087)	0.1102	(0.1060)	0.2569**	(0.1097)	0.2548**	(0.1076)
EU_{ijt}	0.9644***	(0.1092)	0.9598***	(0.1067)	1.0445***	(0.1091)	1.0215***	(0.1069)
$Basis0_{ijt}^{EA\text{-}EA}$					0.0559	(0.0470)	0.0517	(0.0425)
$Basis1_{ijt}^{EA\text{-}EA}$					0.2511***	(0.0266)	0.2484***	(0.0261)
$Basis0_{ijt}^{EA\text{-}NEA}$					-0.1990***	(0.0361)	-0.1990***	(0.0300)
$Basis1_{ijt}^{EA\text{-}NEA}$					0.0601***	(0.0146)	0.0578***	(0.0137)
$Basis0_{ijt}^{NEA\text{-}EA}$					0.1746***	(0.0433)	0.1665***	(0.0368)
$Basis1_{ijt}^{NEA\text{-}EA}$					0.1237***	(0.0252)	0.1214***	(0.0245)
$Basis0_{ijt}^{NEA\text{-}NEA}$					0.0791**	(0.0387)	0.0744**	(0.0295)
$Basis1_{ijt}^{NEA\text{-}NEA}$					-0.0269*	(0.0161)	-0.0293**	(0.0148)
Hausman statistic [*p-value*]:								
FE vs RE	114.84	[0.0000]			232.12	[0.0000]		
FE vs HT			5.20	[0.9946]			8.68	[0.6514]
R^2_{adj}	0.4977				0.5067			
R^2_{within}	0.1358				0.1453			
No. Obs.	22192		22192		22192		22192	

Note: ***, ** and * indicate significance respectively at the 1%, 5% and 10% levels. Cluster robust standard deviations are in brackets. The variables $PRES_{ij}$, DD_{ij} and PA_{ijt}, controlling for the selection biais, are considered when the HT estimator is used. Time dummies are included in the estimates when no trend variables are considered in the estimates (i.e., in columns (1) and (2)).

Table 4: Augmented specification

	(1)		(2)		(3)		(4)	
Estimator:	FE		HT		FE		HT	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
$\ln Y_{it}$	0.7497	(0.4839)	0.6762***	(0.0850)	0.5660	(0.5219)	0.6944***	(0.0668)
$\ln Y_{jt}$	1.6811***	(0.1614)	1.5436***	(0.1227)	1.4106***	(0.1838)	1.2378***	(0.0838)
$\ln D_{ij}$			-0.2609***	(0.0802)			-0.4509***	(0.0616)
$Language_{ij}$			1.6959***	(0.2155)			1.1506***	(0.1661)
$Legal_{ij}$			0.1044	(0.1231)			0.2908***	(0.1122)
$Contig_{ij}$			-0.8448**	(0.3942)			-0.4894	(0.2990)
EIA_{ijt}	0.2751**	(0.1115)	0.2681**	(0.1099)	0.2214*	(0.1225)	0.2153*	(0.1192)
EU_{ijt}	0.8294***	(0.1071)	0.8050***	(0.1049)	0.6899***	(0.1098)	0.6683***	(0.1061)
$Credit_{it}$	0.0979***	(0.0358)	0.0972***	(0.0358)	0.1278***	(0.0377)	0.1223***	(0.0376)
$Credit_{jt}$	0.3247***	(0.0416)	0.3207***	(0.0411)	0.2861***	(0.0475)	0.2800***	(0.0453)
$Kaopen_{jt}$					0.1162***	(0.0298)	0.1111***	(0.0272)
$Property_{jt}$					0.0511**	(0.0260)	0.0560**	(0.0251)
$Concentration_{jt}$					-0.0056***	(0.0014)	-0.0058***	(0.0014)
$Basis0_{ijt}^{EA\text{-}EA}$	-0.0370	(0.0500)	-0.0219	(0.0444)	0.0243	(0.0530)	0.0333	(0.0448)
$Basis1_{ijt}^{EA\text{-}EA}$	0.2772***	(0.0264)	0.2808***	(0.0257)	0.3099***	(0.0292)	0.3105***	(0.0284)
$Basis0_{ijt}^{EA\text{-}NEA}$	-0.2263***	(0.0402)	-0.1978***	(0.0334)	-0.1972***	(0.0450)	-0.1746***	(0.0322)
$Basis1_{ijt}^{EA\text{-}NEA}$	0.0741***	(0.0164)	0.0765***	(0.0154)	0.1034***	(0.0183)	0.1025***	(0.0171)
$Basis0_{ijt}^{NEA\text{-}EA}$	0.1338***	(0.0426)	0.1503***	(0.0330)	0.1808***	(0.0466)	0.1876***	(0.0343)
$Basis1_{ijt}^{NEA\text{-}EA}$	0.1096***	(0.0310)	0.1127***	(0.0301)	0.1443***	(0.0333)	0.1445***	(0.0321)
$Basis0_{ijt}^{NEA\text{-}NEA}$	0.1021**	(0.0438)	0.1309***	(0.0334)	0.1781***	(0.0468)	0.1956***	(0.0290)
$Basis1_{ijt}^{NEA\text{-}NEA}$	-0.0498***	(0.0174)	-0.0492***	(0.0157)	-0.0310*	(0.0177)	-0.0349**	(0.0158)
Hausman statistic [*p-value*]:								
FE vs RE	262.09	[0.0000]			151.15	[0.0000]		
FE vs HT			17.33	[0.1375]			11.79	[0.6231]
R^2_{adj}	0.5969				0.6287			
R^2_{within}	0.1825				0.2022			
No. Obs.	17819		17819		14264		14264	

Note: ***, ** and * indicate significance respectively at the 1%, 5% and 10% levels. Cluster robust standard deviations are in brackets. The variables $PRES_{ij}$, DD_{ij} and PA_{ijt}, controlling for the selection biais, are considered when the HT estimator is used.