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**DO FINANCIAL SYSTEMS CONVERGE?  
NEW EVIDENCE FROM HOUSEHOLD FINANCIAL ASSETS IN SELECTED OECD COUNTRIES**

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*This document has been prepared by Giuseppe Bruno and Ricardo De Bonis, Bank of Italy and will be presented under item 1 of the draft agenda*

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# **Do Financial Systems Converge ? New Evidence from Household Financial Assets in Selected OECD Countries**

Giuseppe Bruno and Riccardo De Bonis\*

Bank of Italy, Economic Research and International Relation Area

## **Abstract**

Many authors underlined the convergence of financial structures towards a model which combines elements of the Anglo Saxon one, where markets prevail, with characteristics of the continental European systems, where intermediaries are predominant. Convergence of financial systems has been measured studying different financial products and taking into account price-, news- or quantity-based indicators. Following the last approach, the goal of this paper is to study financial systems convergence through the lens of household asset allocation. We analyze  $\sigma$  and  $\beta$  convergence of total household financial assets and their main components: deposits, securities other than shares, shares and other equity, insurance technical reserves. The novelty of the paper is to exploit a database containing time series since 1980 for nine OECD countries. Using disposable income as a scale variable, we found convergence of household total financial assets, insurance technical reserves and shares and other equity. Weaker results are obtained for convergence of household securities other than shares, and currency and deposits. In a nutshell, financial systems show signals of convergence but national characteristics persist when households invest in securities and deposits. The world is not (entirely) flat.

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JEL classification: G10, G20

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## 1. Introduction

The last three decades have witnessed a growing pressure on financial systems from liberalisation and globalisation. These events have made the study of differences and similarities between national systems more important than in the past. There is renewed interest in institutional economics, with a focus on comparing capitalist economies and, more specifically, their financial systems<sup>1</sup>. A specific issue is their trend to converge or no. While we have a theory and many empirical applications on per capita income convergence, there is neither a theory of financial systems convergence, nor of an “optimum financial system”<sup>2</sup>. On the other hand one might expect that globalisation, deregulation, economic integration, harmonization of regulations and corporate governance rules led to a convergence of financial systems characteristics. For example some authors have claimed that the classical distinction between “bank-based” and “market-based” systems does not hold anymore. According to this point of view the European continental financial systems have become more similar to the Anglo-Saxon ones<sup>3</sup>.

The investigation of financial convergence is an empirical issue, that has been studied using different methods and indicators. In this paper we offer a new perspective, analysing convergence of the weights of the main financial assets in household portfolios. We assume that household asset allocation, relative to disposable income, provides information on the general characteristics of financial systems. Shares and other equity, especially quoted shares, and insurance products are more common in “market-based” systems like those of the UK and the US than in continental Europe. Assets like currency and deposits are more important in Germany, Italy and Japan, often defined as “bank-based” systems.

Convergence is a long run concept. The novelty of our paper is to take advantage of a dataset containing annual data since 1980 for nine OECD economies: the USA, Japan, Germany, France, the United Kingdom, Italy, Canada, Spain and Austria. This reconstruction is the outcome of a joint project among the OECD, Pioneer Investment (a financial company) and some national central banks. Using these statistics and disposable

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<sup>1</sup> See Djankov et al (2003).

<sup>2</sup> On the risks of doing “measurement without theory” see Koopmans (1947), Kydland and Prescott (1995) and Klein (1977).

<sup>3</sup> On these subjects see Allen and Gale (2000) and Rajan and Zingales (2003).

income as a scale variable, we measure  $\beta$ - and  $\sigma$ -convergence for household total financial assets and their main components: currency and deposits, securities other than shares, shares and other equity, insurance technical reserves.

The paper is divided into five sections. After this introduction section 2 summarises the literature on convergence studies and methodologies. Section 3 describes the dataset. In section 4 we present the econometric results while section 5 concludes.

## 2. The convergence approach

In this section we first review some contributions on financial convergence, focusing on those that studied household financial instruments (2.1)<sup>4</sup>; then we summarise the statistical methods used in the paper (2.2).

**2.1. A brief review of the literature.** Convergence of financial systems may be studied using three types of indicators: price-, news- or quantity-based measures. Price-based measures look at differences in price or returns of financial instruments caused by their geographic origin. This approach often aims to test the validity of the law of one price. News-based indicators analyse the impact that common factors – for example the availability of new public information – have on the movement of an asset yield. Quantity-based measures have the goal to quantify the effects of frictions on the demand and supply of investment opportunities. Previous studies have often examined the ease of market access, as shown by cross border activities: these holdings would proxy the portfolio home bias<sup>5</sup>.

In this paper we follow the third line of research, picking up, among quantity-based indicators, household financial assets. As anticipated in the introduction, we assume that the relative weight of household financial instruments in each country provide information on the peculiarities of national financial systems.

Other papers have followed a similar route, concentrating on quantity-based measures of convergence to draw conclusions on the general features of financial structures. These

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<sup>4</sup> We will not deal here with other important issues like convergence of market rates, inflation, public finance indicators, and real convergence. On these subjects see Calcagnini, Farabullini and Hester (2000), Lane (2006).

<sup>5</sup> On these issues see Baele et al (2004) for the general framework; Baele and Ferrando (2004) on bond and equity market integration; Manna (2004) on integration of banking systems; Baltzer et al (2008) on integration in new EU member states; Affinito and Farabullini (2006) on convergence of bank interest rates.

studies looked at convergence without theoretical a priori, often focusing on the effects of institutional breaks like the creation of the European common market or that of the euro area. Studying seven European countries for the years 1972-1996, Murinde, Agung and Mullineux (2004) found convergence of equity issues, but not of issues of securities other than shares. Di Giacinto and Esposito (2006), using a panel with observations from 1995 to 2003, found convergence for indicators of financial development of 13 European countries, but not for banking products. Examining components of financial assets in euro-area countries, Hartmann, Maddaloni and Manganeli (2003) found that the dispersion of currency and deposits increased between 1995 and 2001; bond investment, on the contrary, became more uniform. Studying 12 European countries in the period 1995-2000, Bartiloro and De Bonis (2005) found  $\beta$ -convergence but not  $\sigma$ -convergence for the ratio of financial assets held by residents to GDP. Analysing a longer period, from 1980 to 2000, Byrne and Davis (2002) found some evidence of  $\sigma$ -convergence, towards a more market-oriented financial system, for the balance sheet structures of the UK, France, Germany and Italy. Schmidt, Hackethal and Tyrrel (1999) found that particularly France moved towards a more market-oriented system. Bianco, Gerali and Massaro (1997) presented a comparison of six developed countries' financial systems, based on their characteristics in the mid Nineties. The analysis suggested that convergence across financial systems was still limited and major changes were under way only in France.

It is difficult to draw a conclusion from this literature, because it refers to different periods, financial products and countries and uses different statistical and econometric methods. In short we can say that convergence has been found more frequently for equity instruments than for banking indicators. This seems reasonable because integration of capital markets is easier to reach than that of banking systems where asymmetries of information and local market characteristics remain central. We will come back later on this conclusion. The novelty of our work is to exploit statistics starting from 1980 (see Section 3 for a precise description), while previous papers looked at household financial assets considering shorter time series and a less precise instrument breakdown.

**2.2. The statistical methods.** The task of measuring convergence for different economies has been approached using time series, cross-section and panel data techniques mainly in the context of economic growth models. There is no universally accepted

definition of the term convergence, nonetheless an intuitive meaning of the term is easily understood.

In this paper we adopt the approach based on  $\beta$ - and  $\sigma$ - convergence<sup>6</sup>, originally developed in the growth empirical literature (e.g. Baumol, 1986; Barro and Sala-i-Martin, 1992 and 1995; Mankiw et al., 1992; Sala-i-Martin, 1996). This literature is typically based on regression models where the average growth rate of per capita income is assumed to be dependent on its initial level:

$$\frac{1}{T} \log(y_{i,t+T} / y_{i,t}) = \alpha + \beta \log(y_{i,t}) + \varepsilon_{i,t} \quad (1)$$

In this equation there is absolute  $\beta$ -convergence if  $\beta < 0$ .  $\beta$ -convergence implies that poor economies tend to grow faster, and therefore to catch up with richer countries (“the lower you start, the quicker you go”).

On the other hand a group of economies satisfy  $\sigma$ -convergence if the dispersion of their real per capita GDP levels tends to decrease over time. That is, if

$$\sigma_{t+T} < \sigma_t \quad (2)$$

where  $\sigma_t = \sqrt{\sum_{i=1}^N (\log(y_{i,t}) - \bar{y}_t)^2}$ , is the time  $t$  standard deviation of  $\log(y_{i,t})$  across  $i$ . The concepts of  $\sigma$ - and absolute  $\beta$ - convergence are closely related. If we take the sample variance of  $\log(y_{i,t})$  from (1) we will get:

$$\sigma_{t+1}^2 = (\beta + 1)^2 \cdot \sigma_t^2 + \sigma_\varepsilon^2 \quad (3)$$

From this equation we see that  $\sigma_t^2$  will get asymptotically to a steady state level if and only if  $-2 < \beta < 0$ . If the GDP levels of two economies get closer over time, the poor economy must be growing faster and the GDP levels dispersion shrinks or grows over time depending on the steady state value of  $\sigma_t^2$ . In other words,  $\beta$ -convergence is only a

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<sup>6</sup> See Adam et al (2002) for a similar approach.

necessary condition for  $\sigma$ -convergence. Assuming the initial dispersion of  $\log(y_t)$  is smaller than its steady state value we might have  $\beta$ -convergence without  $\sigma$ -convergence<sup>7</sup>.

Heterogeneity across economies, e.g. a different saving rate, often prevents absolute convergence. Under this circumstance researchers have introduced the concept of conditional convergence. In this case the various economies will not show convergence towards a common level. Nonetheless, it is relevant to pin down the determinants hampering absolute convergence. Conditional  $\beta$ -convergence is measured by introducing country specific variables in the model (1) in the following way:

$$\frac{1}{T} \log(y_{i,t+T} / y_{i,t}) = \alpha + \beta \log(y_{i,t}) + \gamma X_{i,t} + \varepsilon_{i,t} \quad (4)$$

where  $X_{i,t}$  is a vector including the variables required to hold constant the steady state growth rate for country  $i$ . If the estimate of  $\beta$  is negative the dataset will exhibit conditional  $\beta$ -convergence.

### 3. The dataset

Recently, the OECD, the Economic Research Unit of Pioneer Global Asset Management, and some national central banks have started a project aimed at extending back in the past the time series of the financial accounts of OECD countries<sup>8</sup>. In the past the OECD used to publish the national financial accounts in yearly booklets known as the “Golden Books”. This publication was interrupted when the System of National Accounts of 1993 (SNA93) and the European System of Accounts of 1995 (ESA95) introduced new definitions of financial instruments and institutional sectors. The new classification based on the SNA93 and on the ESA95 has made it necessary to reconcile past data with the new series.

Even if statistics would potentially make it possible to analyze all the institutional sectors, in this initial stage data reconstruction has focused on households and non-financial

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<sup>7</sup> This circumstance is closely related to what is referred to as Galton’s fallacy of regression towards the mean. See Quah (1993).

<sup>8</sup> For further information on the construction of the time series see De Bonis, Fano, Sbrana (2007), Sbrana (2007).



corporations for stocks of assets and liabilities from 1980 through 2005. Up to now the statistics have been rebuilt for 9 countries. We focus on  $\beta$ - and  $\sigma$ -convergence of the ratio of household financial assets or their main components to disposable income. Here we provide a short description of the four financial instruments under consideration.

**a) Currency and deposits:** this item includes currency in circulation, transferable deposits, other non transferable deposits, repos.

**b) Securities other than shares:** this item includes bearer financial assets that are negotiable on the market, such as securities issued by the general government, firms and banks.

**c) Shares and other equity:** this category includes financial assets that represent property rights on corporations and quasi corporations. These assets are divided into quoted shares, unquoted shares and other equity. Following ESA95 the item includes also mutual fund shares.

**d) Insurance technical reserves:** this item includes the provision of insurance corporations and pension fund products for future payments to beneficiaries. According to the current international statistical rules this category does not include the assets linked to public pensions schemes.

Figures 1-2 show the log of ratios of household total financial assets and their main component to gross disposable income from 1980 to 2005. All the countries experienced an increase in the ratios of household total financial assets, a fact that confirms the financial deepening of the main economies (fig. 1). Turning to the single financial instruments, the ratios of insurance products and shares and other equity to disposable income grew in all the countries of our sample. On the contrary the behaviour of securities other than shares and currency and deposits was more diversified. Looking at figure 2 the convergence process is quite evident for some instruments, but in other cases a more sophisticated approach is needed.

Figure 1

Total Financial Assets

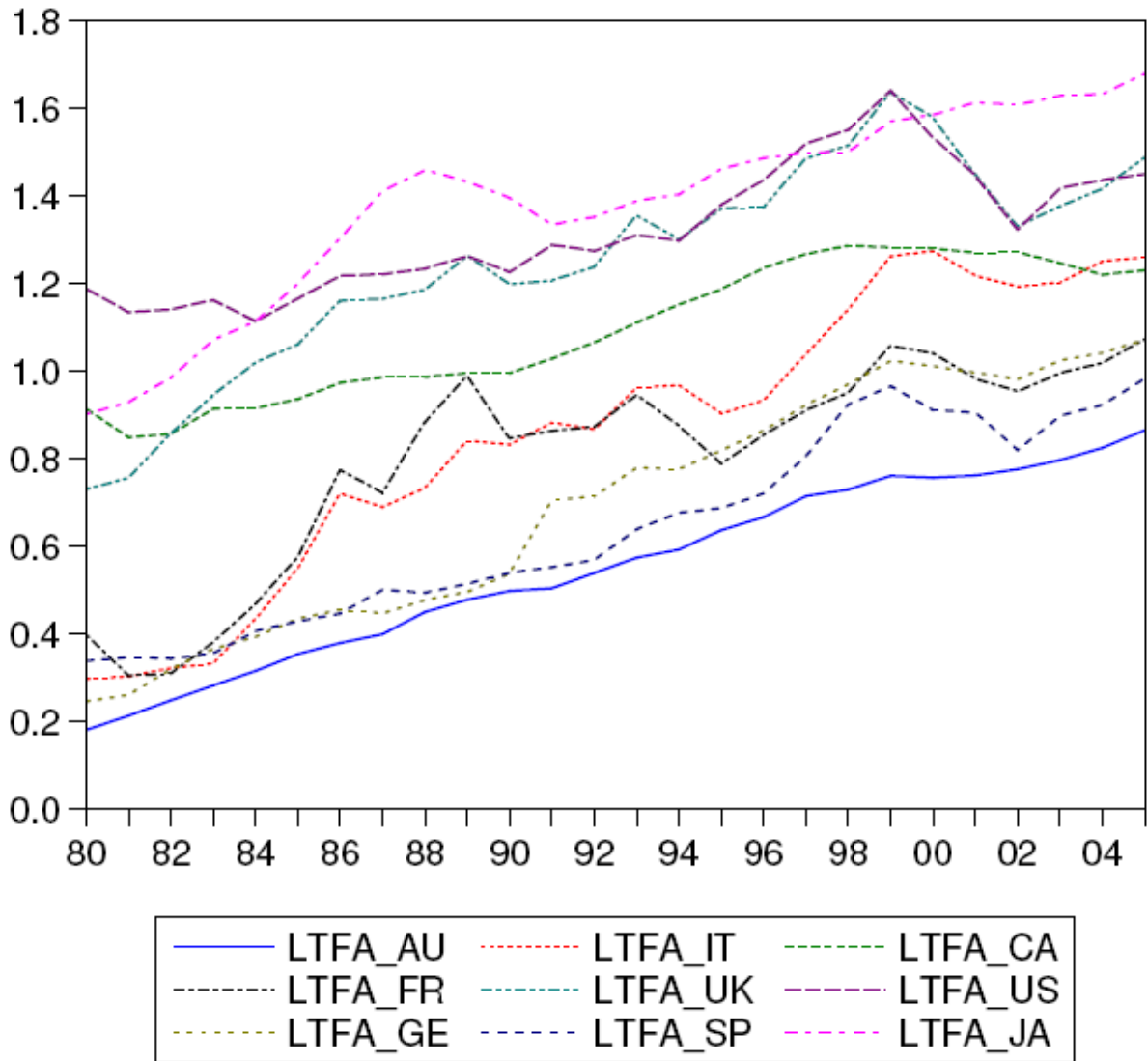
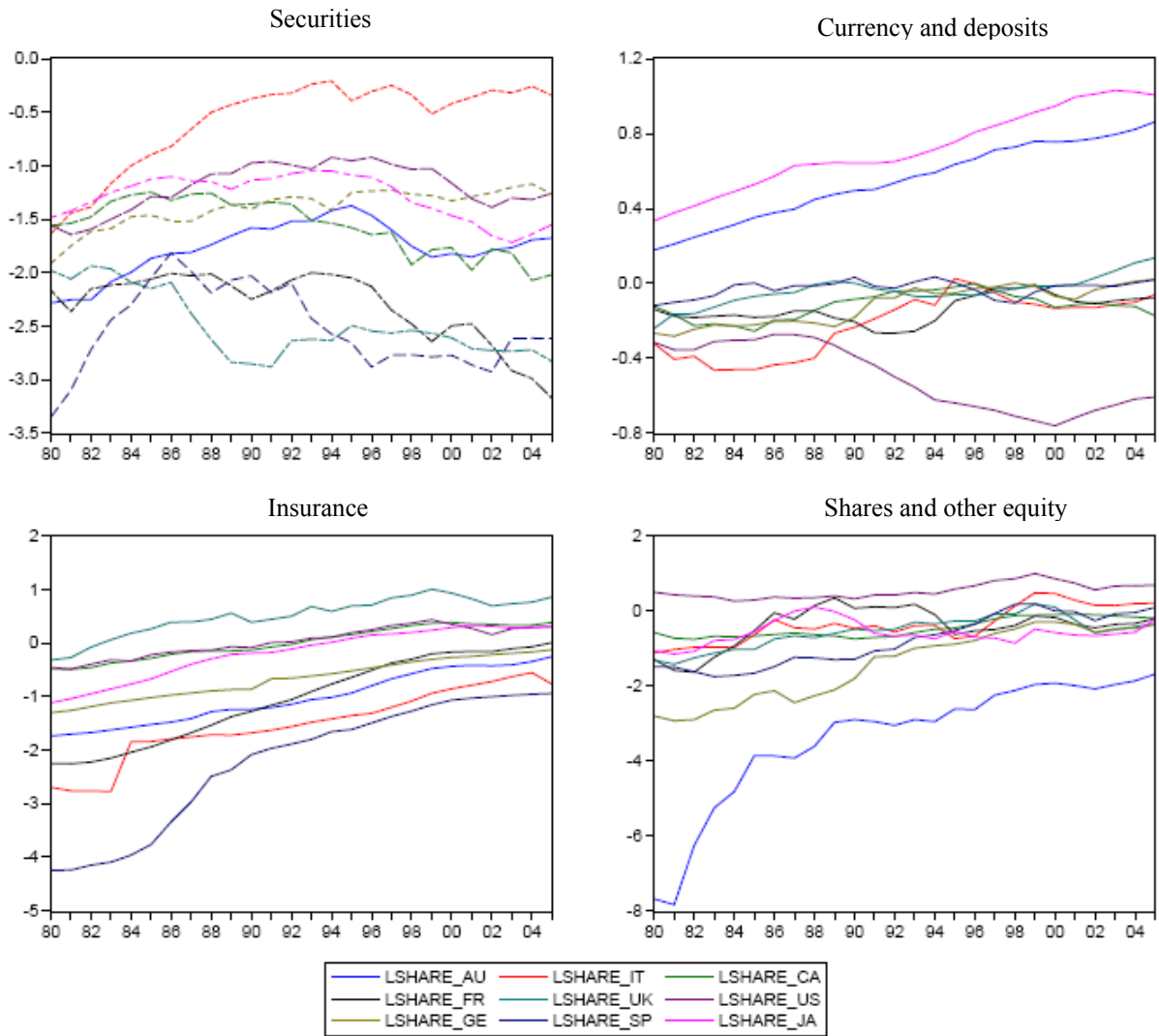


Figure 2



## 4. The results

In subsection 4.1 we focus on absolute  $\beta$ -convergence; in subsection 4.2 we deal with conditional convergence; in subsection 4.3 we concentrate on  $\sigma$ -convergence.

**4.1.  $\beta$ -convergence.** Following Islam (1995) we used the time dimension of the entire panel data to carry out exercises of absolute  $\beta$ -convergence. An important technical issue in switching from a single cross section to a panel data framework is the choice of the time span dividing the total time range. We picked the value of 5 years. This seems a reasonable trade off between the competing needs of increasing the available observations and reducing short term disturbances. The value of 5 years appears to be less sensitive to the business cycle fluctuations and serial correlations in the residuals<sup>9</sup>. Given the temporal extension of our dataset, this choice produces a total of  $2005-1980+1=26/5=5$  observations for each of the countries. The results are robust to a different choice of the time interval (see the following of this subsection for further details). A lower frequency (less than 1 observation every 5 years) would yield too few observations.

We run three different estimation methods against our available dataset: pooled OLS, random and fixed effects. Pooled OLS is the easiest method from the computational standpoint. OLS technique provides a simple benchmark but the estimated  $\beta$  coefficient is inconsistent when the unobservable country effects are correlated with other explanatory variables. For this reason we also add the random-effects estimator that introduces a random country specific element. With this method, when the unobservable country specific component is uncorrelated with the regressors, we have consistency for the estimated  $\beta$  coefficient. Aiming also at efficiency we finally flanked our results with the fixed-effect estimation which includes a country specific constant mirroring all the unmeasured country effects. The use of different estimation methods provide us with a sound robustness check (see Cellini, 1997 and Islam 1995 for the same approach)<sup>10</sup>. Gross disposable income is used as a scale variable.

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<sup>9</sup> This issue is still under debate. Cellini (1997) and Adam et al (2002) use yearly growth rate for the dependent variable when performing convergence exercises.

<sup>10</sup> For example Islam (1995) noted “In the following we present the results from both LSDV(fixed effects) and MD (minimum distance) estimation. It is reassuring that the results are very similar to each other”.

The numerical results for the estimate on total financial assets are shown in table 1 (t-statistics are under the coefficients with a smaller font; the same convention holds in the other tables).

**Table 1.  $\beta$ -convergence for household total financial assets**

Dependent variable: Total Financial assets average growth rate			
Method	OLS	Fixed effects	Random effects
Constant	0.17875 5.83	0.24644 5.41	0.18366 5.89
$Log(y_{t-1})$	-0.07646 -2.42	-0.15240 -3.08	-0.08196 -2.57
$R^2$	0.12	0.35	0.13
S.E. regression	0.08	0.08	0.08
N. obs.	45		
Cross sections	9		

Table 1 shows  $\beta$ -convergence according to all the three estimation methods. Countries having a lower ratio of financial assets to disposable income grew faster than those where financial deepening was already high, in a general context of greater integration and globalization of financial systems.

On the contrary Table 2 shows the absence of a robust  $\beta$ -convergence for the item currency and deposits.  $\beta$ -convergence was found only using the fixed effects method. Cellini (1997) stated that the fixed effect estimator is the appropriate one when studying convergence in a panel data framework.

**Table 2.  $\beta$ -convergence for household currency and deposits**

Dependent variable: Currency and deposits average growth rate			
Method	OLS	Fixed effects	Random effects
Constant	0.03546	0.01565	0.03546
	2.59	1.23	3.01
$\text{Log}(y_{t-1})$	0.04160	-0.31343	0.04160
	0.96	-3.36	1.12
$R^2$	0.02	0.41	0.02
S.E. regression	0.09	0.078	0.09
N. obs.	45		
Cross sections	9		

While banking disintermediation is common to all OECD countries, the importance of deposits still remains different. This result is similar to the evidence reported in Di Giacinto and Esposito (2006). Also other studies found that the weight of safe assets in household portfolios still differs across countries. This result may be influenced by national peculiarities, such as fiscal treatment of deposits, the forms of competition between banks and other financial intermediaries, the different weight of the Post office, and regulatory and institutional factors that influence the offer of deposits.

Table 3 refers to insurance products. The  $\beta$ -coefficients are always negative and statistically significant. Countries where public pension schemes were relevant in the past followed the example of financial systems where private insurance and pension products were traditionally more common among households. We may refer to the catching up of Spain and Italy (see figure 2). Population ageing is a trend common to all industrialised countries and leading to important restructuring of the financial industry, such as a growing role of insurance technical reserves. International statistical standards will change: the new System of National Accounts will recognize pension entitlements for the public sector, that today are not included in the official statistics.

**Table 3.  $\beta$ -convergence for household insurance products**

Dependent variable: Insurance average growth rate			
Method	OLS	Fixed effects	Random effects
Constant	0.13796	0.09257	0.13796
	4.26	2.15	4.24
$Log(y_{t-1})$	-0.14928	-0.20364	-0.14928
	-6.28	-4.91	-6.24
$R^2$	0.48	0.57	0.48
S.E. regression	0.172	0.173	0.172
N. obs.	45		
Cross sections	9		

Table 4 reports the regressions for  $\beta$ -convergence of the item shares and other equity. The three estimates provided a negative and statistically significant  $\beta$  coefficient. The growing weight of capital markets is a common trend to all the economies. We may refer for example to the increasing importance of quoted shares and mutual fund units in household portfolios. The increase of financial deepening was thus accompanied by a greater dissemination of financial instruments traded directly on the markets. The shift in portfolio composition in favour of non-intermediated assets was particularly intense in the period 1995-2000, during the positive cycle of world stock markets.

**Table 4.  $\beta$ -convergence for household shares and equities**

Dependent variable: Shares and equity average growth rate			
Method	OLS	Fixed effects	Random effects
Constant	-0.05849	-0.20729	-0.05849
	-0.85	-2.51	-0.89
$\text{Log}(y_{t-1})$	-0.38354	-0.53906	-0.38354
	-9.50	-8.29	-9.91
$R^2$	0.68	0.76	0.68
S.E. regression	0.381	0.365	0.381
N. obs.	45		
Cross sections	9		

Table 5 reports the results for the item securities other than shares. In this case the  $\beta$  coefficients are always negative but they are statistically significant only in the fixed effects estimates. We are not able to claim that the ratios of household securities to disposable income converged in last years in our sample of nine OECD countries. This evidence confirms that General government, bank and corporate bonds have still a different weight in national household portfolios. Corporate securities remain more important in the UK, the US and Japan than in continental Europe. Moreover, it is well known that the ratio of public debt to GDP differs across countries, leading to households' different portfolios.



**Table 5.  $\beta$ -convergence for household securities**

Dependent variable: Securities average growth rate			
Method	OLS	Fixed effects	Random effects
Constant	-0.11668	-1.11588	-0.17184
	-0.87	-5.66	-1.59
$\text{Log}(y_{t-1})$	-0.08729	-0.68132	-0.12008
	-1.18	-5.91	-2.01
$R^2$	0.03	0.57	0.05
S.E. regression	0.323	0.240	0.316
N. obs.	45		
Cross sections	9		

In order to check for robustness of these results, we have modified the estimation procedure in the following way<sup>11</sup>:

- removing one country at a time and using the remaining cross-sections for the estimations. The upshot of this sort of “jackknifing the sample” confirmed the  $\beta$ -convergence results previously reported;
- increasing the sample observations by reducing the time range over which we take average growth rate from 5 to 4 and 3 years did leave unchanged the statistical significance of the estimates<sup>12</sup>.

The Hausman test has been carried out for all the panel models, the results are summarized in table 6:

<sup>11</sup> E-Views / LIMDEP code and numerical results are available upon request.

<sup>12</sup> We also tested convergence of the percentage composition of household assets. Example of convergence analysis on percentage compositions can be found in Baltzer et al (2008) (see figures 21-25) and Yildirim and Öcal (2006). Our new exercises confirmed the previous evidence.

**Table 6. Hausman test summary**

Dep variable	Hausman test	Probability
Tot financial asset	3.48	0.062
Currency_deposit	17.17	0
Securities	32.34	0
Share & Equities	8.85	0.003
Insurance	2.57	0.108

At a 5% significance level the test rejects the null of no correlation among the unobserved individual effects and the explanatory variables for four variables. Only for the insurance products the random effects model can replace the fixed effects one.

**4.2. Conditional convergence: does legal origin matter ?** For currency and deposits and securities other than shares we checked whether the absence of absolute  $\beta$ -convergence is caused by the different country legal origin. As emphasized in a large strand of literature (see for example La Porta et al 1998, Shleifer and Vishny 1997 and Shleifer and Wolfenzon 2002) the structure of a country's commercial laws may matter for firm and investor behaviour. This literature is rooted on a broad taxonomy splitting up the countries in two major families according to their legal codes: common law and civil law. Within the civil tradition it is possible to further partition the countries according to the three following families: French, German and Scandinavian.

In our set up the database includes only 9 countries: therefore we could not go beyond the main dichotomy between common/civil laws, so as to keep the degrees of freedom at a reasonable level. We allocate the US, the UK and Canada to the common law structure and the remaining six countries to the civil law category. After the introduction of a binary variable indicating the membership to common/civil laws origins we ran another set of  $\beta$ -convergence regressions<sup>13</sup>. The results confirm the outcome of the absolute convergence exercise. The coefficient for the variable indicating the country legal origin is never

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<sup>13</sup> The tables for the estimates are available from the authors upon requests.

statistically different from zero. We interpret this result as a signal that legal origin did not affect the trend of the ratios of currency and deposits and securities other than shares to household disposable income.

Now we turn to the  $\sigma$ -convergence exercises.

**4.3.  $\sigma$ -convergence.** As we underlined in Section 2,  $\beta$ -convergence is a necessary but not a sufficient condition for  $\sigma$ -convergence. The statistical results for the  $\sigma$ -convergence are summarized in figures 3 and 4.

**Figure 3.  $\sigma$ -convergence for the total financial assets of the main OECD countries**

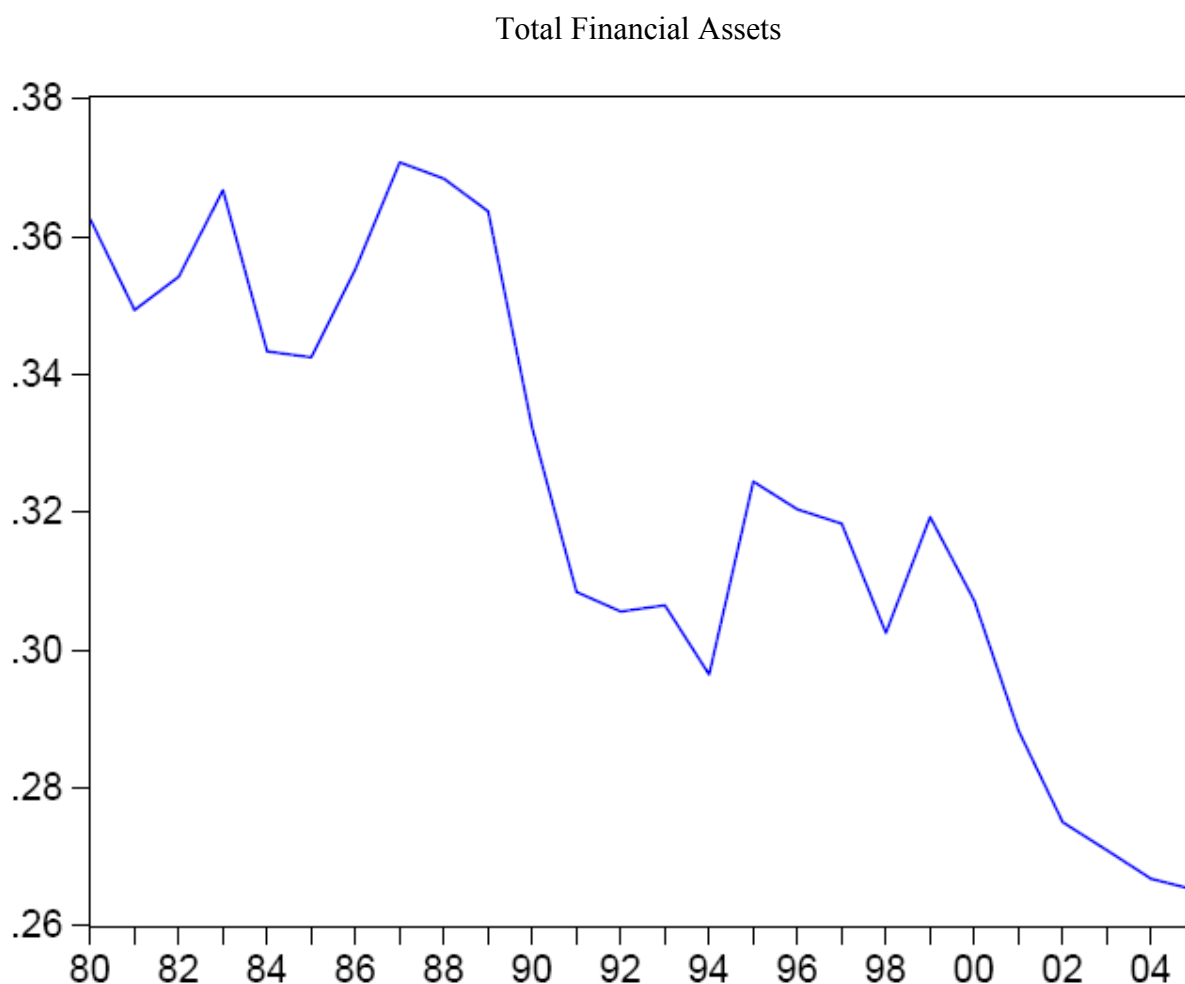


Figure 3 shows a downward behavior for the standard deviation of the ratio of household total financial assets to disposable income. This result provides us a clear evidence of  $\sigma$ -convergence.

**Figure 4.  $\sigma$ -convergence for the main components of financial assets of the selected OECD countries**



Figure 4 indicates  $\sigma$ -convergence for shares and other equity and for the insurance products. These results strengthen the  $\beta$ -convergence results we got in Section 4.1 for these two financial instruments.

On the contrary the cross-section variance of currency and deposits increases over time. Also the ratio of household securities to disposable income lacks  $\sigma$ -convergence. These results are consistent with the  $\beta$ -convergence evidence discussed in section 4.1.

The small number of observations in the cross-sections has prevented us from applying the classical F tests or likelihood-ratio test proposed for example by Carree and Klomp (1996) for confirming the graphical results.

## 5. Concluding remarks

In this work we have investigated the presence of  $\beta$ - and  $\sigma$ -convergence for the ratios of household financial instruments to gross disposable income. We assume that the composition of household portfolio provides information on the features of financial systems. We found evidence of convergence for total financial assets, shares and other equity, and insurance products. Financial globalization, the growth of capital markets and the crisis of public pension schemes are the main explanations of our empirical findings. Mixed results, and often no convergence, are found for currency and deposits and securities other than shares. With reference to deposits, the intensity of bank disintermediation was different in each of the OECD countries: banking and postal deposits lost weight in the US because of the competition coming from money market funds; on the contrary the importance of deposits remained strong in Japan, Italy, Austria and Germany, countries which we may still define as bank-based. As far as securities other than shares are concerned, also their importance remains different in the OECD countries. While the Italian households still hold large amounts of banking and General government securities, their weight is lower in the other main OECD nations. Households have still different combinations of bank securities and deposits in their portfolios, because of various fiscal treatments or different loan maturity. Also the role of corporate bonds differs across countries. While firms' issues of securities other than shares are important in the UK, the US, Canada and Japan, they are negligible in countries like Italy and Germany.

We plan to extend the paper in different directions. First, a further collection of statistics might led us to consider other European countries in the empirical exercises. Second, conditional  $\beta$ - convergence exercises might take into account the impact of variables like inflation and the exchange rate that may influence the shape of financial structures. Third, pending further statistical harmonization, it would be interesting to study convergence of narrower categories of financial instruments: a simple example is the split between quoted and unquoted shares. These subjects are in our research agenda.

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