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Convergence clubs, the euro-area rank
and the relationship between banking and real convergence

by Massimiliano Affinito

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CONVERGENCE CLUBS, THE EURO-AREA RANK AND THE RELATIONSHIP BETWEEN BANKING AND REAL CONVERGENCE

by Massimiliano Affinito*

Abstract

This paper analyses banking convergence, measured through the ratios of deposits and loans to GDP, across 65 countries, compares it with per capita income convergence, and tests its effect on real convergence. The focus of the paper is the group of countries that have adopted the euro as a single currency (euro area). It compares the degree of banking and real convergence among these countries with that reached by other 17 potential convergence clubs around the world (including the EU-27, the OECD, the G20, OPEC, and the Arab League). It employs a diversity of methods (β - and σ - analyses, stationarity tests, IV regressions) and finds three main results. First, the degree of convergence is higher within the clubs than in the entire sample, and it is diversified across the clubs. Second, all methodologies confirm euro-area banking convergence. Third, banking convergence has a positive and significant impact in fostering real convergence.

JEL Classification: G21, F36, C22.

Keywords: convergence, comparing banking systems, euro area.

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1. Introduction¹

The analysis of economic growth long-run convergence across countries is a traditional and central issue of economic research. After the euro was chosen as a single currency by several countries, many works extended the analysis of convergence to banking indicators. Banking convergence is a relevant issue because it is strictly linked to integration (e.g. Adam et al., 2002), which in turn has implications for the single monetary policy, financial stability and economic growth (e.g. Artis et al., 2000; Danthine et al., 2001; Gaspar et al., 2003; Guiso et al., 2004; Lane, 2006). Moreover, convergence of banking indicators counts in itself since it helps to avoid asymmetric effects and to allow the single monetary policy to perform its smooth functioning (e.g. ECB, 2007). This paper deals with these issues and draws on three vast fields of research: income convergence, banking convergence, and the literature on finance and growth.

Regarding the literature on income convergence, I exploit the many different interpretations of convergence that have been offered and methodologies used (see, for example, the surveys of Durlauf and Quah, 1999; Temple, 1999; Islam, 2003) to pursue an eclectic and pragmatic strategy that combines several empirical methods applied to both income and banking convergence indicators. My empirical strategy is divided into three steps. The first step relies on β - and σ - convergence analysis (e.g. Barro and Sala-i-Martin, 1991 and 1992; Mankiw et al., 1992; Sala-i-Martin, 1996; Lee et al., 1997), and obtains an overview of general convergence for real and banking indicators. The second step is based on tests of zero mean stationarity (e.g. Bernard and Durlauf, 1995 and 1996; Evans and Karras, 1996; and Tsionas, 2000), and it is used for checking the first-step results, and to detect the degree of convergence of separate clusters around different cross-country averages. The third step combines the results of the first two steps to verify whether there is a link between real and banking convergence.

Turning to the literature on banking convergence, I exploit three aspects on which researchers and policymakers have reached a substantial consensus. First, I tackle the issue empirically, and investigate banking convergence through the analysis of two indicators (the ratios of deposits and loans respectively to GDP), since the literature shows that, compared with real GDP growth rate convergence, there is no clear theory on banking convergence and that the issue is therefore basically an empirical question. Second, I collect data from the 1960s, since the literature stresses that convergence is a long-term concept. Finally, I compare euro-area

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convergence with that reached by other groups of countries around the world, since the literature states that convergence is a relative concept and the only reliable method to assess the degree of convergence of a group of countries is to use control samples.

I refer to these control samples as potential convergence clubs. This expression derives from Baumol (1986), who coined the term “convergence club” to express the idea that some sets of countries, characterized by economic or institutional links, might converge faster and more fully than others. My overall sample includes 65 countries, which I divide into 17 partially overlapping potential convergence clubs. As clarified in detail later, subsequent studies showed that Baumol’s analysis suffered from a selection bias, and that any identification of clubs is not free of problems. Accordingly, and since I am interested in the effects of international affiliation and not in abstract statistical clustering, I follow a simple criterion. Since my focus is the euro area (which can be treated as an international organization), I simply identify the control clubs on the basis of countries’ membership in international organizations (the EU-27, OECD, G20, OPEC, the Arab League, etc.), and for further control, I add clubs identified by geography contiguity.

The literature on banking convergence generally concludes that in the euro area some segments of financial market have made greater progress in convergence than retail banking (e.g. Centeno and Mello, 1999; De Bandt and Davis, 2000; Kleimeier and Sander, 2000; Adam et al., 2002; Baele et. al., 2004; Dermine, 2006). It also finds that intra-country convergence is higher than euro-area convergence (e.g. Affinito and Farabullini, 2009; Gropp and Kashyap, 2009), and consequently analyses the factors hampering convergence (e.g. Affinito and Piazza, 2009). By contrast, my approach based on a comparison among several potential convergence clubs around the world shows that euro-area banking convergence is higher than that of the other clubs.

Finally, as for the literature on growth and finance, I exploit some of its concepts and methodologies (in particular from Aghion, Howitt and Mayer-Foulkes, 2005; and Abiad, Leigh and Mody, 2007), and show, as far as I know for the first time, that banking convergence facilitates per capita income convergence.

My findings are statistically robust, because they are based on the concurrence of results and tests obtained by very different methods, and are economically and politically relevant. They show that euro-area affiliation makes banking convergence easier, which in turn seems to enhance per capita income convergence, disclosing another reason why it is significant to monitor banking convergence.

The remainder of the paper proceeds as follows. Section 2 describes my methodology. Section 3 reviews the potential convergence clubs in my dataset, and explains how they are

identified. Section 4 describes the data. Section 5 shows my econometric outcomes and robustness checks. Section 6 concludes.

2. Methodology

My empirical analysis is divided into three steps. Each step in turn relies on different indicators, approaches and specifications, which are summarized in Figure 1.

2.1. First step (β and σ convergence): Do banking and real convergence exist?

In the first step, I use two complementary measures: β and σ convergence. As far as β -convergence is concerned, the empirical literature on income growth regresses the average growth rate of per capita income on its initial level and interprets a negative correlation as a sign of convergence. In other words, there is β -convergence if poor economies tend to grow faster than and to “catch up” with richer countries. I proceed in the same way, applying the concepts of β -analysis to per capita income as well as to two banking indicators (Loans/GDP and Deposits/GDP).

In formal terms, β -convergence may be analysed using the following equation:

$$\frac{1}{T} \Delta[\log(Y_{it})]_{t=t_0}^T = \alpha + (1 + \beta) \log(Y_{it_0}) + \gamma X_{it} + \varepsilon_{it} \quad (1.1)$$

where $Y_{i,t}$ is the variable of interest for country i at date t ; $\frac{1}{T} \Delta[\log(Y_{it})]_{t=t_0}^T$ is the average, between the first period t_0 and the last one T , of first differences of the logarithm of $Y_{i,t}$, corresponding to its average growth rate; $\log Y_{it_0}$ is the logarithm of the initial level of the variable of interest; ε_{it} is an error term.

Following the literature on economic growth, I distinguish between absolute and conditional convergence for all my indicators. Convergence is absolute if β is negative in a univariate regression, i.e. without controlling for additional variables on the right-hand side of the equation (1.1), then $X_{it} = 0$.² Convergence is conditional if a negative β is obtained after allowing for other country structural characteristics X_{it} . Conditional convergence implies that, even if countries do not reach the same level of the variable of interest, they can reach their respective

² Absolute convergence can be viewed as a test for a unit root (e.g. Levin et al., 2002), which underpins my second approach. In fact, if $|\beta| = 1$, a unit root is present, the time series is said to have a stochastic trend and there is no convergence. On the contrary, if β is negative, the hypothesis of the unit root can be rejected.

steady states. Therefore, conditional convergence suggests that a country positioned further below the steady state level tends to grow faster.³

My second measure of convergence is σ -convergence, which is obtained from the following equation:

$$\sigma_t^2 = 1/N \sum_{i=1}^N [\log(Y_{it}) - \bar{y}_t]^2 \quad (1.2)$$

where \bar{y}_t is the mean of the logarithm of Y_{it} . There is σ -convergence when the dispersion of the variable of interest across groups of economies tends to fall over time: $\sigma_{t+T} < \sigma_t$.

Although related, the two measures of convergence have different informational contents. Moreover, β -convergence does not formally imply σ -convergence, since it is a necessary but not a sufficient condition for σ -convergence (Quah, 1993; Barro and Sala-i-Martin, 1995).⁴

2.2. Second step (tests of zero mean stationarity): What is the most convergent club?

My second step explores real and banking convergence through tests of stationarity applied to differentials between two time-series (e.g. Hobijn and Franses, 2000; Harvey and Carvalho, 2002; Harvey, 2002; Busetti *et al.*, 2007). My methodology is based on three computations (Busetti *et al.*, 2007; Affinito and Farabullini, 2009).

First, I calculate the differentials D_{it} for each variable of interest. These differences can be computed following two alternative approaches (Figure 1): (i) the bilateral differentials D_{it}^j between each pair of countries; or (ii) the differences D_{it}^A between each country and the common average of a group of countries (e.g. Bernard and Durlauf, 1995; Hobijn and Franses, 2000; Corrado, Martin and Weeks, 2005; Pesaran, 2007).

In the first approach, the bilateral differentials D_{it}^j between each pair of countries are defined as:

$$D_{it}^j = Y_{it} - Y_{jt} \quad (2.1)$$

³ About conditional convergence of per capita income, Islam (1995) argues that "... convergence is more commonly understood as different countries of the world approaching the same or similar levels of income [i.e., in the 'absolute' sense]. There is probably little solace to be derived from finding that countries in the world are converging ... when the points to which they are converging remain very different".

⁴ In other words, mean reversion is not an indication that cross-sectional variance decreases over time. Sala-i-Martin (1996) explains the conceptual difference between the two convergence measures writing: " σ -convergence studies how the distribution of income evolves over time and β -convergence studies the mobility of income within the same distribution".

where apex j indicates that the differences D_{it} are between countries i and j , with $i \neq j$, and $Y_{i,t}$ is defined as in equation (1.1). If these differentials D_{it}^j are computed for all pairs of countries, the total number of bilateral differentials is $N_T(N_T - 1) / 2$, where N_T is the total number of countries.

In the second approach, the differentials D_{it}^A between each country and the common average of a group of countries are defined as:

$$D_{it}^A = Y_{it} - \bar{Y}_t \quad (2.2)$$

where apex A indicates that the differences D_{it} are obtained between each country i and the common average of a group of countries $\bar{Y}_t = N_C^{-1} \sum_{i=1}^{N_C} Y_{it}$, where N_C is the number of countries in the group; and $Y_{i,t}$ is defined as in equation (1.1).

Second, once the differentials D_{it} are computed as either in equation (2.1) or (2.2), I verify whether they are either nonstationary or stationary processes by utilizing the augmented Dickey-Fuller (ADF) test. In formal terms, the ADF test verifies if a unit root is present by testing the null hypothesis $\rho_i^* = 0$ against $\rho_i^* < 0$ in the following equation:

$$\Delta D_{it} = \mu_i + \rho_i^* D_{it-1} + \sum_{k=1}^{p-1} \phi_{ik} \Delta D_{it-k} + \varepsilon_{it} \quad (2.3)$$

where $\phi_k = \sum_{s=k+1}^p \rho_s$ and $\rho^* = (\sum_{r=1}^p \rho_r) - 1$. The test signals convergence when $\rho_i^* < 0$, i.e. if it rejects the hypothesis that a unit root is present; or equivalently when $\rho_i < 1$, i.e. if it rejects the hypothesis of nonstationarity.

Third, I verify the zero-mean stationarity of stationary differentials D_{it} by utilizing the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test, which verifies their zero-mean stationarity, rejecting this null hypothesis for large values of ζ statistic:

$$\zeta = \frac{\sum_{t=1}^T \left(\sum_{i=1}^N D_{it} \right)^2}{T^2 \hat{\sigma}_{LR}^2} \quad (2.4)$$

where $\hat{\sigma}_{LR}^2$ is a non-parametric estimator, robust to autocorrelation and to heteroscedasticity, of the long-run variance of D_{it} :

$$\hat{\sigma}_{LR}^2 = \hat{\gamma}(0) + 2 \sum_{\tau=1}^m w(\tau, m) \hat{\gamma}(\tau) \quad (2.5)$$

where $\hat{\gamma}(\tau)$ is the sample autocovariance of D_{it} at lag τ ; $w(\tau, m)$ is a weight function defined as $w(\tau, m) = 1 - |\tau|/m + 1$, and m is such that, as $T \rightarrow \infty$, $m \rightarrow \infty$ and $m^2/T \rightarrow 0$.

This methodology based on both ADF and KPSS tests aims at increasing the power of the tests, in particular at decreasing biases in favour of convergence. However, as a check of my results, the two kinds of test are also run separately.

Since in equation (2.2) the differentials D_{it}^A are computed on an average of countries in the same group, the average \bar{Y}_t can be seen as a steady state where the group of countries might converge. In other words, if the countries of a group converge to the common mean \bar{Y}_t , then a homogeneous model of development might emerge (convergence club), and it should be captured by \bar{Y}_t , which represents the common, long-run trend.

In the following, I refer to equation (2.1) to indicate the approach based on equations (2.1), (2.3), (2.4) and (2.5); and I refer to equation (2.2) to indicate the approach based on equations (2.2), (2.3), (2.4) and (2.5).

2.3. Third step (parallel convergences): Does banking convergence favour real convergence?

My third step uses the results of the previous steps in order to assess if there is a link between banking and real convergence. Although many studies have found a nexus between finance and growth (e.g. King and Levine, 1993a,b; Rajan and Zingales, 1998; Levine, 1998 and 1999; Levine, Loayza and Beck, 2000; Aghion, Howitt and Mayer-Foulkes, 2005; Demirgüç-Kunt and Levine, 2008), the relationship that might emerge between their respective convergences has received less attention. A number of factors can contribute to their simultaneous convergence. Obstfeld (1994) demonstrates that financial integration allows greater saving diversification and hence a shift in output growth. Gourinchas and Jeanne (2006) note that financial integration and high capital mobility may accelerate the convergence toward long-run levels of per capita output. Abiad, Leigh and Mody (2007) point out that greater financial integration differentiates current

accounts and allows poorer countries to attract capital from richer countries and to accelerate their growth.

In this light, some studies have tested if global financial integration benefits long-run growth and investigated the effect on growth rates of the international reallocation of capital. This literature has produced no consensus because, paradoxically, capital often moves from poorer to richer countries (e.g. Lucas, 1990; Kose, Prasad, Rogoff and Wei, 2006; Prasad, Rajan and Subramanian, 2006). More recently, Henry (2006) and Abiad, Leigh and Mody (2007) have argued that the role of international capital flows might be that of influencing the income convergence rather than raising the steady-state rate of growth. I follow their argument, testing the effect of banking convergence on per capita income convergence. To the best of my knowledge, such an analysis has not yet been utilized, probably because of the difficulty of measuring banking convergence and implementing this measure in an estimation of real convergence. Again I use two approaches (Figure 1).

The first approach consists simply in regressing the following equation:

$$g_i = b_i + u_i \tag{3.1}$$

where g_i and b_i are dummies taking the value of one when the bilateral differentials between a pair of countries is zero-mean stationary (results of equation 2.1), respectively, for per capita income and, alternatively, for one of the two banking indicators, and u_i is an error term. The regressor b_i is instrumented as explained in detail in Section 5.

The second approach basically follows the methodology of Aghion, Howitt and Mayer-Foulkes (2005), who examine the effect of a phenomenon on per-capita income convergence interacting a proxy of the phenomenon with the initial level of per-capita income. The likelihood of real convergence increases if and only if the coefficient of interaction term turns out to be significantly negative (in this line also Abiad, Leigh and Mody, 2007).⁵

This second approach is described by the following equation of an IV absolute β -analysis:

$$\frac{1}{T} \Delta[\log(G_{it})]_{t=t_0}^T = \alpha + (1 + \beta_{BG}) \log(G_{it_0}) \times B_i + \varepsilon_{it} \tag{3.2}$$

where G is the per capita income, B is a proxy of banking convergence; β_{BG} is the coefficient of the interaction term, and the other symbols are defined as in equation (1.1). My interaction term

⁵ Aghion, Howitt and Mayer-Foulkes (2005) explore the effect of financial development on per capita income convergence, while I analyse the effect of banking convergence on per capita income convergence. As clarified in Section 5, I also follow Aghion, Howitt and Mayer-Foulkes in the choice of several robustness checks.

is between the initial level of per capita income and a proxy of banking convergence B_i , which is computed either on Loans/GDP or on Deposits/GDP.

In turn B_i is alternatively measured in two ways. The first uses the results of equation (2.2). In this case, the banking convergence proxy is a dummy taking the value of one when the country converges to the average of my entire sample (bilateral differentials between each country and the whole cross-country average). The second uses the results of σ -convergence analysis of equation (1.2) to get a convergence indicator with continuous values. In order not to change the interpretation of the sign of the interaction term coefficient, B_i in this case is obtained as follows:

$$B_i = 1 - \sigma_i / \sigma_{max} \quad (3.3)$$

where σ_i is defined as in equation (1.2), and σ_{max} is the highest value of σ_i . Banking convergence decreases in σ_i and increases in B_i ; this is bounded between zero and one by construction.⁶

As detailed in Section 5, the banking convergence proxy B_i , in both its definitions, and the regressor b_i in equation (3.1), are all estimated with linear models and are instrumented to solve possible problems of endogeneity. This is done because most studies find that the nexus between finance and growth moves from the former to the latter, but there is no lack of reverse causality explanations (e.g. Shan et al. 2001; Allen et al., 2005), and the finance-growth relationship might also be driven by simultaneity bias.

3. Potential clubs

My entire dataset includes 65 countries, divided into 17 partially overlapping potential convergence clubs (Table 1 and 2). As mentioned in the Introduction, my main focus is the euro area, the potential club composed by the countries adopting the euro. The other countries and potential clubs are basically used as control samples.

I use the expression “potential convergence clubs” to mean groups of countries which may be supposed to converge faster and to a greater degree than the larger sample as a whole. This interpretation of potential convergence clubs derives from the concept of convergence club that can be traced back to Baumol (1986), who coined the expression to indicate that the presence or absence of unconditional convergence depends on the country sample.⁷ My potential

⁶ σ_i tends to zero and B_i tends to one when convergence improves in the sample. By construction, $\sigma_i = \sigma_{max}$ and B_i is equal to zero when convergence is minimum in the sample.

⁷ Baumol (1986) obtains a significant negative coefficient on the initial income variable in a growth-initial level regression for 16 OECD countries and for a group of formerly centrally planned countries, and takes this as evidence

convergence clubs are identified on the basis of their geographic contiguity or countries' membership in international organizations. This choice deserves to be clarified because it could appear open to the same criticism levelled at Baumol, whose club selection, according to De Long (1989) and Quah (1996a), suffers from a self-selection bias.⁸

In the literature that addresses the problem of the choice of criteria to be used in order to group the countries before testing for club convergence so as to prevent self-selection biases, two main approaches can be found. The first holds that a group of countries can reach a particular equilibrium, and thus can be empirically identified as a club, on the basis of conditioning variables, namely if each of countries shares the initial position or they all present strong similarities in structural, institutional and technological conditions (e.g. Durlauf and Johnson, 1995; Desdoigts, 1999; Canova, 2004). The second approach identifies the clubs endogenously with no conditioning variables, but using statistical tools (e.g. Hobijn and Franses, 2000; Corrado, Martin, and Weeks, 2005). However, there are drawbacks to both of these procedures. For the first approach: (i) it entails the difficulty of detecting and choosing the relevant conditioning variables; (ii) if the initial income cut-off is used, the choice of the cut-off date remains arbitrary; (iii) allowing for any attribute makes it hard to distinguish club convergence from conditional convergence.⁹ By contrast, the second approach omits factors which determine the clustering, and so it is liable not to yield any policy guidance (for a broad discussion, see Islam, 2003).

On the other hand, Corrado, Martin and Weeks (2005) suggest that “hypothetical clubs” of intra-country regions may be easily identified on the basis of simple common characteristics such as spatial proximity, political factors and country membership. Accordingly, a reasonable method of classifying groups of countries is to use their geographic contiguity or their membership in international organizations. As neighbouring regions, and regions within a given nation, share institutional frameworks, regulatory systems, consumer tastes, and technologies, it stands to reason that neighbouring countries, and countries within a given international organization, are more likely to have characteristics in common, determined by similar histories, similar cultures or even decisions and rules adopted in common in an international organization.

of (unconditional) convergence; while he does not find evidence of convergence in an extended sample of 72 countries.

⁸ DeLong (1988) shows that the proper criterion for sample selection in analysing convergence is *ex-ante* income level, and not *ex-post*. He also shows that, when the *ex-ante* criterion is used and Baumol's OECD sample is modified slightly, the result of unconditional convergence no longer holds.

⁹ Actually, the concept of convergence club is strictly related to the notion of conditional convergence. In the case of unconditional convergence, there is only one equilibrium level for all economies. For countries belonging to a club, instead, absolute and conditional convergence should be equivalent, because club affiliation (if correctly identified) should capture the economies' “fundamentals” that are otherwise captured by the regressors included in conditional estimations.

Indeed, some international organizations implicitly or explicitly pursue “convergence” as a goal. Further, geographic contiguity and membership in international organizations can also be viewed as exogenous determinants of those conditioning variables used by some studies to identify potential clubs. Finally, since the literature stresses that the only reliable method for measuring different degrees of convergence is to use control samples, and since my focus is the euro area, taken as an international organization, then the most suitable control samples appear to be other groups of countries that have decided to join an international organization.¹⁰

My first criterion – geographic contiguity – allows me to obtain 5 potential clubs as shown in Table 1. The first potential club is formed by all countries in my dataset, and thus I call it the “World”. The other four potential clubs are four continents: Europe, America, Africa and Asia. Oceania is excluded because it would include only Australia and New Zealand.

Using the criterion of membership in international organizations, I obtain nine potential clubs (Table 2).¹¹ The first potential club is the euro area. My dataset covers 15 out of the 16 euro-area countries, excluding only Luxembourg. The “euro-founders” club consists of the countries that adopted the single currency from its launch in January 1999. There were 11 countries; my sample covers 10 of them (Luxembourg is excluded).¹² The distinction between the euro area as a whole and the euro-founders serves to investigate whether convergence in the euro area has changed significantly with the entry of new countries.

The third potential club is the European Union (the EU-27), composed of 27 members and represented in my sample by 26 countries (again, only Luxembourg is missing).¹³ The OECD

¹⁰ Many works analyse convergence by selecting an affiliated group of economies, in particular belonging to the euro area or the OECD. For example, Bianco, Gerali and Massaro (1997) present a comparison of six developed economies and find that convergence across financial systems was limited. Schmidt, Hackethal and Tyrrel (2001) find that France in particular moved towards a more market-oriented system. Byrne and Davis (2002) find σ -convergence towards a more market-oriented financial system for the UK, France, Germany and Italy. Examining euro-area countries, Hartmann, Maddaloni and Manganelli (2003) find that the dispersion of currency, deposits and loans increased, while bond investment and financing became more uniform. Rajan and Zingales (2003) show that in the last two decades the convergence of European financial markets has improved and become more market oriented. Analysing seven European countries, Murinde, Agung and Mullineux (2004) find convergence of equity issues and internal firm finance, but not of bank loans. Sørensen and Gutierrez (2006) conclude that the introduction of the euro has increased the degree of cross-country homogeneity. By contrast, Dahl, Shrieves and Spivey (2006) reject the hypothesis that banks in different European countries have common activities. Affinito, De Bonis and Farabullini (2006) show the persistence of a country-effect in the composition of national banks’ balance sheets. On the other hand, Goddard et al. (2007) conclude that the process of transition towards a single European banking market is multi-faceted and ongoing. Di Giacinto and Esposito (2008) find β -convergence for indicators of financial development of 13 European countries, but not for banking business. Bruno and De Bonis (2009) analyse the financial accounts of eight OECD countries and find some signs of convergence.

¹¹ Table 2 also identifies the countries of each club that are excluded from my dataset because data are unavailable or series are too short.

¹² The single currency was adopted from the beginning by Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. Greece joined in 2001; Slovenia in 2007; Cyprus and Malta in 2008; and Slovakia in 2009.

¹³ The EU-27 indicates the 27 countries members of the European Union. Previously, the acronyms were EU-12; EU-15 and EU-25. In order not to overload my discussion, I do not analyse those “historical” clubs separately.

club consists of 27 out of 29 countries (excluding Iceland and Luxembourg). All eight countries of the G8 are included in my dataset. The G20 club includes 16 out of 19 countries (Argentina, South Africa and Saudi Arabia are left out). The NAFTA club includes all three members. OPEC includes 9 out of 13 member countries, and the Arab League 14 out of 22.

Finally, I obtained three “other” clubs which, though not identified by geographic contiguity or affiliation in organizations, are often considered together in international analyses. BRIC is the acronym for four large, rapidly developing countries: Brazil, Russia, India and China. CEEC is the club of 13 Central and East Europe Countries. “Former socialists” are countries were politically and economically similar at least until the end of 1980s.

As is evident, my potential convergence clubs are partially overlapping, in the sense that some countries are included in several clubs. For example, France belongs to eight potential clubs: the euro area, the euro-founders, the EU-27, the OECD, the G8, the G20, Europe, and the World; Indonesia belongs to four: the G20, OPEC, Asia, and the World.

My clubs constitute good samples in terms of both the number of countries and their population. My complete sample includes the largest countries in the world, a total population of more than 5 billion and almost all of global GDP. Even when the sample number of countries is low compared with the actual number (that is the case of the Arab League), the missing countries are small. Nevertheless, my selection may suffer from two problems. First, some my potential clubs, obtained for geographic contiguity, may be under-representative samples. For instance, the Europe club is a representative sample of the continent in terms of both population and number of countries; whereas the number of countries is low in the clubs America, Africa and Asia. Second, at least in two cases (NAFTA and BRIC), though the clubs are self-representative, the number of countries is very small. Nonetheless, where possible I keep these clubs in the analysis for the sake of completeness and because their comparison is interesting in any case. At the same time, I am forced to drop the smallest clubs when the number of observations is very low.

4. The data

The methodology described in Section 2 is applied to my three variables of interest: one indicator of real economic development (per capita income) and two indicators of banking development (Deposits/GDP and Loans/GDP). The source of data is the International Monetary Fund database (IMF).

Several studies, some of which are reviewed in this paper, have examined cross-country banking convergence using variables that are very similar to my two indicators. Like others (e.g. Levine, Loayza and Beck, 2000), I use private deposits and loans divided by GDP, excluding

interbank business and credit granted to the public sector, as well as loans granted by central banks and development banks. Interbank transactions are excluded because I am interested in the relationship between banks and their final customers; credit to the public sector because banks that are allocating credit to the private sector are more likely to effectively monitor borrowers than banks that are allocating credit to government and public enterprises (Levine and Zervos, 1998; Demirgüç-Kunt and Levine, 2008).

Ex-ante, it is hard to guess which banking indicator is more likely to converge earlier (Affinito and De Bonis, 2011). Deposits might converge more because of reduced global use of currency in circulation for payments and because of increased cash remittances from richer to poorer countries; however, the indicator could be affected by differences in national saving rates and in the availability of alternative forms of saving. The Loans/GDP ratio might converge faster because it reflects the general and similar credit needs once they are weighted for GDP; however, convergence could be impeded by differences between countries in the size of firms, the size of stock exchanges, the securities issued by firms, and so on.

I collected available annual data from 1964 to 2007 (44 periods for each country). The first year was chosen because the series are available for the majority of countries from it onwards. In several cases the time-series are shorter. For a few countries the length of time-series differs for the different variables.¹⁴ Table 3 provides summary statistics for the three variables in the 17 potential clubs. As expected, the G8 and the OECD present the highest average values for the per capita income, Africa the lowest. The highest figures for Deposits/GDP and Loans/GDP are in the euro area. Dispersion, measured by standard deviation, is lower in the euro area than in the OECD, but that of banking indicators is also low in the OPEC and Arab League. This confirms that the analysis needs more sophisticated statistical tools.

In the exercise on conditional β -convergence, even if I do not need to allow for specific factors influencing growth and convergence (as spelled out later), the matrix X_{it} of equation (1.1) contains a few control variables, typically used in the literature: GDP growth rate; a proxy for the size of the banking system; official exchange rates against the US dollar; inflation rates; and volumes of exports and imports. The source of data is again the IMF.

A further methodological choice I have made with regard to the data deserves to be stressed. Even if I have long time-series, in β - and σ -convergence analysis, and thus in my first

¹⁴ The data are available for: Bulgaria from 1969; Indonesia from 1967 for GDP and 1980 for deposits and loans; Hungary from 1970 for GDP and 1982 for loans and deposits; the United Arab Emirates from 1973; Bahrain and Oman from 1975; China from 1978; Lebanon, Poland and Romania from 1980; Turkey from 1987; Yemen from 1990; Slovenia from 1991; Albania, Russia and Ukraine from 1992; Croatia, Macedonia, the Czech Republic, Estonia, Latvia, Lithuania and Slovakia from 1993; Georgia from 1994; Spain (loans) from 1972; Ireland (deposits) from 1999.

step (equations 1.1 and 1.2) and in the second part of my third step (equation 3.2), I split my entire sample period into different spans, averaging my observations over these intervals. This procedure allows me both to exploit the panel dimension of data and to emphasize their cross-sectional nature, and thus allows avoiding the trade-off between panel and cross-section estimation of the speed of convergence that was pointed out by the empirical growth literature. For example, Quah (1993 and 1996a,b) stresses that panel estimations, though they allow not taking steady states as identical, still tend to overestimate the speed of convergence. Barro (1997) and Durlauf and Quah (1999) contend that the cross-sectional dimension of data contains long-run features that are more pertinent to growth study than the panel estimation. Hauck and Wacziarg (2004), and Aghion, Howitt and Mayer-Foulkes (2005) point out that a cross-sectional approach is preferable because development is imperfectly measured and persistent. Demirgüç-Kunt and Levine (2008) argue that panel methods may be less precise in assessing long-run growth issues than methods based on lower frequency data.

In particular, the procedure of averaging data over several, non-overlapping and non-frequent years is widely accepted because it makes it possible (for a broad discussion see, for example, Quah, 1993 and 1996a,b; Islam, 1995 and 2003; Barro, 1997; Cellini, 1997; Lee et al., 1998; Temple, 1999): (i) to enhance the long-run notion of convergence; (ii) to reduce measurement errors; (iii) to abstract from business cycle fluctuations; (iv) to decrease serial correlation; and (v) to avoid short-term disturbances and biases in favour of finding convergence that have been found when brief intervals and too frequent spans are used. On the other hand, using this procedure reduces the number of observations and forces me to give up the smallest clubs in the β -analysis.

The length of the intervals is chosen in such a way as to define periods of equal length and with an adequate number of years. In particular, my basic estimations (i.e. those presented in the tables) are carried out on three time intervals defined as r_1 , r_2 and r_3 .¹⁵ In any case, in order to test the robustness of my results and in particular their sensitivity to the definition of the spans, I try several combinations for the composition and length of the time intervals, both in the β - and σ -convergence analysis.

¹⁵ For the same reasons, and to avoid an excessive sensitivity to the first period values, initial levels of variables are computed as averages over the previous period. In formal terms, in equation (1.1), the first periods t_0 are respectively the time spans r_2 and r_1 ; the last periods T are respectively the time spans r_3 and r_2 ; $\frac{1}{T} \Delta [\log(Y_{it})]_{t=t_0}^T$ are the average growth rates of dependent variables for the periods r_3 and r_2 ; Y_{it_0} are the initial average values of the dependent variables, respectively, in the periods r_2 and r_1 ; X_{it} are the average values of other regressors, respectively, in the periods r_3 and r_2 or in the spans r_2 and r_1 if they are lagged. In the σ -convergence analysis I simply compute the averages of the three dependent variables for each country over each period, and then the cross-section standard deviations. In the specifications presented in the tables: r_1 is the span 1964-1978; r_2 is 1979-1992; and r_3 is 1993-2007.

By contrast, my second step, based on stationarity tests, keeps all the available yearly (not averaged) observations.

5. Results

The results of my three steps may be interesting in themselves, be viewed as mutual robustness checks or read as successive moments of the analysis.

5.1. First step (β - and σ - convergence): The euro area always exhibits signs of convergence

To obtain the β coefficients, I implemented a pooled regression, respectively for per capita income, Deposits/GDP, and Loans/GDP.¹⁶ The upper panel of Table 4 shows the results for the euro-area club; the lower panels show the results for all countries in my sample (the “World”), for “Europe”, the EU-27 and the OECD. The results of the other potential clubs are not reported for β -analysis because of the insufficient number of observations.

Table 4 contains two specifications. The first specification does not contain regressors, initial levels apart, and corresponds to the test of absolute β -convergence. The second specification reports the covariates included in the X_{it} matrix and represents a test of conditional β -convergence. The natural logarithms of Loans/GDP and the GDP growth rate are computed as lagged averages when they are used as regressors, in line with the empirical literature on growth and finance. A part of this literature uses previous-period lags as regressors in order to discern possible casual links (e.g. King and Levine, 1993a, b). However, even if this device is used to enhance the robustness of estimations, I am not interested in the effects of control variables because, analysing convergence, I focus only on the sign and statistical significance of β . Moreover, I am confident that the most important condition is that the matrix X_{it} always includes country-by-country dummies. In line with Durlauf and Quah (1999) and Islam (2003), the idea is that these dummies capture all remaining national specificities, and so I do not need to add any other control variable, contrary to the literature that deals with the effect of specific factors on growth and convergence.¹⁷

¹⁶ In the estimations, I used a standard robust regression model that implements a data-dependent method for down-weighting outliers.

¹⁷ The prevailing literature states that the central factor underlying the divergence is the technology. In turn, the cross-country differences in rates of technological progress can be explained by several factors. For example, a few studies include in the estimations variables measuring population health, political instability, educational attainment (e.g. Galor and Zeira, 1993; Howitt, 2000), or geographical, institutional and policy variables (e.g. Parente and Prescott, 1994; Acemoglu, Aghion and Zilibotti, 2002).

Turning to my empirical results, for per capita income, absolute β -convergence does not exist when I consider all the countries in my dataset, while it does emerge for the euro area, Europe, the EU-27, and the OECD. By contrast, a minor conditional convergence appears even for the World. This result is coherent with the prevailing empirical literature, which has found robust β -convergence only for developed industrialized economies and reported mixed results when emerging countries are included in the regressions (see Baumol, 1986; Romer, 1989; King and Rebelo, 1989; Rebelo, 1991; Mankiw, Romer and Weil, 1992; Romer, 1994; Evans, 1996; Pritchett, 1997; Maddison, 2001).

The results are interestingly diversified for the two banking indicators. The World does not converge at all. Deposits show neither absolute nor conditional convergence, and in no club. On the contrary, Loans seem to converge to similar levels in the euro area, Europe, the EU-27, and the OECD.¹⁸

The σ -analysis allows me to compare different groups of countries at any point of time and the same club over time (Table 5). From the former point of view, the euro area and, even more, the euro-founders, display the lowest intra-group dispersion for my three indicators. From the latter perspective, the euro area, besides presenting the lowest dispersion, also shows a clear σ -convergence for all three indicators.¹⁹ The OECD, for example, which has the second-lowest degree of dispersion, registers stable figures and then absence of σ -convergence.

As noted, β - and σ - analyses capture two partially different aspects that, taken together, give a more complete picture and reveal the uniqueness of the euro area, which is the only club that always exhibits signs of convergence (Table 6).

5.2. Second step (tests of zero mean stationarity): The euro area stands out for banking convergence

As illustrated in Section 2.2 and Figure 1, the tests of zero mean stationarity are run with two approaches based on equations (2.1) and (2.2). First, I analyse the individual differentials D_{it}^j between each pair of countries belonging to a certain group, including the World club, and therefore between all bilateral pairs: $N_T(N_T - 1) / 2 = 2,080$ observations. Second, I test the differentials D_{it}^A between each country and the common average computed for countries belonging to the same club.

¹⁸ The results of Table 4 also validate my selection of clubs. In fact, if clubs are correctly identified, the value of β should not change when regressions are run with and without the set of conditioning variables.

¹⁹ In my exercises, there are cases in which σ -convergence follows absence of β -convergence. Yet it can be demonstrated, on the contrary, that if there is no β -convergence, there cannot be σ -convergence (e.g. Barro and Sala-i-Martin, 1995). The reason for my seemingly strange result is twofold. First, it depends on my choice of averaging observations over three time intervals. Second, σ -convergence is presented for all three time spans, while for β -convergence one time observation is dropped when regressing the variable on its initial level.

To make the results easier to read, I do not show all these tests. What I present, for both approaches and for each variable, are the percentage shares of convergent differentials on the total number of differentials. Figure 2 (geographical clubs and “other” clubs) and Figure 3 (international organizations) present the results of the first approach (equation 2.1). Figures 4 (geographical clubs and “other” clubs) and Figure 5 (international organizations) present the results of the second approach (equation 2.2).

For example, the G8 presents 28 combinations [$N_T(N_T - 1) / 2 = 8 \times 7 / 2 = 28$] when I adopt equation (2.1), while it has 8 country-observations when I follow equation (2.2). In the first approach, I found that 12 bilateral pairs of countries were convergent for per capita income, and so Figure 3 reports the percentage share of 42.9 (= $12/28 \times 100$). In the second approach, four G8 countries converge to the common G8 per capita income mean, and so Figure 5 reports the percentage share of 50 (= $4/8 \times 100$). To facilitate comparison, the results for the euro area and euro-founders are reported in all the figures. The right-scale, labelled as banking convergence, is the sum of the two banking indicators.

This second step basically confirms the results of the β - and σ - analyses. The degree of convergence is different for my three indicators and across the clubs; in particular, it is higher within each group than in the World as a whole.²⁰ The World club exhibits a generally low share of convergence (as it did not display signs of β - and σ - convergence). Symmetrically, the OECD confirms a good degree of convergence (as it showed β -convergence).

The outcome that also emerges clearly in this second step is the nature of effective convergence clubs of the two euro clubs. In the first approach (Figures 2 and 3), the euro-founders show a higher degree of convergence than all the other clubs. The euro area is outstripped by several clubs as regards per capita GDP and Deposits, while its convergence is high for Loans/GDP. Even more, the second exercise (Figures 4 and 5) confirms that the euro-founders are the most homogeneous club, while the euro area reveals its specificity in banking convergence: although other clubs exceed it for per capita income convergence, the euro area presents a common steady state for Deposits and notably for Loans.

5.3. Third step (parallel convergences): Banking convergence spurs real convergence

The results of the third step of my analysis are shown in Table 7. Briefly, the third step consists in regressing per capita income convergence on banking convergence, which in turn is instrumented in order to deal with endogeneity. The regressors b_i in (3.1) and B_i in (3.2)-(3.3) are

²⁰ Needless to say, paraphrasing Islam (1995), there is probably little solace to be derived from finding that countries of a club are converging when the points to which they are converging remain very low.

instrumented with two kinds of instrumental variables: four dummies capturing the legal origin of each country and four alternative indexes of banking supervisory practice.²¹

The set of four dummies for legal origin is based on the legal scholars' view that national legal systems present sufficient similarities to be classified into four major families of law: English, French, German and Scandinavian.²² La Porta et al. (1997) and (1998) asserted that legal traditions were typically introduced into countries through conquest and colonization and, as such, are largely exogenous. The same studies underscored that legal origin affects legal rules and institutions, and thus can be used as an instrument in a two-stage procedure, where the second stage explains financial development. Since then, an abundant literature has taken legal origins as good instrumental variables because, in addition to be exogenous, they have a strong effect on finance and – of greater relevance for my purposes – also on banks.²³

Despite the wide use of these instruments in the literature, I include a second kind of instrumental variable in my estimations and I carry out several checks (described below) to verify the robustness of my results, as the possible pitfalls of using legal origin as an instrument have been pointed out by La Porta et al. (2008) and Shleifer (2008), the authors who pioneered its use in empirical economics.²⁴ The second kind of instrumental variable includes four alternative indexes of banking supervisory practice. The four indexes are taken from Barth, Caprio and Levine (2006), and are calculated using a cross-country database on Bank Regulation and Supervision originally kept by the World Bank. For each country they measure respectively: (i)

²¹ In addition, I use other instruments as robustness checks (see Section 5.4).

²² In my exercises the omitted case is the Scandinavian dummy.

²³ See, among others, Rajan and Zingales (1998); Levine (1998 and 1999); Demirgüç-Kunt and Maksimovic (1998); Beck, Levine and Loayza (2000); Levine, Loayza and Beck (2000); Ongena and Smith (2000); Esty and Megginson (2003); Aghion, Howitt and Mayer-Foulkes (2005); Jappelli, Pagano and Bianco (2005); Djankov et al. (2007); Qian and Strahan (2007); Demirgüç-Kunt and Levine (2008); Haselmann, Pistor and Vig (2010). The evidence showing that legal origin affects banking systems' characteristics deserves to be stressed because I use legal origins as instruments for banking convergence. For example, it has been found that legal origins affect the number of banking relationships (Ongena and Smith, 2000), the contours of foreign bank lending (Esty and Megginson, 2003), credit availability (Jappelli, Pagano and Bianco, 2005), private credit (Djankov et al., 2007), and bank lending rates (Qian and Strahan, 2007). Using banking indicators very similar to mine ones, Haselmann, Pistor and Vig (2010) find that they have a positive effect on lending volumes. Aghion, Howitt and Mayer-Foulkes (2005) also measure financial development through indicators very similar to those on which I estimated banking convergence.

²⁴ There are potentially two problems, one bearing on the channels through which legal origin influences finance, the other on the channels other than finance through which legal origin influences growth. With regard to the first issue, when La Porta et al. (2008) warn that “legal origins influence many spheres of law making and regulation, which makes it dangerous to use them as instruments”, they are referring to the fact that it is difficult to identify the channels through which legal origin influences finance, because legal origin influences finance through multiple channels (e.g. laws and regulations, their interpretation, contract enforcement, the judiciary's quality and judicial flexibility). However, “this criticism in no way rejects the significance of legal origins in shaping outcomes [that is in affecting finance]; it speaks only to the difficulty of identifying the channel”. In this light, since I do not use legal origins as instruments for specific rules or institutions (because I use them as instruments for my general indicators of banking convergence), the question of the channels through which legal origin influences finance is irrelevant in my exercises. As for the second issue, La Porta et al. (2008), though they admit that legal origins may influence growth through their effect on finance, labour markets and competition, emphasize that “the most obvious potential channel of influence of legal origins on growth is financial development”. In any case, I have adopted a prudent approach in my estimations and have added other instruments and several checks.

the restrictiveness of banking supervision, by defining the scope of credit institutions' activities (e.g. if they are allowed to engage in securities business, to sell insurance, the rules for entry, etc.); (ii) the set of general supervisory powers; (iii) supervisory forbearance; and (iv) financial statement transparency. The idea is that these factors have a direct effect on banking systems' characteristics but not on real convergence.

However, these instrumental variables are likely to be correlated or even endogenous to the first one (the set of dummies of legal origin). In fact, Barth, Caprio and Levine (2004) show that cross-country measures of banking regulation vary systematically by legal origin. This could bias my estimations when I use the two instruments simultaneously. To address this issue, in the third step I run three different specifications (Figure 1): the first specification (labelled *a* in Table 7: 1a; 2a; and 3a) includes the two kinds of instrument, the second (labelled *b*) only the legal origins, and the third (labelled *c*) only an index of supervisory practice.²⁵

The first part of Table 7 (specifications 1a; 1b; and 1c) reports the results of equation (3.1), where the dependent and independent variables are the results of equation (2.1), respectively, for per capita income and Deposits/GDP.

The second part of Table 7 reports the results of an IV β -analysis of per capita income using as a regressor the interaction term between the initial level of per capita income and two alternative indicators of banking convergence measured on the ratio Loans/GDP.²⁶ The first indicator of banking convergence (specifications 2a; 2b; and 2c) is a dummy that take the value of one when the country's Loans/GDP ratio is zero-mean stationary with the World average (equation 3.2, which uses the results of equation 2.2). The second indicator of banking convergence (specifications 3a; 3b; and 3c) is the complement to one of the ratio between the standard deviation and its highest value (equations 3.2-3.3, which use the results of equation 1.2). I do not present estimations with other regressors, which, however, are run (Section 5.4), because the results of Table 7 are closer to the concept of absolute β -convergence, and the presence of absolute convergence renders analysis of conditional convergence pointless.

All IV estimations indicate that banking convergence has a significant impact fostering real convergence. The standard statistical tests (reported in the Table 7) signal that my instruments are likely to be weak in the model of equation (3.1).²⁷ However, the same statistical

²⁵ In the results of Table 7, the supervisory practice index is the restrictiveness of banking supervision. However, I used alternatively all four indexes in my regressions and the results are equivalent. Instrumenting with the four indexes of banking supervisory practice, there are fewer observations because they are not available for some countries in my dataset.

²⁶ I show the results obtained running equation (3.1) with the Deposits/GDP ratio and equations (3.2)-(3.3) with the Loans/GDP ratio. However, the results are analogous using Loans in (3.1) and Deposits in (3.2)-(3.3).

²⁷ In equation (3.1), both the dependent and covariate are not observed variables but proxies resulting from statistical tests, and thus both are subject to measurement errors. This may lead to inconsistency in the inferential procedure.

tests corroborate the validity and strength of my instruments in the models of equations (3.2)-(3.3).²⁸ Therefore, while Aghion, Howitt and Mayer-Foulkes (2005) found that financial development spurs real convergence, my results suggest that banking convergence also spurs real convergence.

5.4. Robustness checks

The main check of my results on convergence consisted in using several empirical methods. I adopted two different methodologies and two different measures/approaches for each methodology. When the results are consistent across several markedly different econometric methods, they appear robust and reliable. This is precisely the case of the high degree of convergence reached by the euro-area countries and the euro-founders. Moreover, I also performed the following checks.

In the first step, in addition to estimation based on the three spans described in Section 4, I ran a single cross-section regression, following the method of Barro and Sala-i-Martin; and I also tried to change the composition and the length of the three spans. These results were analogous to those of the pooled regression and so they are not reported. As for conditional β -analysis, I ran several specifications by progressively introducing the explanatory variables in order to control for endogeneity; by substituting exports with exchange rates; by dropping each country in turn (since in the literature it is still an open question whether individual country outliers exist). The results remained stable.

For the same reason, in the second step I also dropped each country in turn in the whole sample and in the single clubs. This exercise simultaneously changed both the numerator and the denominator of the shares shown in the Figures 2-5 and left the relative differences among clubs broadly stable.²⁹ Likewise, relative comparisons across clubs remained stable even applying to

However, I decided also to show the results of this model, which are weaker but equivalent to those found in equations (3.2)-(3.3).

²⁸ In each of the three specifications (a), it was possible to carry out a Sargan test because the number of instruments is greater than the number of endogenous variables. The results of the tests indicate that the sample evidence is consistent with the joint validity of all instruments. In particular, they corroborate the idea that legal origin instruments affect growth only through financial indicators. In fact, if my instruments affected growth through a variable not included in my specifications, then the Sargan test should reject the null, that is to say the validity of instruments. In line with Aghion, Howitt and Mayer-Foulkes (2005), I computed the Sargan test in specifications (b) as well, even if in this case the greater number of instruments derives from the use of three dummies, which refer to the different legal origins. The results again corroborate my choice of instruments. Moreover, in all specifications, in order to check the strength of my instruments, I estimated the reduced form of each specification, and I computed the corresponding F -statistic. According to the reference value of the F -statistic proposed by Staiger and Stock (1997), and Stock and Watson (2003), which is equal to 10, the results of equation (3.1) are liable to be based on weak instruments. However, the results of equations (3.2) and (3.3), specifications 2 and 3, are based on valid and strong instruments.

²⁹ Since China is mentioned as a counterexample to the general findings on finance and growth (Allen, Qian and Qian, 2005), it is worth underscoring that my results remain stable even when China is dropped.

the differentials D_{it} in equations (2.1) and (2.2) either the ADF or the KPSS tests instead of both of them. The results remained the same even when I dropped observations over time and changed the first or the last sample period.

The results of the third step were checked by: running other models without instrumenting (probit for the first exercise and OLS for the second exercise); dropping countries in turn; measuring alternatively banking convergence with Deposits or Loans; changing again the composition and length of the three time-spans; including my additional explanatory variables in matrix X_{it} and country dummies; and interacting the additional explanatory variables with the initial output.³⁰ The outcomes always remained stable.

Finally, in addition to the instrumental variables and statistical tests already described in the previous subsection, I verified whether the results of my third step are determined by the choice of the instruments by using three further alternative instruments. The first was obtained interacting the legal origins with initial output instead of using the simple legal origins.³¹ As a second alternative instrument, I used the lagged B_i of equation (3.3). As a third alternative instrument, I used the settler mortality (see Acemoglu, Johnson, and Robinson, 2001), interacted or not with initial output.³² The results were always confirmed.

6. Conclusions

Combining the literature on euro-area banking convergence, real convergence and finance and growth, and comparing banking convergence with convergence of per capita income, I have pursued three goals in this paper. First, I sought to verify whether membership in international organizations and geographical contiguity constitute suitable criteria to select potential

³⁰ As argued by Aghion, Howitt and Mayer-Foulkes (2005), the addition of other interactions serves both as a test for the robustness of the sign and significance of the relevant coefficient, and as a further test for instruments' validity. In particular, it is interesting to mention the results when I include as a single or interacted regressor the natural logarithm of Loans/GDP (used in the matrix X_{it} of my equation 1.1, and by Aghion, Howitt and Mayer-Foulkes as a proxy of financial development): (i) it is significantly positive if I include it as a non-interacted regressor and maintain my main interacted regressor (i.e. banking convergence \times initial per-capita income); (ii) it is significantly negative if I interact it with the initial output and omit my main interacted regressor (and thus am able to replicate the result of Aghion, Howitt and Mayer-Foulkes); (iii) it is statistically insignificant if I interact it with the initial output and maintain my main interacted regressor (which remains significantly negative). The results are substantially the same even alternating the use of my instruments. Therefore, in my sample, my result on the role of convergence is more robust than Aghion, Howitt and Mayer-Foulkes' result on financial development.

³¹ Furthermore, following again Aghion, Howitt and Mayer-Foulkes (2005), I used the interacted instrument (legal origin \times initial per-capita income) to model the interaction term (banking convergence \times initial per-capita income), and instrumented separately for the banking convergence component with the non-interacted legal origin.

³² Several scholars considered settler mortality a strong instrument for financial development (e.g. Beck, Demirgüç-Kunt and Levine, 2003). Of course, the variable is not available for non-ex-colonies. In order not to lose observations, I again replicated the methodology of Aghion, Howitt and Mayer-Foulkes (2005), assigning settler mortality of New Zealand (the lowest available value in the dataset) to all non-ex-colonies. Alternatively, I set the settler-mortality of each country equal to the lowest value in the same continent (I again used the New Zealand value for European countries). In both cases I included in the regression a dummy equal to one for non-ex-colonies. The results always supported my outcomes.

convergence clubs around the world; in other words, whether such clubs converge more (and, if so, which ones). Second, I analysed if the convergence club formed by the euro-area countries represents a special case; in other words, if it converges even more than the other international clubs. Third, I tested whether banking convergence favours per capita income convergence.

I reasoned that, since convergence is a relative concept, the comparison between the euro area and the other potential clubs can shed light on the effective degree of convergence reached by countries adopting the euro. Therefore, I split my entire sample of 65 countries in 17 partially overlapping potential convergence clubs, and I juxtaposed their convergence results. To this end, I analysed three indicators (per capita income, Deposits/GDP and Loans/GDP), and applied in the econometric exercises the concepts of β - and σ - convergence, on one hand, and stationarity tests, on the other. I obtained three main findings.

First, convergence changes across the clubs and it is higher within the single groups than in the global sample.

Second, despite some differences among the results of minor clubs, the euro area exhibits convergence according to all methodologies. In particular, euro-area convergence reaches its peak for banking indicators, confirming the expectation that the euro-area banking systems are more homogeneous. The euro-founders – the subset of countries in the euro from the beginning – show higher convergence than the euro area as a whole, signalling that there is room for improved convergence when the last joiners close the gap with the older members.

Third, this paper provides evidence for the first time supporting the hypothesis that the exogenous component of banking convergence favours economic convergence.

Taken together, these results imply that new euro-area entrants have to be chosen carefully because they can jeopardize the convergence that has been achieved by the first joiners. On the other hand, the successful entry of a country into the euro area enhances banking convergence and this in turn seems likely to improve per capita-income convergence.

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Tables and figures

Figure 1. Summary of methodology

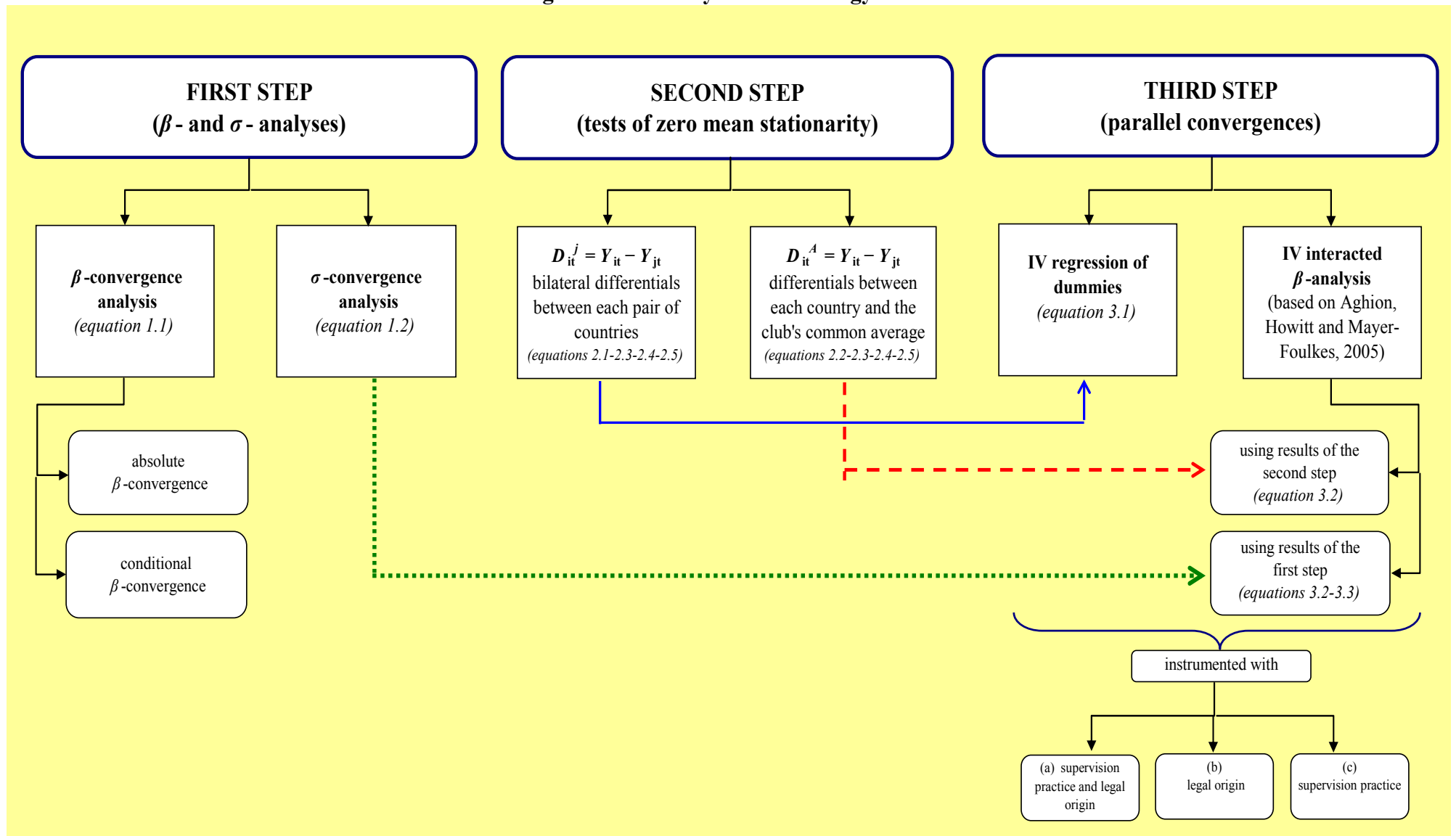


Table 1– Countries in the dataset and their classification in potential geographical clubs

| Countries in dataset ("World" club) | Europe | America | Africa | Asia |
|---|----------------|---------------|------------|----------------|
| Albania | Albania | | | |
| Algeria | | | Algeria | |
| Australia | | | | |
| Austria | Austria | | | |
| Bahrain | | | | Bahrain |
| Brazil | | Brazil | | |
| Belgium | Belgium | | | |
| Bulgaria | Bulgaria | | | |
| Canada | | Canada | | |
| China | | | | China |
| Croatia | Croatia | | | |
| Cyprus | Cyprus | | | |
| Czech Republic | Czech Republic | | | |
| Denmark | Denmark | | | |
| Egypt | | | Egypt | |
| Estonia | Estonia | | | |
| Finland | Finland | | | |
| France | France | | | |
| Gabon | | | Gabon | |
| Georgia | Georgia | | | |
| Germany | Germany | | | |
| Greece | Greece | | | |
| Hungary | Hungary | | | |
| India | | | | India |
| Indonesia | | | | Indonesia |
| Iran | | | | Iran |
| Ireland | Ireland | | | |
| Israel | | | | Israel |
| Italy | Italy | | | |
| Japan | | | | Japan |
| Jordan | | | | Jordan |
| Kuwait | | | | Kuwait |
| Latvia | Latvia | | | |
| Lebanon | | | | Lebanon |
| Lithuania | Lithuania | | | |
| Macedonia | Macedonia | | | |
| Malta | Malta | | | |
| Mauritania | | | Mauritania | |
| Mexico | | Mexico | | |
| Morocco | | | Morocco | |
| Netherlands | Netherlands | | | |
| New Zealand | | | | |
| Nigeria | | | Nigeria | |
| Norway | Norway | | | |
| Oman | | | | Oman |
| Poland | Poland | | | |
| Portugal | Portugal | | | |
| Qatar | | | | Qatar |
| Romania | Romania | | | |
| Russia | Russia | | | |
| Slovakia | Slovakia | | | |
| Slovenia | Slovenia | | | |
| South Korea | | | | South Korea |
| Spain | Spain | | | |
| Sweden | Sweden | | | |
| Switzerland | Switzerland | | | |
| Syria | | | | Syria |
| Tunisia | | | Tunisia | |
| Turkey | Turkey | | | |
| Ukraine | Ukraine | | | |
| United Arab Emirates | | | | U. A. Emirates |
| United Kingdom | U. Kingdom | | | |
| United States | | United States | | |
| Venezuela | | Venezuela | | |
| Yemen | | | | Yemen |
| Number of countries in the dataset for each club | 35 | 5 | 7 | 16 |
| Total number of countries in each club | 44 | 27 | 54 | 50 |

Table 2 – Countries in the dataset and their classification in potential clubs for international organizations and other clubs

| Countries in dataset ("World" club) | Euro | | International organizations' clubs | | | | | | | Other clubs | | |
|---|---|--------------------|------------------------------------|---------------|---------------|---------------|---------------|----------------|------------------|-------------|------------|-------------------|
| | Euro area | Euro area founders | European Union - 27 | OECD | G8 | G20 | NAFTA | OPEC | Arab League | BRIC | CEEC | Former socialists |
| Albania | | | | | | | | | | | Albania | Albania |
| Algeria | | | | | | | | Algeria | Algeria | | | |
| Australia | | | | Australia | | Australia | | | | | | |
| Austria | Austria | Austria | Austria | Austria | | | | | | | | |
| Bahrain | | | | | | | | | Bahrain | | | |
| Brazil | | | | | | Brazil | | | | Brazil | | |
| Belgium | Belgium | Belgium | Belgium | Belgium | | | | | | | | |
| Bulgaria | | | Bulgaria | | | | | | | | Bulgaria | Bulgaria |
| Canada | | | | Canada | Canada | Canada | Canada | | | | | |
| China | | | | | | China | | | | China | | |
| Croatia | | | | | | | | | | | Croatia | Croatia |
| Cyprus | Cyprus | | Cyprus | | | | | | | | | |
| Czech Republic | | | Czech Rep. | Czech Rep. | | | | | | | Czech Rep. | Czech Rep. |
| Denmark | | | Denmark | Denmark | | | | | | | | |
| Egypt | | | | | | | | | Egypt | | | |
| Estonia | | | Estonia | | | | | | | | Estonia | Estonia |
| Finland | Finland | Finland | Finland | Finland | | | | | | | | |
| France | France | France | France | France | France | France | | | | | | |
| Gabon | | | | | | | | Gabon | | | | |
| Georgia | | | | | | | | | | | | Georgia |
| Germany | Germany | Germany | Germany | Germany | Germany | Germany | | | | | | |
| Greece | Greece | | Greece | Greece | | | | | | | | |
| Hungary | | | Hungary | Hungary | | | | | | | Hungary | Hungary |
| India | | | | | | India | | | | India | | |
| Indonesia | | | | | | Indonesia | | Indonesia | | | | |
| Iran | | | | | | | | Iran | | | | |
| Ireland | Ireland | Ireland | Ireland | Ireland | | | | | | | | |
| Israel | | | | | | | | | | | | |
| Italy | Italy | Italy | Italy | Italy | Italy | Italy | | | | | | |
| Japan | | | | Japan | Japan | Japan | | | | | | |
| Jordan | | | | | | | | | Jordan | | | |
| Kuwait | | | | | | | | Kuwait | Kuwait | | | |
| Latvia | | | Latvia | | | | | | | | Latvia | Latvia |
| Lebanon | | | | | | | | | Lebanon | | | |
| Lithuania | | | Lithuania | | | | | | | | Lithuania | Lithuania |
| Macedonia | | | | | | | | | | | Macedonia | Macedonia |
| Malta | Malta | | Malta | | | | | | | | | |
| Mauritania | | | | | | | | | Mauritania | | | |
| Mexico | | | | Mexico | | Mexico | Mexico | | | | | |
| Morocco | | | | | | | | | Morocco | | | |
| Netherlands | Netherlands | Netherlands | Netherlands | Netherlands | | | | | | | | |
| New Zealand | | | | New Zealand | | | | | | | | |
| Nigeria | | | | | | | | Nigeria | | | | |
| Norway | | | | Norway | | | | | | | | |
| Oman | | | | | | | | | Oman | | | |
| Poland | | | Poland | Poland | | | | | | | Poland | Poland |
| Portugal | Portugal | Portugal | Portugal | Portugal | | | | | | | | |
| Qatar | | | | | | | | Qatar | Qatar | | | |
| Romania | | | Romania | | | | | | | | Romania | Romania |
| Russia | | | | | Russia | Russia | | | | Russia | | Russia |
| Slovakia | Slovakia | | Slovakia | | | | | | | | Slovakia | Slovakia |
| Slovenia | Slovenia | | Slovenia | | | | | | | | | Slovenia |
| South Korea | | | | South Korea | | South Korea | | | | | | |
| Spain | Spain | Spain | Spain | Spain | | | | | | | | |
| Sweden | | | Sweden | Sweden | | | | | | | | |
| Switzerland | | | | Switzerland | | | | | | | | |
| Syria | | | | | | | | | Syria | | | |
| Tunisia | | | | | | | | | Tunisia | | | |
| Turkey | | | | Turkey | | Turkey | | | | | Turkey | |
| Ukraine | | | | | | | | | | | | Ukraine |
| United Arab Emirates | | | | | | | | U. A. Emirates | U. A. Emirates | | | |
| United Kingdom | | | U. Kingdom | U. Kingdom | U. Kingdom | U. Kingdom | | | | | | |
| United States | | | | United States | United States | United States | United States | | | | | |
| Venezuela | | | | | | | | Venezuela | | | | |
| Yemen | | | | | | | | | Yemen | | | |
| Number of countries in the dataset for each club | 15 | 10 | 26 | 27 | 8 | 16 | 3 | 9 | 14 | 4 | 13 | 16 |
| Total number of countries in each club | 16 | 11 | 27 | 29 | 8 | 19 | 3 | 13 | 22 | 4 | 13 | chenging |
| | Missing countries in the dataset | | | | | | | | | | | |
| | Luxembourg | Luxembourg | Luxembourg | Island | | Argentina | | Ecuador | Comoro | | | |
| | | | | Luxembourg | | South Africa | | Iraq | Djibouti | | | |
| | | | | | | Saudi Arabia | | Libya | Iraq | | | |
| | | | | | | | | South Arabia | Libya | | | |
| | | | | | | | | | Palestine & Gaza | | | |
| | | | | | | | | | Somalia | | | |
| | | | | | | | | | South Arabia | | | |
| | | | | | | | | | Sudan | | | |

Table 3
Descriptive statistics for the 17 potential clubs in the dataset

| Kind of club | Period | Per-capita income | Deposits/GDP | Loans/GDP |
|-----------------------------|----------------------|-------------------|--------------|-----------|
| Euro | Euro-area | | | |
| | Observations | 604 | 569 | 596 |
| | Mean | 12.13 | 0.65 | 0.67 |
| | Std. Dev. | 10.98 | 0.23 | 0.32 |
| | Min | 0.38 | 0.16 | 0.13 |
| | Max | 66.57 | 1.42 | 1.98 |
| | Euro-founders | | | |
| | Observations | 440 | 405 | 432 |
| | Mean | 13.93 | 0.64 | 0.72 |
| | Std. Dev. | 11.81 | 0.20 | 0.31 |
| Geographical contiguity | World | | | |
| | Observations | 2,355 | 2,256 | 2,287 |
| | Mean | 9.21 | 0.50 | 0.49 |
| | Std. Dev. | 11.41 | 0.35 | 0.37 |
| | Min | 0.00 | 0.00 | 0.00 |
| | Max | 92.58 | 3.05 | 2.02 |
| | Europe | | | |
| | Observations | 1,129 | 1,056 | 1,083 |
| | Mean | 11.41 | 0.58 | 0.59 |
| | Std. Dev. | 12.42 | 0.34 | 0.38 |
| | Min | 0.15 | 0.00 | 0.00 |
| | Max | 92.58 | 3.05 | 2.02 |
| | America | | | |
| | Observations | 220 | 220 | 220 |
| | Mean | 10.03 | 0.44 | 0.40 |
| | Std. Dev. | 10.86 | 0.28 | 0.27 |
| | Min | 0.43 | 0.08 | 0.08 |
| | Max | 48.12 | 1.60 | 1.39 |
| | Africa | | | |
| | Observations | 308 | 306 | 308 |
| | Mean | 1.36 | 0.27 | 0.26 |
| | Std. Dev. | 1.54 | 0.20 | 0.17 |
| | Min | 0.06 | 0.02 | 0.03 |
| | Max | 8.11 | 0.85 | 0.69 |
| | Asia | | | |
| | Observations | 610 | 586 | 588 |
| | Mean | 8.27 | 0.50 | 0.46 |
| | Std. Dev. | 10.81 | 0.40 | 0.40 |
| | Min | 0.00 | 0.00 | 0.00 |
| | Max | 64.53 | 2.33 | 2.00 |
| International organizations | EU-27 | | | |
| | Observations | 929 | 860 | 887 |
| | Mean | 11.26 | 0.60 | 0.61 |
| | Std. Dev. | 11.27 | 0.32 | 0.35 |
| | Min | 0.38 | 0.11 | 0.02 |
| | Max | 66.57 | 3.05 | 2.02 |
| | OECD | | | |
| | Observations | 1,114 | 1,067 | 1,094 |
| | Mean | 13.78 | 0.63 | 0.65 |
| | Std. Dev. | 12.98 | 0.37 | 0.40 |
| Min | 0.11 | 0.06 | 0.02 | |
| Max | 92.58 | 3.05 | 2.02 | |
| International organizations | G8 | | | |
| | Observations | 324 | 323 | 323 |
| | Mean | 15.55 | 0.82 | 0.77 |
| | Std. Dev. | 12.05 | 0.52 | 0.39 |
| | Min | 0.31 | 0.13 | 0.08 |
| | Max | 48.12 | 3.05 | 2.00 |
| | G20 | | | |
| | Observations | 636 | 615 | 615 |
| | Mean | 10.28 | 0.60 | 0.59 |
| | Std. Dev. | 11.38 | 0.46 | 0.39 |
| | Min | 0.00 | 0.06 | 0.08 |
| | Max | 48.43 | 3.05 | 2.00 |
| | NAFTA | | | |
| | Observations | 132 | 132 | 132 |
| | Mean | 13.02 | 0.55 | 0.48 |
| | Std. Dev. | 12.18 | 0.30 | 0.27 |
| | Min | 0.43 | 0.08 | 0.11 |
| | Max | 48.12 | 1.60 | 1.39 |
| | OPEC | | | |
| | Observations | 383 | 367 | 369 |
| Mean | 8.01 | 0.32 | 0.26 | |
| Std. Dev. | 11.26 | 0.22 | 0.19 | |
| Min | 0.03 | 0.02 | 0.03 | |
| Max | 64.53 | 1.78 | 1.39 | |
| Arab League | | | | |
| Observations | 539 | 535 | 537 | |
| Mean | 6.65 | 0.39 | 0.34 | |
| Std. Dev. | 10.04 | 0.24 | 0.28 | |
| Min | 0.12 | 0.02 | 0.01 | |
| Max | 64.53 | 1.78 | 1.90 | |
| Other | BRIC | | | |
| | Observations | 134 | 126 | 126 |
| | Mean | 3.13 | 0.32 | 0.41 |
| | Std. Dev. | 5.82 | 0.18 | 0.33 |
| | Min | 0.00 | 0.10 | 0.08 |
| | Max | 29.12 | 1.15 | 1.36 |
| | CEEC | | | |
| | Observations | 275 | 239 | 239 |
| | Mean | 3.79 | 0.34 | 0.33 |
| | Std. Dev. | 3.18 | 0.16 | 0.20 |
| Min | 0.15 | 0.06 | 0.02 | |
| Max | 19.17 | 0.73 | 0.94 | |
| Former socialists | | | | |
| Observations | 316 | 278 | 278 | |
| Mean | 3.97 | 0.31 | 0.31 | |
| Std. Dev. | 3.82 | 0.17 | 0.21 | |
| Min | 0.15 | 0.00 | 0.00 | |
| Max | 22.82 | 0.73 | 0.94 | |

Table 4
First step: β -convergence analysis (equation 1.1)

| | Per-capita income | | Deposits/GDP | | Loans/GDP | |
|-------------------------------------|-------------------------------|----------------------------------|-------------------------------|----------------------------------|-------------------------------|----------------------------------|
| | absolute β -convergence | conditional β -convergence | absolute β -convergence | conditional β -convergence | absolute β -convergence | conditional β -convergence |
| Euro-area | | | | | | |
| initial level of dependent variable | -0.016 *** <i>0.004</i> | -0.024 ** <i>0.012</i> | -0.016 <i>0.013</i> | -0.058 <i>0.045</i> | -0.024 <i>0.016</i> | -0.092 ** <i>0.040</i> |
| Inflation rate (r-1) | | 0.000 <i>0.002</i> | | -0.001 <i>0.002</i> | | -0.005 *** <i>0.002</i> |
| Exports/GDP (r-1) | | 0.133 <i>0.140</i> | | -0.273 <i>0.236</i> | | -0.592 *** <i>0.208</i> |
| Ln(Loans/GDP) (r-1) | | 0.044 * <i>0.027</i> | | | | |
| GDP growth rate (r-1) | | | | -0.481 * <i>0.289</i> | | -0.725 ** <i>0.346</i> |
| Country-by country dummies | no | yes | no | yes | no | yes |
| constant | 0.089 *** <i>0.007</i> | 0.093 ** <i>0.038</i> | 0.009 <i>0.010</i> | 0.132 <i>0.077</i> | 0.013 <i>0.013</i> | 0.261 *** <i>0.068</i> |
| Number of observations | 27 | 25 | 25 | 24 | 27 | 24 |
| World | | | | | | |
| initial level of dependent variable | -0.001 <i>0.002</i> | -0.013 * <i>0.007</i> | -0.006 <i>0.004</i> | -0.011 <i>0.016</i> | -0.006 <i>0.006</i> | 0.005 <i>0.029</i> |
| Inflation rate (r-1) | | 0.000 <i>0.000</i> | | 0.000 <i>0.000</i> | | 0.000 <i>0.000</i> |
| Exports/GDP (r-1) | | -0.017 ** <i>0.008</i> | | 0.044 <i>0.084</i> | | 0.024 * <i>0.013</i> |
| Ln(Loans/GDP) (r-1) | | 0.032 <i>0.021</i> | | | | |
| GDP growth rate (r-1) | | | | -0.039 <i>0.089</i> | | -0.206 <i>0.166</i> |
| Country-by country dummies | no | yes | no | yes | no | yes |
| constant | 0.060 *** <i>0.004</i> | 0.125 *** <i>0.044</i> | 0.015 *** <i>0.005</i> | -0.022 <i>0.042</i> | 0.019 *** <i>0.007</i> | -0.102 <i>0.101</i> |
| Number of observations | 105 | 89 | 96 | 81 | 98 | 88 |
| Europe | | | | | | |
| initial level of dependent variable | -0.014 *** <i>0.003</i> | -0.022 * <i>0.012</i> | -0.012 <i>0.009</i> | -0.059 <i>0.062</i> | -0.022 ** <i>0.010</i> | -0.107 *** <i>0.034</i> |
| Inflation rate (r-1) | | -0.001 <i>0.002</i> | | -0.001 <i>0.003</i> | | -0.005 *** <i>0.002</i> |
| Exports/GDP (r-1) | | 0.143 <i>0.144</i> | | -0.248 <i>0.372</i> | | -0.531 *** <i>0.189</i> |
| Ln(Loans/GDP) (r-1) | | 0.040 * <i>0.025</i> | | | | |
| GDP growth rate (r-1) | | | | -0.320 <i>0.391</i> | | -0.699 ** <i>0.279</i> |
| Country-by country dummies | no | yes | no | yes | no | yes |
| constant | 0.088 *** <i>0.004</i> | 0.147 <i>0.206</i> | 0.009 <i>0.007</i> | 0.118 <i>0.136</i> | 0.014 <i>0.009</i> | 0.343 ** <i>0.151</i> |
| Number of observations | 47 | 40 | 40 | 37 | 42 | 39 |
| EU-27 | | | | | | |
| initial level of dependent variable | -0.015 *** <i>0.004</i> | -0.023 ** <i>0.011</i> | -0.013 <i>0.011</i> | -0.053 <i>0.039</i> | -0.024 * <i>0.012</i> | -0.118 *** <i>0.025</i> |
| Inflation rate (r-1) | | 0.000 <i>0.002</i> | | -0.001 <i>0.002</i> | | -0.005 *** <i>0.001</i> |
| Exports/GDP (r-1) | | 0.147 <i>0.124</i> | | -0.254 <i>0.238</i> | | -0.613 *** <i>0.138</i> |
| Ln(Loans/GDP) (r-1) | | 0.040 * <i>0.021</i> | | | | |
| GDP growth rate (r-1) | | | | -0.377 <i>0.273</i> | | -0.949 *** <i>0.225</i> |
| Country-by country dummies | no | yes | no | yes | no | yes |
| constant | 0.089 *** <i>0.006</i> | 0.192 * <i>0.109</i> | 0.008 <i>0.008</i> | 0.364 <i>0.241</i> | 0.013 <i>0.011</i> | 0.300 *** <i>0.095</i> |
| Number of observations | 39 | 35 | 35 | 33 | 37 | 34 |
| OECD | | | | | | |
| initial level of dependent variable | -0.013 *** <i>0.003</i> | -0.042 *** <i>0.012</i> | -0.007 <i>0.007</i> | -0.050 <i>0.034</i> | -0.023 *** <i>0.008</i> | -0.082 * <i>0.044</i> |
| Inflation rate (r-1) | | -0.003 * <i>0.002</i> | | 0.000 <i>0.001</i> | | -0.006 * <i>0.003</i> |
| Exports/GDP (r-1) | | 0.297 * <i>0.172</i> | | -0.004 <i>0.256</i> | | 0.418 <i>0.307</i> |
| Ln(Loans/GDP) (r-1) | | 0.047 ** <i>0.021</i> | | | | |
| GDP growth rate (r-1) | | | | -0.245 <i>0.223</i> | | 0.051 <i>0.369</i> |
| Country-by country dummies | no | yes | no | yes | no | yes |
| constant | 0.084 *** <i>0.005</i> | 0.314 ** <i>0.115</i> | 0.012 * <i>0.006</i> | 0.020 <i>0.081</i> | 0.012 <i>0.008</i> | -0.189 <i>0.118</i> |
| Number of observations | 50 | 46 | 47 | 45 | 49 | 45 |

Table reports regression coefficients and associated standard errors in italics. ***, **, and * denote statistical significance at 1, 5 and 10 % level, respectively.

Table 5
First step:
 σ -convergence analysis (equation 1.2)

| Kind of club | Period | Per-capita income | Deposits/GDP | Loans/GDP |
|-----------------------------|--------------------------|-------------------|--------------|-----------|
| Euro | Euro-area | | | |
| | $r_1 = 1964-1978$ | 0.53 | 0.40 | 0.44 |
| | $r_2 = 1979-1992$ | 0.52 | 0.30 | 0.34 |
| | $r_3 = 1993-2007$ | 0.50 | 0.29 | 0.37 |
| | Euro-founders | | | |
| | $r_1 = 1964-1978$ | 0.46 | 0.30 | 0.43 |
| | $r_2 = 1979-1992$ | 0.44 | 0.23 | 0.30 |
| $r_3 = 1993-2007$ | 0.26 | 0.21 | 0.21 | |
| Geographical contiguity | World | | | |
| | $r_1 = 1964-1978$ | 1.64 | 0.68 | 0.62 |
| | $r_2 = 1979-1992$ | 1.59 | 0.54 | 0.70 |
| | $r_3 = 1993-2007$ | 1.37 | 0.73 | 0.88 |
| | Europe | | | |
| | $r_1 = 1964-1978$ | 0.59 | 0.40 | 0.46 |
| | $r_2 = 1979-1992$ | 1.38 | 0.41 | 0.59 |
| | $r_3 = 1993-2007$ | 1.20 | 0.76 | 0.82 |
| | America | | | |
| | $r_1 = 1964-1978$ | 0.75 | 0.50 | 0.37 |
| | $r_2 = 1979-1992$ | 0.85 | 0.47 | 0.53 |
| | $r_3 = 1993-2007$ | 0.84 | 0.62 | 0.75 |
| | Africa | | | |
| | $r_1 = 1964-1978$ | 0.70 | 0.60 | 0.41 |
| | $r_2 = 1979-1992$ | 0.90 | 0.55 | 0.44 |
| | $r_3 = 1993-2007$ | 1.00 | 0.85 | 0.89 |
| | Asia | | | |
| $r_1 = 1964-1978$ | 2.50 | 0.58 | 0.64 | |
| $r_2 = 1979-1992$ | 2.01 | 0.55 | 0.87 | |
| $r_3 = 1993-2007$ | 1.44 | 0.50 | 0.85 | |
| International organizations | EU-27 | | | |
| | $r_1 = 1964-1978$ | 0.57 | 0.39 | 0.42 |
| | $r_2 = 1979-1992$ | 0.77 | 0.38 | 0.54 |
| | $r_3 = 1993-2007$ | 0.92 | 0.55 | 0.61 |
| | OECD | | | |
| | $r_1 = 1964-1978$ | 0.70 | 0.45 | 0.54 |
| | $r_2 = 1979-1992$ | 0.79 | 0.47 | 0.63 |
| $r_3 = 1993-2007$ | 0.72 | 0.47 | 0.55 | |
| International organizations | G8 | | | |
| | $r_1 = 1964-1978$ | 0.33 | 0.32 | 0.46 |
| | $r_2 = 1979-1992$ | 1.27 | 0.35 | 0.33 |
| | $r_3 = 1993-2007$ | 0.83 | 0.72 | 0.66 |
| | G20 | | | |
| | $r_1 = 1964-1978$ | 2.39 | 0.57 | 0.57 |
| | $r_2 = 1979-1992$ | 2.13 | 0.59 | 0.61 |
| | $r_3 = 1993-2007$ | 1.46 | 0.61 | 0.69 |
| | NAFTA | | | |
| | $r_1 = 1964-1978$ | 0.89 | 0.39 | 0.27 |
| | $r_2 = 1979-1992$ | 0.96 | 0.55 | 0.64 |
| | $r_3 = 1993-2007$ | 0.83 | 0.59 | 0.67 |
| | OPEC | | | |
| | $r_1 = 1964-1978$ | 1.71 | 0.55 | 0.28 |
| | $r_2 = 1979-1992$ | 1.45 | 0.56 | 0.40 |
| | $r_3 = 1993-2007$ | 1.56 | 0.74 | 0.80 |
| | Arab League | | | |
| $r_1 = 1964-1978$ | 1.54 | 0.50 | 0.45 | |
| $r_2 = 1979-1992$ | 1.22 | 0.43 | 0.75 | |
| $r_3 = 1993-2007$ | 1.31 | 0.55 | 0.87 | |
| Other | BRIC | | | |
| | $r_1 = 1964-1978$ | 3.24 | 0.05 | 0.24 |
| | $r_2 = 1979-1992$ | 2.14 | 0.13 | 0.46 |
| | $r_3 = 1993-2007$ | 1.30 | 0.40 | 0.68 |
| | CEEC | | | |
| | $r_1 = 1964-1978$ | 0.22 | n.a. | n.a. |
| | $r_2 = 1979-1992$ | 0.99 | 0.37 | 0.84 |
| | $r_3 = 1993-2007$ | 0.52 | 0.50 | 0.49 |
| | Former socialists | | | |
| | $r_1 = 1964-1978$ | 0.22 | n.a. | n.a. |
| $r_2 = 1979-1992$ | 1.27 | 0.34 | 0.81 | |
| $r_3 = 1993-2007$ | 0.76 | 0.63 | 0.58 | |

Table 6
First step: summary of results (equations 1.1 and 1.2)

| Kind of club | Club | Per capita GDP | | | Deposits/GDP | | | Loans/GDP | | |
|-----------------------------|---------------|-------------------------------|----------------------------------|-----------------------|-------------------------------|----------------------------------|-----------------------|-------------------------------|----------------------------------|-----------------------|
| | | absolute β -convergence | conditional β -convergence | σ -convergence | absolute β -convergence | conditional β -convergence | σ -convergence | absolute β -convergence | conditional β -convergence | σ -convergence |
| Euro | Euro area | yes | Yes | yes | No | no | yes | no | yes | yes |
| | Euro-founders | yes | Yes | yes | No | yes | yes | no | yes | yes |
| Geographical contiguity | World | no | Yes | yes | No | no | no | no | no | no |
| | Europe | yes | Yes | no | No | no | no | yes | yes | no |
| | Asia | yes | Yes | yes | No | no | yes | no | no | no |
| International organizations | EU-27 | yes | Yes | no | No | no | no | yes | yes | no |
| | OECD | yes | Yes | no | No | no | no | yes | yes | no |
| | G20 | yes | Yes | yes | No | no | no | no | no | no |
| | OPEC | no | No | yes | No | yes | no | no | no | no |
| | Arab League | no | No | yes | No | no | no | no | no | no |

In order to improve the comparisons, Table 6 also summarizes the results of β -analysis for some clubs (the euro-founders, Asia, the G20, OPEC and the Arab League) not detailed in Table 4 because of sample size problems. In any case, their results are mostly confirmed by the second step of my analysis.

Figure 2
Second step - first approach (equation 2.1)
Tests of differences of each country with every other country in the club
(percentage shares of statistically similar bilateral differences in each club)
Outline by geographical clubs and "other" clubs

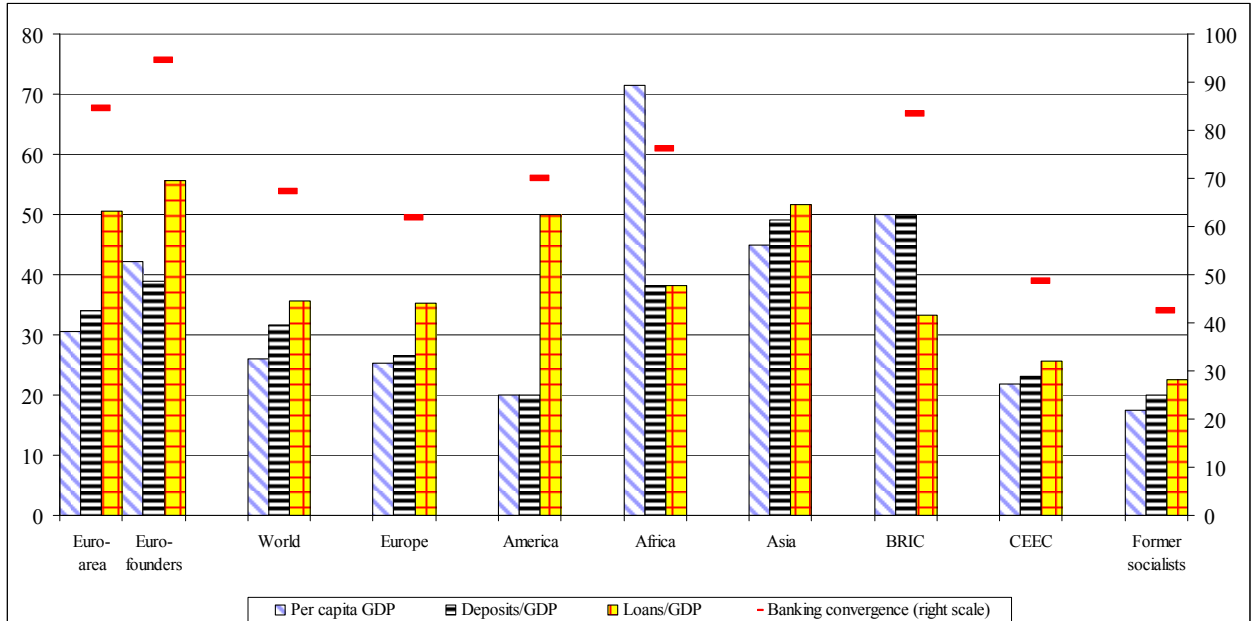


Figure 3
Second step - first approach (equation 2.1)
Tests of differences of each country with every other country in the club
(percentage shares of statistically similar bilateral differences in each club)
Outline by international organization clubs

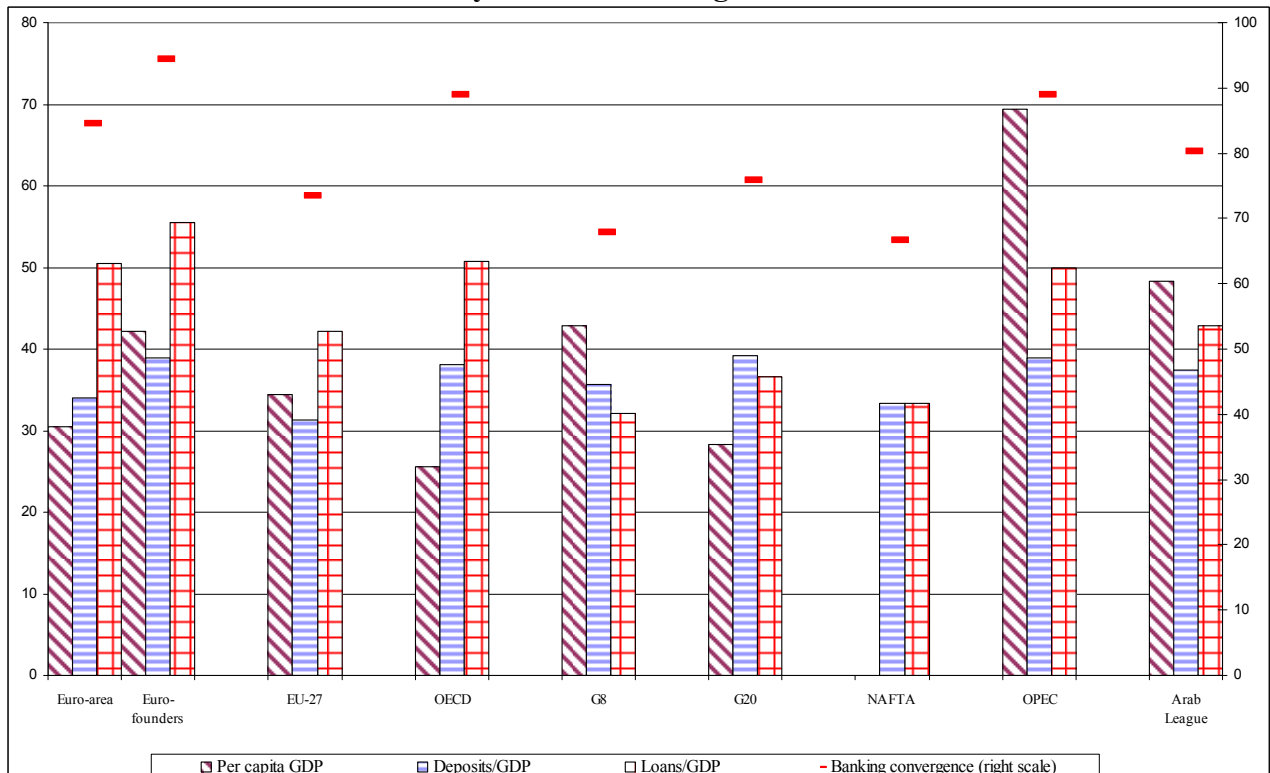


Figure 4
Second step - second approach (equation 2.2)
Tests of differences of each country with the mean of the club
(percentage shares of statistically similar differences in each club)
Outline by geographical clubs and other clubs

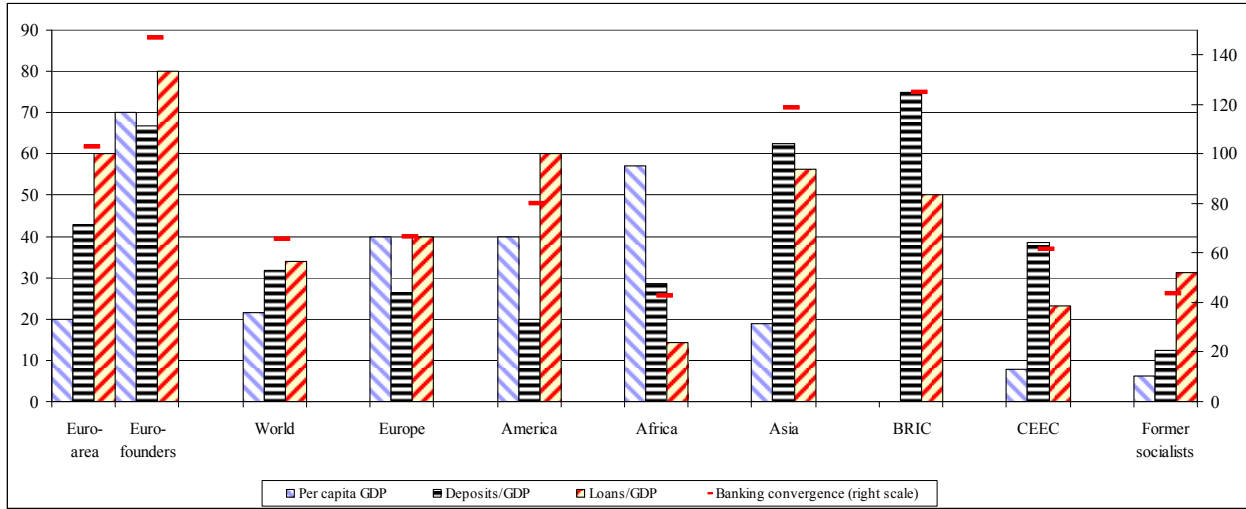


Figure 5
Second step - second approach (equation 2.2)
Tests of differences of each country with the mean of the club
(percentage shares of statistically similar differences in each club)
Outline by international organization clubs

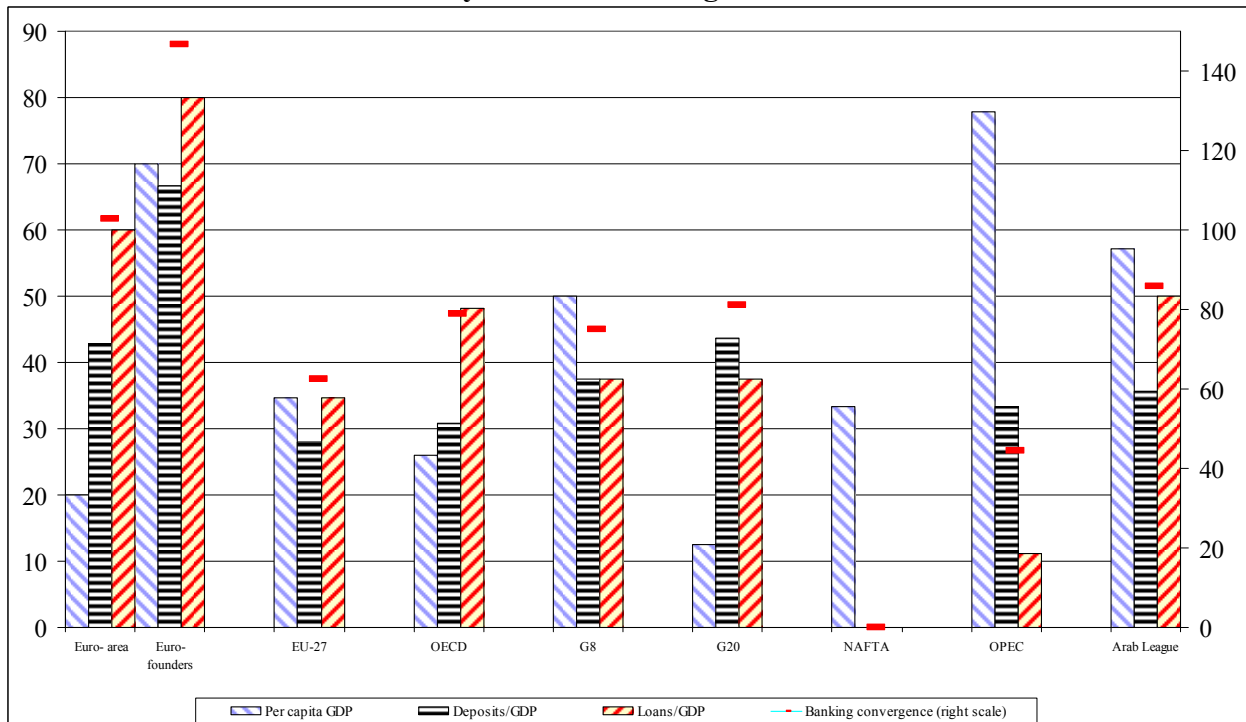


Table 7

Third step – parallel convergences: banking convergence spurs real convergence

| Dependent variable → | Equation 3.1 | | | Equation 3.2 | | | Equations 3.2-3.3 | | |
|---|---|--------------|--------------|--|--------------|--------------|--|--------------|--------------|
| | Stationary per-capita income (results of equation 2.3) | | | Average growth rate of per- capita income | | | Average growth rate of per- capita income | | |
| | (1a) | (1b) | (1c) | (2a) | (2b) | (2c) | (3a) | (3b) | (3c) |
| Stationary Deposits/GDP (bilateral differentials approach) | 5.164 *** | 2.233 ** | 7.825 ** | | | | | | |
| | <i>1.716</i> | <i>1.118</i> | <i>3.205</i> | | | | | | |
| Interaction: initial level of per-capita income × stationary Loans/GDP (differentials from the mean of the World club, results of equation 2.2) | | | | -0.023 *** | -0.021 *** | -0.027 *** | | | |
| | | | | <i>0.008</i> | <i>0.008</i> | <i>0.008</i> | | | |
| Interaction: initial level of per-capita income × convergent Loans/GDP (far from standard deviation of the World club, based on equation 1.2 and 3.3) | | | | | | | -0.176 *** | -0.169 *** | -0.179 *** |
| | | | | | | | <i>0.037</i> | <i>0.039</i> | <i>0.038</i> |
| Constant | -1.397 ** | -0.414 | -2.256 ** | 0.077 *** | 0.072 *** | 0.079 *** | 0.072 *** | 0.067 *** | 0.072 *** |
| | <i>0.557</i> | <i>0.340</i> | <i>1.038</i> | <i>0.006</i> | <i>0.006</i> | <i>0.007</i> | <i>0.005</i> | <i>0.005</i> | <i>0.005</i> |
| Sargan test: <i>Chi-sq</i> -statistic | 1.769 | 1.173 | | 3.141 | 1.716 | | 2.962 | 2.057 | |
| <i>F</i> -statistic of reduced form | 3.26 | 6.33 | 5.96 | 19.69 | 21.31 | 33.30 | 14.50 | 20.32 | 55.45 |
| Number of observations | 1,711 | 2,278 | 1,711 | 96 | 105 | 96 | 96 | 105 | 96 |

Table reports regression coefficients and associated standard errors in italics. In model (1), the dependent variable and the regressor are dummies assuming value one when the bilateral differentials of, respectively, per-capita income and the Deposits/GDP ratio, between a pair of countries are zero-mean stationary (results of equation 2.1). Models (2) and (3) are IV absolute β -convergence estimations. The dependent variable is the average growth rate of per-capita GDP, and the key regressor is the interaction-term between the initial level of per-capita income and a proxy of banking convergence (measured on the ratio Loans/GDP). The components of the interaction-term are included, but not reported. In model (2), the proxy of banking convergence is a dummy assuming value one when the country converges to the average of my entire sample (equation 2.2). In model (3), the proxy of banking convergence is the complement to one of the World standard deviation. In order to take account of possible endogeneity problems, in all cases regressions are ran by IV estimations, instrumenting for banking convergence, with: in specifications (a), both an index of supervisory practice and the legal origin of each country; in specifications (b), only the legal origins; and in specifications (c), only the index of supervisory practice. The index of supervisory practice is not available for some countries in my dataset. Table reports also the χ^2 -statistic of the Sargan test for specifications (a) and (b), where it is applicable; and the *F*-statistics of the reduced forms of each specification. ***, ** denote statistical significance at 1% and 5% level, respectively.

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