

# FINANCIAL CONSUMPTION AND THE COST OF FINANCE: MEASURING FINANCIAL EFFICIENCY IN EUROPE (1950–2007)

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## Abstract

This paper proposes a quantitative evaluation of the financial sector from 1950 to 2007 in Germany, France, the United Kingdom, and Europe more broadly. Three main facts are revealed. First, the ratio of domestic financial intermediaries' income to GDP increases continuously in all the countries over the period, even during the 1990s and the 2000s, contrary to the national accountant evaluation. Second, comparing financial income to the quantity of intermediated assets, the analysis shows that the unit cost of financial intermediation does not decrease over the period, except in France. In addition, because European unit cost decreased after the 1990s whereas it remained stable in the United States, the unit cost increased more in the United States than in Europe over the whole period. Third, an econometric investigation shows that (i) the increase in nominal interest rates during the 1970s and the 1980s is positively correlated to unit cost and (ii) the joint development of financial wealth management, credit intermediation, and the securities industry during the 1990s and the 2000s coincides with higher unit cost values. (JEL: E2, G2, N2)

## 1. Introduction

The main function of finance is to transfer resources from actors who have them to those who need them more. In this process, financial intermediation pools the risks, provides the liquidity, and reduces the information asymmetries that impede the transfer of funds. Because financial intermediaries are remunerated for providing those services, this entails a transfer of income from the nonfinancial sector to the financial sector. Financial income in this perspective measures the aggregate cost of

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financial intermediation for customers to obtain financial services. Recent research has shown that the financial sector has grown rapidly compared to GDP since the 1970s in Europe and the United States (Philippon and Reshef 2013; Haldane et al. 2010; Philippon 2015), with the result that new questions have arisen as to the justification of the increasing aggregate cost of financial intermediation and its consequences for financial costs (French 2008; Fama and French 2010; Philippon and Reshef 2012; Gennaioli, Shleifer, and Vishny (GSV henceforth) 2014). Because of the increasing role played by the financial sector in the economy and theoretical models (Chari et al. 1995; Kiyotaki and Moore 1997; Bernanke et al. 1999), quantifying its role appears as the main motivation of this paper. Although evidence exists from the United States (Philippon 2015; Greenwood and Scharfstein 2013), little is known about Europe and the predominant role played by banks there. Therefore, this paper proposes to calculate the unit cost of financial intermediation—that is, the cost of obtaining a basket of 1 euro of financial services for one year—for Germany, France, the United Kingdom, and Europe as a whole from 1950 to 2007.<sup>1</sup> The calculation is based on the ratio of “financial income” to “financial output” where “Financial output” measures the quantity of financial services obtained from the financial industry—namely, transfer of funds (credit provision, securities issuance, wealth management, etc.) and liquidity provision. In addition, this new data set should help us know more about the structural determinants of financial intermediation costs. First, cross country comparisons allow to complement the literature on the consequences of bank-based (Germany), state-based (France), and market-based (the United Kingdom and the United States) origins of financial systems (Schmidt et al. 1997). Second, the data provide the opportunity to search for stylized facts capturing the relationship between unit cost and other macroeconomic variables such as inflation, financial openness, or nominal interest rates (Lucas 2000; Demirgüç-Kunt et al. 2004; Philippon and Reshef 2012), which play an important role in the literature on growth and macroeconomic policy.<sup>2</sup> Third, cross-country comparison should improve our understanding of the consequences of financial deregulation in the 1980s and the 1990s.<sup>3</sup> In particular, this would help us to account for the consequences of the joint development of financial wealth management, credit intermediation, and the securities industry (Greenwood and Scharfstein 2013).

However, measuring the financial intermediation cost is prone to specific difficulties. First, the unit cost measure must provide the same information whatever

1. Since the relevant data are not systematically available for all European countries, “Europe” here includes its largest economies, Germany, France, the United Kingdom, Italy, Spain, and the Netherlands. These countries accounted for more than 85% of Europe’s GDP over the period covered.

2. Two effects of financial intermediation cost can be emphasized here. First, because of the relationship between unit cost values and the access to external capital, any change of financial intermediation costs should affect the capital/output ratio and thereby economic growth (Levine 2011). Second, economic policy efficiency may depend on the impact of unit cost values on individuals and enterprises choices (Goodfriend and McCallum 2007; Ajello 2015). Therefore, a monetary policy shock could have various economic effects, depending on the link between nominal rates, inflation, and unit cost, and investment strategies (Christiano et al. 2005; Gerali et al. 2010; Hall 2011).

3. For a quantitative investigation of financial deregulation from 1973 to 2005, see Abiad et al. (2007).

the financial divergences occurring across countries and over time. In particular, the calculation must account for financial intermediaries' ability to cross-subsidize their financial services, which makes it impossible to link one specific income to one specific service. This is why, unlike Demirgüç-Kunt et al. (2004) who used interest spreads to assess financial intermediation cost, this paper takes an aggregate view of financial intermediation. Second, there are no data available to measure the quantity of financial services provided by the financial sector. Therefore, because the transfer of funds and the provision of liquidity are based on the provision and management of financial assets, I rely on the quantity of financial assets intermediated to assess "financial output" (Philippon 2015). Third, "Financial income" is commonly assessed through financial VA (Berger and Humphrey 1992; Philippon and Reshef 2013; Philippon 2015). However, banking institutions have considerably increased their securities management activity in recent years due to the development of the securities industry. These securities create income for banks in the form of dividends, interest on securities, and capital gains that are not always captured from a national accountant's perspective (Stauffer 2004; Fournier and Marionnet 2009). Because such income belongs to banks' risk management strategies (Diamond and Rajan 2009; Acharya, Schnabl, and Suarez 2013) and because of cross-subsidization among financial services (Stiroh 2004), capital income is akin to an implicit consumption of financial services. This generates a transfer of income from the nonfinancial sector to the financial sector which is not passed on to depositors and investors. Although this issue should not dramatically affect the results for the United States, due to the limited share of banking activities in total financial activity there, it could have a great impact in Europe, where banks are the principal financial intermediaries, including in the United Kingdom. Therefore, this paper proposes two measures of unit cost. Although the "plain" unit cost uses plain VA to measure financial income, the "corrected" unit cost adds banks' net property income and capital gains to financial VA.

The first contribution of the paper is to show that unit cost varies across countries and over time. First, unit cost appeared higher in France than in Germany, the United Kingdom, and the United States until the early 1990s. Second, the unit costs rose in the 1970s in all the countries studied and appeared rather stable during the 1990s and 2000s in Germany and the United Kingdom, but fell in France. This means that unit cost did not decrease after financial deregulation, except in France. Third, comparison between the European and US series shows that unit costs followed very similar paths until the early 1990s. However, the European unit cost decreased during the 1990s whereas the US unit cost remained quite stable until 2007.

The second contribution of the paper is to provide an econometric analysis of unit cost evolution. The new data sets allow us to provide a basis for discussing regularities between unit cost and macroeconomic and financial variables. Two main facts are revealed by the analysis: First, unit cost and nominal interest rates are positively and significantly correlated until the early 1990s. On the other hand, inflation seems not to affect unit cost value. This suggests that the increase in nominal rates during the 1970s and the 1980s coincides with an increase in unit cost. Second, the joint development of financial wealth management, credit intermediation, and the securities industry

coincides with unit costs remaining high during the 1990s and the 2000s. Because financial intermediation income depends less on nominal rates due to the development of the securities industry, the unit cost did not follow the decline in nominal rates during the 1990s.

The rest of this paper is organized as follows: Section 2 explains the method used to calculate the unit cost of financial intermediation; Section 3 presents the German, French, and UK cases in detail; Section 4 proposes an estimation of the unit cost of financial intermediation for the whole of Europe; Section 5 discusses the unit cost calculation hypotheses; Section 6 looks at financial intermediation theories and panel data analysis to find out more about the evolution of unit cost; and Section 7 concludes.

## 2. Measuring Financial Income, Financial Output, and the Unit Cost of Finance

The heterogeneity of financial services makes it impossible to use pricing to measure financial intermediation efficiency (Philippon 2015). Therefore, I rely on aggregate data to measure the unit cost of financial intermediation.

### 2.1. Financial Income

The income of the finance industry, measured as a percentage of GDP, gives an idea of the economic weight of the finance industry over time. According to national accounting principles for calculating value added (VA), income can be measured in two ways: first, as the sum of revenues received by the finance industry minus the consumption required for the production of financial services and, second, as the sum of profits, compensations, and net taxes distributed by the financial industry for its services. However, the specificity of the finance sector means that these two measures cannot be always equated, especially in the banking sector, as some activities are not considered in the national accounts to be the product of financial intermediation services.

Despite numerous debates about the right way to assess financial VA (Stauffer 2003), the national accounts use a production view of financial intermediation and rely on two things: (i) fees received by intermediaries and (ii) financial intermediation services indirectly measured (FISIM, henceforth). FISIM are used to estimate the value of the services provided by financial intermediaries for which no explicit charges are made; this corresponds to the case where banks collect deposits and provide loans. FISIM is thus calculated as follow:  $FISIM = (r_L - r)L + (r - r_D)D$ , where  $L$  is the value of loans,  $D$  the amount of deposits,  $r_L$  the lending rate,  $r_D$  the deposit rate, and  $r$  the reference rate used to assess banks' refinancing cost—most often the interbank rate. The first term of FISIM calculation measures the service of credit provision whereas the second term measures the service of deposit management. Because  $VA_{finance} = fees + FISIM - intermediate\ consumption$ , the national accountant excludes net property income from securities and capital gains,

which may be large in the case of banks.<sup>4</sup> Indeed, the financial accountant measures financial intermediation in a limited way, notably to respect the homogeneity of the accounting framework in other economic sectors (the calculation of VA removes income from property and capital gains in all sectors even though that income is included in GDP calculation; Stauffer 2003; Fournier and Marionnet 2009). For that reason, the difference between banking income and VA produced by banks depends on four main elements: (i) net interest margins excluded from FISIM but included in banking income, that is, interest income excluding interest from loans minus interest expenses excluding interest from deposits; (ii) dividends from banks' securities portfolios; (iii) net capital gains from banks' securities portfolios; (iv) net income and capital gains on derivatives.<sup>5</sup>

However, measuring financial income without accounting for those elements is problematic because of the link between banks' asset management activities and capital income. In order to better understand this point consider two intermediaries, an equity mutual fund and a bank. In the first case, the equity mutual fund manages €100 on behalf of nonfinancial clients. Equity raises 5%. Because fees are set at 20% of total investors' gains plus 2% of total managed funds, the mutual fund income is equal to €3. In the second case the bank collects deposits of €100 and provides loans for the same value. Because, the deposit rate is 4% and the lending rate 6%, banking income is equal to €2. Financial industry value added in this example is equal to fees plus FISIM, which is exactly the sum of the mutual fund and bank financial income, that is, €3 + €2 = €5. But now assume a third case where the bank issues €100 debts at 5% along with its previous intermediation activities. Debts are used to buy securities the value of which raises 2% before being resold at the end of the period. Additional income from those securities (dividends, other interest income) are equal to €5. Banking income is now €2 from traditional activities, plus €2 capital gains, plus €5 property income, less €5 nondeposit interest expenses. Financial VA is still equal to €5 but financial income is now equal to €7: €3 from mutual fund fees, €2 from traditional banking activities captured in FISIM, and €2 from net property income and capital gains. In other words, although such additional banking activity is a mixture of transfer of funds and portfolios management it is excluded from financial VA calculation; financial VA remains the same despite the increasing amount of assets intermediated (Figure A1 in the [Online Appendix](#) proposes an additional example of the FISIM and banking income gap due to the development of hybrid banking activities).

The related gap between banking income and VA produced by banks has become wide since banks have increased the volume of securities recorded on their balance sheets considerably over the last 30 years (Fournier and Marionnet 2009; Haldane

4. Note that because of the production approach used to assess financial VA, gross operating surplus (GOS, henceforth) is based on fees and FISIM and does not account for capital income. In this respect,  $GOS = \text{fees} + \text{FISIM} - \text{intermediate consumption} - \text{compensations} - (\text{taxes} - \text{subsidies})$ .

5. If, for example, a loan is securitized the related interest income is not included in FISIM calculation. In other words, financial VA does not account for interest income from securitized loans such as asset back securities and collateral debt obligations (Greenwood and Scharfstein 2013).

et al. 2010). In addition the development of shadow banking activities has led banks to increase their securities management activities (Adrian and Shin 2010; Gorton and Metrick 2012; Acharya et al. 2013). Because capital income is akin to a transfer of income from the nonfinancial sector to the financial industry that is not transferred to banks' clients, depositors, and debtholders, that income constitutes an indirect cost of financial intermediation. This has been particularly true since the 1990s since universal banks have used traditional activities to develop their market-based activities.<sup>6</sup> Because financial systems are more hybrid due to the joint development of financial wealth management, credit intermediation, and the securities industry, a large share of financial income has been transferred to property income and capital gains along with this new intermediation strategy.

I use two different indicators of financial intermediation income in this regard. I first take the "plain" VA series calculated by the national accountant. Second, I address the issue revealed by Stauffer (2004) and Fournier and Marionnet (2009) and propose a "corrected" estimation of financial income using OECD data on net banking income. The OECD data have the advantage of capturing capital income through the provision of a consolidated income statement at national level, which means that this income is not diverted from other banks. By the same token, if this income is diverted from other financial intermediaries then it appears as a cost in the VA calculation of those intermediaries.<sup>7</sup> In addition, net banking income data are net of clients' income, that is interest paid on liabilities, bonds, and securities and the difference between the issue price on debt instruments and their par value. Therefore, capital income from OECD data is diverted from the nonfinancial sector.

However, "correcting" for financial income using OECD data entails new problems of aggregation.<sup>8</sup> First, what is the institutional coverage of the OECD data and what is it supposed to replace in VA? Financial VA in national accounts is composed of three elements: *Financial intermediation excluding insurance and pension funding*, which is almost entirely based on banking activities, *Insurance and pension funding, except*

6. This is the case when banks use securitization, which allows them to do business on trading markets while extending their volume of credit. To quote from an interview with John Reed—former chair and chief executive of Citycorp and Citygroup—in the Financial Times of 9 September 2013: "when trading was small in proportion to everything you could have a group of high bonus professionals that you treated differently and it did not affect the culture of the whole organization. As trading becomes more important then it becomes harder and harder to keep those cultures separated. And it began to work into the risk-taking culture as well. Risk officers would say to someone who wanted to make a loan: 'I don't like this credit. We aren't going to do it. Stop. Period'. But now they would recognize that if a certain transaction did not go through, his colleague was not going to be paid that year. It became very difficult to say 'Sorry. Don't do it. Your colleague was being compensated for doing transactions...' It became infectious. (...) These cultures don't mix well and one tends to push out the other (...)."

7. Dividends from other intermediaries' equities held in banks' balance sheets are the exception. However, this represents a very small share of total financial income. If, for example, the amount of distributed profits of nonbank intermediaries is 10% of nonbank VA and if banks hold 10% of the related equities, then 1% of other intermediaries' VA is captured in banks' capital income. If other intermediaries' VA accounts for 30% of all financial income, this might lead to all financial income being overvalued by 0.3%.

8. See also OECD 2004; or the OECD data appendix for details of the OECD measure of banking income per country and net banking income calculation details



*compulsory social security*, and *Activities auxiliary to financial intermediation*, that is, auxiliary activities such as brokering and funds management outside the banking business. Given that the institutional coverage of the OECD data is focused on banking intermediation (interest margins, fees on intermediation services, banks' capital gains, and net property income, etc.). I use banking income as a substitute for *Financial intermediation excluding insurance and pension funding* even though the coverage may differ slightly.<sup>9</sup> Comparing the OECD data with Fournier and Marionnet (2009) reconstitution of French banking income from *financial intermediation excluding insurance and pension funding* VA shows, however, that the difference is very small. Second, along with differences vis-a-vis capital income, some charges are excluded from VA but included in banking income. Because there is no satisfactory way to measure those charges based on OECD data and because some of those charges are disguised wages or benefits-in-kind, I do not distinguish between them in the calculation. Third, the geographic coverage of the OECD data is not the same in all countries. For example, Germany and France account for national bank branches' activities abroad but exclude foreign bank branches' activities at home whereas Italy and Spain do the opposite. This leads to different measures of banking income whenever national bank branches' activities abroad are not the same as foreign bank branches' activities at home. Nevertheless, Fournier and Marionnet (2009) show that the difference is very small, at least in the case of France. Fourth, the lack of international homogeneity in the data adds difficulties to the aggregation of financial income at European level. I deal with this problem by proposing different methods of aggregation, which, as Section 3 will show, only have marginal effects on the European series.

Therefore, I add the value added of insurances, pension funding, and activities auxiliary to financial intermediation to net banking income as an alternative to the plain financial income measure. I call this series "corrected financial income". Table A1 in the [Online Appendix](#) provides accounting details about "corrected" financial income, which can be summarized by the following equation:

$$\begin{aligned} \text{corrected financial income} = & \text{net banking income} + \text{financial sector VA} \\ & - \text{financial intermediation excluding insurance and pension funding VA.} \quad (1) \end{aligned}$$

This new measure is imperfect but, unlike the national accountant perspective, it helps account for market-based activities of banks that surged along with financial deregulation in the 1990s (Greenwood and Sharfstein 2013; Philippon and Reshef 2012, 2013).

9. See table A1 in the [Online Appendix](#) for details.

## 2.2. *Financial Industry Output*

Financial output is supposed to account for all services provided by financial intermediaries. The calculation includes transfers of funds and liquidity services. Because financial intermediaries create and manage assets to provide financial services, the easiest way to measure the total production of financial services intermediated is to sum the financial assets intermediated (Philippon 2015).<sup>10</sup> Two questions arise about this calculation. First, what is an intermediated asset? Second, is the calculation capable of taking all kinds of financial services into account?

An intermediated asset is an asset that provides a financial service to nonfinancial industry customers that must be intermediated. The related assets are intermediated because they require the intervention of a financial intermediary at the moment of their creation and thereafter during the course of their life. For example, in making a loan to a business, a bank creates a debt that it manages until its term is reached. In return, this debt appears in the form of deposits the management of which also depends on financial intermediaries. Thus, the volume of services produced by the finance industry depends on the volume of intermediated financial assets. These assets are loans, transferable securities (stocks and bonds), public debts, and the money supply in the broad sense. The loans, public debts, and transferable securities correspond to the activity of transferring funds; the broad money indicator corresponds to the provision of liquidity, including the creation of liquid assets in the parallel banking sector that operates outside banking regulations (Gorton and Metrick 2012). The sum of credit and market capitalization accounts for both the supply and demand sides of the transfer of funds services. Insofar as those assets are most often managed by banks and asset managers, the capital management service is captured by the calculation (see the discussion in Section 5). Because credit entails monitoring and screening services, and because market capitalization is related to the issuing of securities, the series also capture financial services related to capital provision.

The calculation does not include derivatives for three reasons. First, derivatives “derive” from other financial assets. These contracts are of zero net supply. Second, although derivatives help financial intermediaries gain access to external funds by spreading the idiosyncratic risk of financial assets, the related positive effects of risk management are supposed to include the fact that it increases the volume of financial services (e.g., the amount of domestic credit). This is thus accounted for in the output calculation. Third, any liquidity service related to shadow banking is captured by the broad money aggregate that accounts for shadow banking risk-free asset creation. As explained by Gorton and Metrick (2012) and Sunderam (2014), shadow banking liabilities are substitutes for money. In particular, repos and money market fund shares

10. Philippon (2015) estimates the financial output by compiling two separate estimations. The first estimation is the one used in this paper. The second estimation uses the flow of credit, money, and security issuance. I do not use this method here because data are unavailable. It is worth noting, though, that both estimations are very similar in Philippon’s study. There is thus no reason to think that this simplification might bias the results.



might be seen as shadow deposits. This is why I use a broad monetary aggregate—M3 for European countries and M4 for the United Kingdom—to account for shadow banking risk-free asset creation. Lastly, some derivatives are supposed to provide a direct service to the economy especially through risk management—for example, interest rate risk management through swaps. This represented less than 10% of all derivatives in 2007 according to the BIS. Based on ISDA data, 10% of world “gross credit exposure”—that is, gross market value of derivatives (total OTC) after netting, which reflects the amount of risk managed through derivatives—corresponds approximately to 330 billion dollars, that is, less than 0.5% of total intermediated European assets.

In compiling financial assets into one synthetic series it is important to account for the “quality” of asset intermediation. The “quality adjustment” of intermediation is defined as the amount of intermediation an asset needs to keep the same risk-adjusted pay off as a safe asset. Because such information is hard to obtain quantitatively, I assume, as in Philippon (2015) that each asset requires the same intensity of intermediation, normalized to unity, except in the case of public debt that is discounted by a factor 10.<sup>11</sup> By the same token I assume that it is as intensive to provide one euro of financial service today as 50 years ago. This hypothesis is not unrealistic as financial innovation tends to reduce the incentive for financial intermediaries to screen and monitor borrowers (Keys et al. 2012). However, the results may still be biased as long as quality adjustment related to lending to low-cash firms and poor households is ignored. Because those assumptions may affect the results, I discuss their potential effects on the shape of the unit cost series in Section 5.<sup>12</sup> Thus the financial output is measured as follows:

$$\text{Financial output} = \text{credit} + \text{money} + \text{capitalization} + 0.1 \text{ debt}. \quad (2)$$

### 2.3. International Issues and Unit Cost Calculations

In a closed economy there are no differences between what is paid for the consumption of one basket of financial services and the production cost of that basket. This is no longer the case when financial intermediaries provide cross-border financial services. If for example a Spanish customer obtains a loan of €1 from Spanish and German intermediaries and pays back 1 cent to a Spanish intermediary and 1 cent to a German intermediary, although the unit cost for this customer to obtain financial services is 2% the unit cost measure would state 1% due to trade balance issue. Therefore, the unit cost needs to account for financial intermediation trade balance.

Four unit cost measures are proposed based on financial income correction and financial sector trade balance adjustment. When data are unavailable, the unit cost does

11. In fact, government debt is weakly intermediated, although debts must be traded and generate a duration risk (Philippon 2015). It is therefore assumed that the management of public debt is less intensive.

12. It is worth emphasizing that this is a common issue of price series in service industries (see for instance real estate price series issues).

not account for financial sector trade balance. This was the case before 1992, except for the United Kingdom for which data were provided as far back as 1950. However, the low amount of international activities before those years shows that those hypotheses do not affect the unit cost measure. In addition, because it is hard to know about capital income trade balance, I use the VA share of financial sector trade balance—that is, financial sector trade balance to financial VA—to adjust the corrected unit cost.

Unit cost is thus obtained from the following formula (details on series calculation and sources are provided in the data appendix to this paper):

$$z_{unadjusted}^{corrected} = \frac{\text{corrected financial income}}{\text{financial output}}, \quad (3)$$

$$z_{unadjusted}^{plain} = \frac{\text{plain financial income}}{\text{financial output}}, \quad (4)$$

$$z_{adjusted}^{corrected} = \frac{\text{corrected financial income} \times (1 - \text{financial sector trade balance share})}{\text{financial output}}, \quad (5)$$

$$z_{adjusted}^{plain} = \frac{\text{plain financial income} \times (1 - \text{financial sector trade balance share})}{\text{financial output}}. \quad (6)$$

Where (un)adjusted means that financial sector trade balance is (not) taken into account in unit cost calculation.

### 3. Three European Cases: Germany, France, and the United Kingdom

Because Germany, France, and the United Kingdom account for more than 60% of European GDP throughout the period under study, and because those countries are often seen as the stereotype of bank-based (Germany), state-based (France), and market-based (the United Kingdom) financial systems before deregulation, it is interesting to examine the specific evolution of unit cost in those countries. In addition, the [Online Appendix](#) proposes some historical facts that can be used to interpret the series.

#### 3.1. Germany

Figure 1 plots the evolution of GDP share of finance in Germany with “plain” and “corrected” estimation of financial income.<sup>13</sup> In both cases, the GDP share of finance increased over the period covered. Moreover, the figure shows that using banking

13. Note that OECD data cite German bank activities in both Germany and abroad, including the subsidiaries of foreign banks in Germany, and excluding the foreign subsidiaries of German banks.

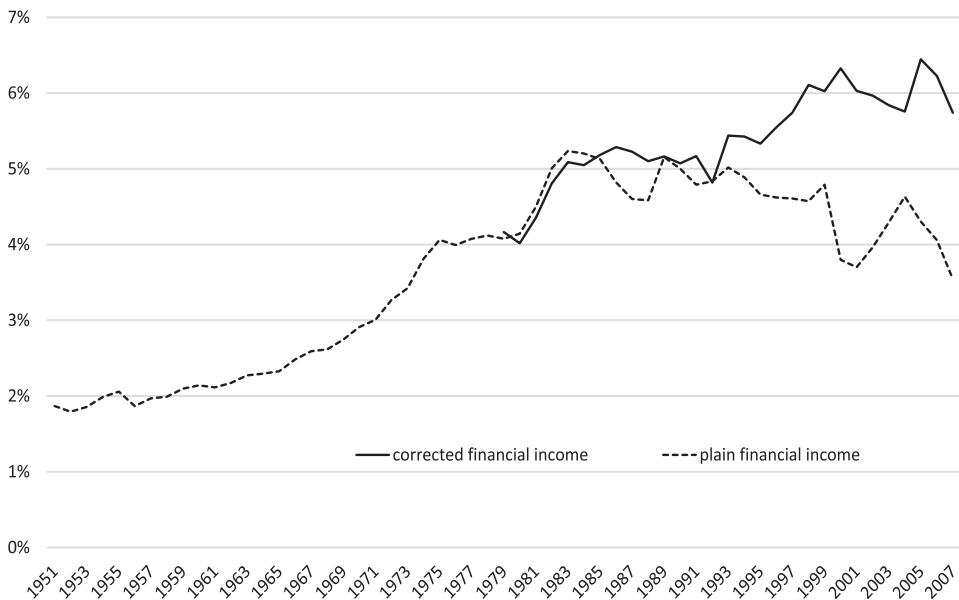


FIGURE 1. Financial income in Germany (% of GDP). Corrected financial income is the sum of net banking incomes + VA of insurance and pension funds + VA of auxiliary financial intermediation. The data for net banking incomes are available from 1979 to 2008.

incomes in the calculation had no impact on the series before 1992, that is, until after the second European banking directive liberalizing market activities. After that year, the series diverged increasingly.

Table 1 plots the ratio of financial output to GDP by asset type. We can see that credit was the major source of financial output in Germany throughout the period, confirming the bank-based character of the German financial system. Most of the increase that occurred after the mid-1990s was due to market capitalization whereas the ratio of credit to GDP remained quite stable after 1980. This confirms the new orientation of the German financial system, although, it did not mean that nonbank financial intermediaries kept banks out of the financial market business (Vitols 2005).

Finally, it is important to note that the series includes East-Germany in national series after 1993. This may explain why net foreign assets fell in the 1990s (Lane and Milesi-Ferretti 2007) whereas domestic credit rose; however, this does not seem to produce breaks in the series. In addition, since the difference between corrected and plain financial income is mainly due to capital income, the inclusion of East Germany in the data cannot be responsible for the diverging path of the series in the 1990s.

Figure 2 plots the unit cost of financial intermediation. This figure shows that overall, the corrected unit cost did not fall during the 1990s whereas the plain unit cost increased during the 1970s then decreased in the 1990s, returning to its 1960s' value.

TABLE 1. Financial output per asset type (%GDP).

Country	Asset type	1951	1960	1970	1980	1990	2000	2007
Germany	Credit (%)	37.83	68.49	90.06	108.59	113.60	130.37	121.66
	Broad money (%)	19.27	31.00	43.47	50.42	61.38	67.46	76.47
	Market capitalization (%)	26.22	63.94	19.89	10.58	20.70	67.30	63.30
	Public debt (%)	17.51	18.75	17.44	30.01	41.04	59.74	65.02
	Total financial assets (%)	100.83	182.18	170.86	199.60	236.72	324.87	326.45
	Financial output (%)	85.07	165.31	155.16	172.59	199.78	271.10	267.93
France	Credit (%)	28.32	43.84	80.55	85.97	103.27	116.64	141.71
	Broad money (%)	38.76	50.42	60.70	66.73	71.09	69.42	93.05
	Market capitalization (%)	9.09	29.90	16.18	8.84	25.00	109.00	92.00
	Public debt (%)	22.84	22.09	12.37	20.89	35.17	57.27	63.78
	Total financial assets (%)	99.01	146.25	169.80	182.43	234.53	352.33	390.54
	Financial output (%)	78.45	126.37	158.67	163.63	202.88	300.79	333.14
UK	Credit (%)	50.82	50.47	62.37	62.39	133.38	148.01	207.31
	Broad money (%)	73.84	50.31	50.08	47.24	78.97	81.90	111.30
	Market capitalization (%)	61.62	89.91	104.79	70.31	76.15	154.22	123.33
	Public debt (%)	175.23	106.77	64.20	46.10	32.58	40.87	43.94
	Total financial assets (%)	361.51	297.46	281.44	226.04	321.08	425.00	485.88
	Financial output (%)	203.80	201.37	223.66	184.55	291.76	388.22	446.33
Europe	Credit (%)	40.65	59.60	81.10	91.19	108.39	126.09	155.10
	Broad money (%)	40.62	39.33	48.71	55.87	69.19	69.76	89.79
	Market capitalization (%)	35.31	64.90	33.47	22.02	31.42	101.48	87.52
	Public debt (%)	71.06	42.23	27.77	34.01	49.10	62.81	63.86
	Total financial assets (%)	187.64	206.06	191.05	203.09	258.10	360.14	396.27
	Financial output (%)	123.69	168.05	166.06	172.48	213.91	303.61	338.80

Note: The financial output is estimated from the sum of private credit, broad money, market capitalization, and public debt discounted by a factor of 10. Sources and calculation details are provided in the data appendix.

### 3.2. France

Figure 3 plots the evolution of the GDP share of financial income in France.<sup>14</sup> In order to make both series comparable, corrected income has been rescaled based on the mean value of the ratio of corrected to plain financial income from the first three years for which corrected income data is available. In both cases, the financial income to GDP increased over the period covered. The figure shows that using banking income in the calculation has some impact as the ratio of plain financial income to GDP declined slightly over the last 20 years of the series whereas the ratio of corrected financial income to GDP continued to rise. It is also worth noting that, unlike in Germany, the difference between the two series was already large in 1988 when banking income data started. This might be due to early 1980s financial deregulation that helped develop

14. As in Germany, OECD data cite French bank activities in both France and abroad, including the subsidiaries of foreign banks in France, and excluding the foreign subsidiaries of French banks.

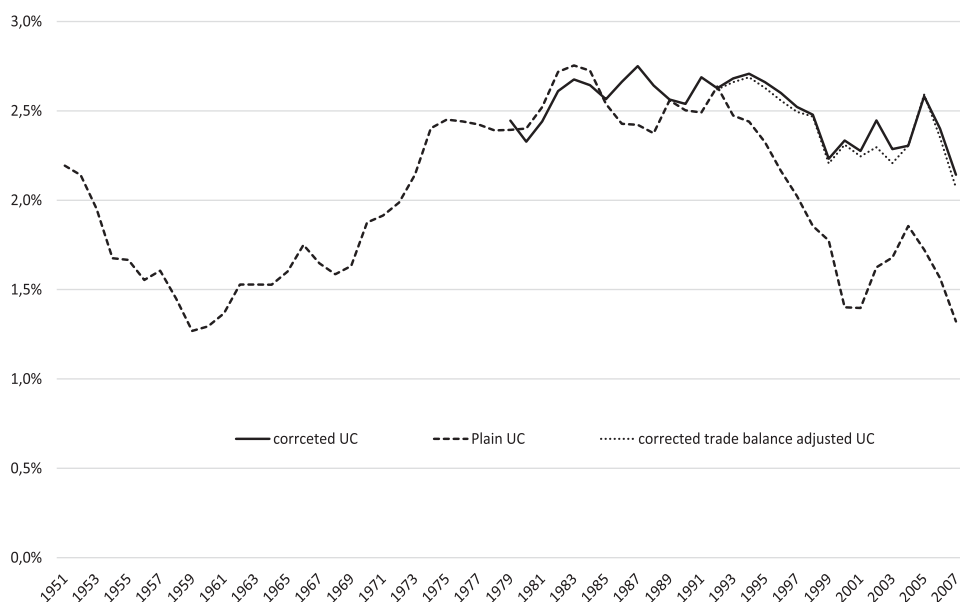


FIGURE 2. Unit cost of financial intermediation in Germany. The plain unit cost uses plain financial VA, whereas the corrected unit cost uses corrected financial income. The unit cost is “trade balance adjusted” when financial sector trade balance is added to financial income.

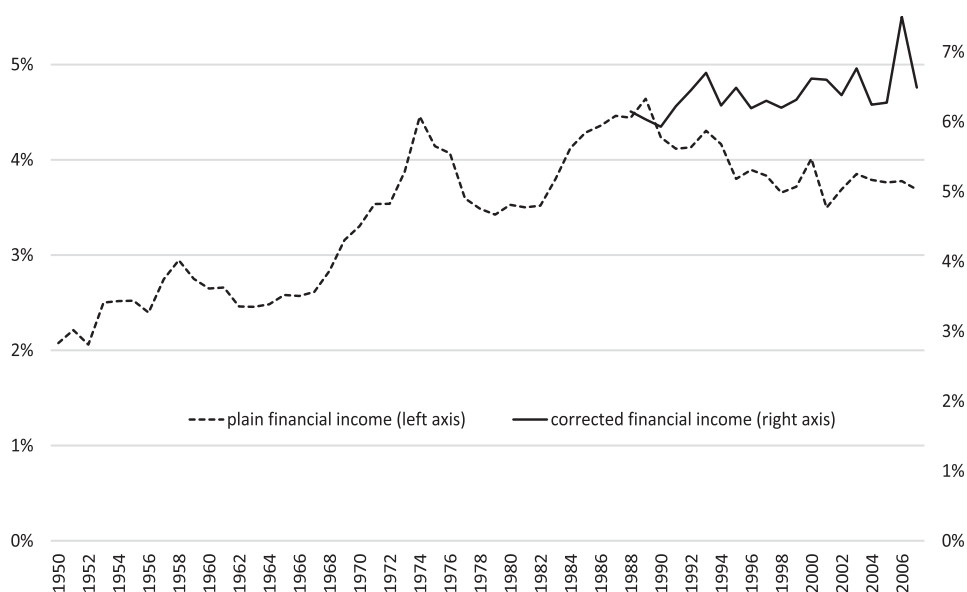


FIGURE 3. Financial income in France (% of GDP). Corrected financial income is the sum of net banking incomes+VA of insurance and pension funds+VA of auxiliary financial intermediation. The data for net banking incomes are available from 1988 to 2008.

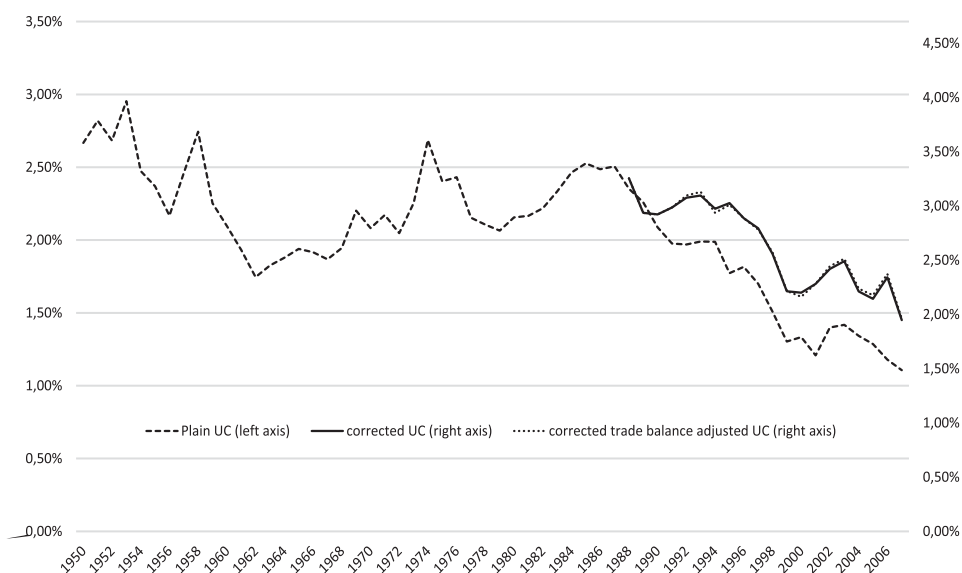


FIGURE 4. Unit cost of financial intermediation in France. The plain unit cost uses plain financial VA, whereas the corrected unit cost uses corrected financial income. The unit cost is “trade balance adjusted” when financial sector trade balance is added to financial income.

market-based activities at the expense of traditional banking (Plihon 1995; Schmidt et al. 1999; Bertrand et al. 2007).

Based on Table 1 we see that credit accounts for a large part of the financial output from the late 1960s to the early 1990s. Before the 1970s, liquidity management was the most important aspect of financial intermediation. The 1984–1986 reforms show clearly in the data as the weight of market capitalization increased significantly in the 1980s. However, market capitalization was not the only variable explaining the post-1990s financial output increase as credit and broad money rose rapidly throughout the last 20 years too.

Figure 4 plots the unit cost series. It shows that the unit cost is globally decreasing when we use plain financial income. Based on the period for which data are available, the corrected unit cost is also decreasing.<sup>15</sup>

### 3.3. The United Kingdom

Measuring financial income in the United Kingdom entails two difficulties. First, because of the increasing international role played by financial intermediaries, it is hard to separate domestic from international financial services. Second, the correction of financial income with banking income appears problematic due to the institutional

15. This suggests some gain in efficiency after deregulation probably due to the reduction of government directed credit in the banking sector (Bertrand et al. 2007).



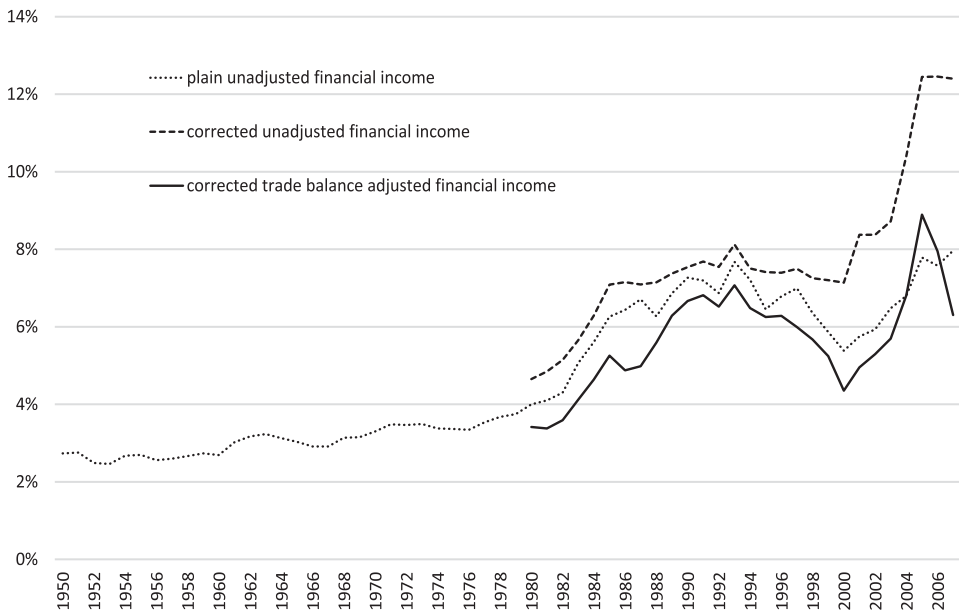


FIGURE 5. Financial income in the United Kingdom (% of GDP). Corrected financial income is the sum of net banking incomes+VA of insurance and pension funds+VA of auxiliary financial intermediation. The data for net banking incomes are available from 1980 to 2007. The unit cost is trade balance adjusted when financial sector trade balance is added to financial income.

and geographical coverage of banking income. OECD data do not account for foreign banks' business in the United Kingdom but include the overseas activities of national banks. This helps to account for the many activities of bank subsidiaries, especially market-based activities that are declared in tax havens, but this generates asymmetries between financial income and financial output. For that reason corrected financial income must be taken with caution.

Figure 5 plots the GDP share of finance. It shows that the GDP share of finance increased overall during the period. It also shows that a major change occurred in the early 1980s, that is, after the 1979 financial reforms. A comparison of corrected and plain financial income shows that corrected series tended to diverge from plain series in the late 1990s. Before that date both series appeared quite close, which tends to confirm the increase in capital income along with the joint development of financial wealth management, credit intermediation, and the securities industry. Note that the widening gap between unit costs whether financial intermediation trade balance is taken or not into account suggests that the international provision of financial services in the United Kingdom increased considerably over the last ten years.

Based on Table 1, the UK financial output increased at the same pace as GDP till the early 1980s. After that, this ratio surged until 2007. Unlike in Germany and France, the role of market capitalization was very important throughout the period covered, meaning that credit development helps to explain most of the increase in financial

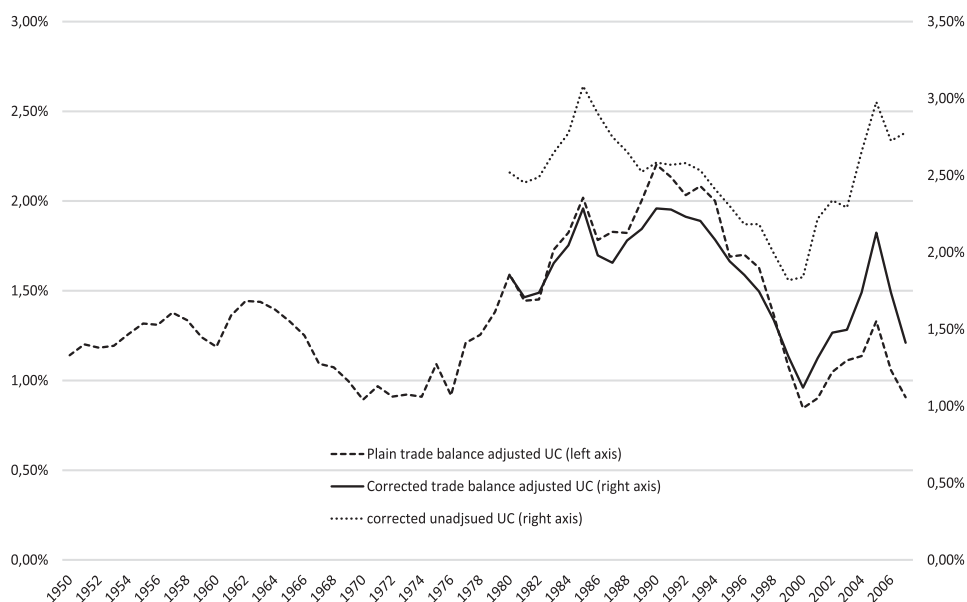


FIGURE 6. Unit cost of financial intermediation in the United Kingdom. The plain unit cost uses plain financial VA, whereas the corrected unit cost uses corrected financial income. The unit cost is “trade balance adjusted” when financial sector trade balance is added to financial income.

output over the last 30 years of the period. Interestingly, the credit development inflection point corresponds to 1979. The financial output share of GDP reached the astonishing value of 457% in 2006, with credit accounting for 45% of financial output compared with 34% in 1979. The structure of foreign assets helps explain this relative surge in credit as the UK foreign position was increasingly long on equities but increasingly short on debts after the 1990s (Lane and Milesi-Ferretti 2007).

Figure 6 plots the corrected and plain unit cost. As in Germany but not in France, the corrected unit costs did not decrease from the 1980s to 2007. However, the plain unit cost increased during the 1970s then decreased in the 1990s falling back to its 1960s level.

### 3.4. Accounting for Banks' Capital Income in the United States

Because Philippon (2015) does not account for banks' capital income, this section proposes to “correct” the US estimation of the unit cost. Figure 7 plots the GDP share of finance using plain financial income and corrected financial income. The series diverged during the mid-1980s but remained stable thereafter. Unlike in European countries, accounting for capital income did not greatly affect the US series. This is probably due to the lesser importance of banking in financial wealth management. As a comparison, although the financial VA share of the *Federal Reserve banking, credit intermediation, and related activities* fell from 51% in 1978 to 45% in 2007 in the

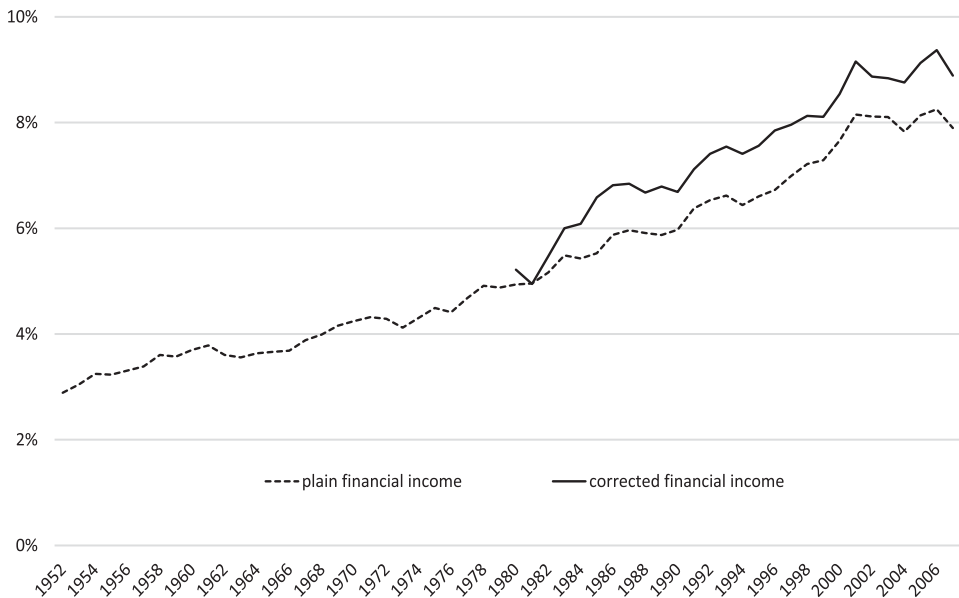


FIGURE 7. Financial income in the United States (% of GDP). Corrected financial income is the sum of net banking incomes+VA of insurance+VA of other financial intermediaries. The data for net banking incomes are available from 1980 to 2007.

United States, the share of *financial intermediation excluding insurance and pension funding* in financial VA declined from 75% to 68% in Germany.

Figure 8 plots the unit cost of financial intermediation in the United States using both corrected and plain financial income. Although the unit cost was a little higher from the mid-1980s to 2007, the general shape of the curve is not really affected by the correction of the series.

### 3.5. Comparing National Series

To give a broader view of the coevolution of national unit costs, Figure 9 plots national series, including for the United States, despite the lack of homogeneity among banking income series. Three main facts stand out. First the United States series diverged from the French and German series in the late 1990s for both unit cost measures, although the gap appears smaller in the case of corrected unit cost. Second, the UK plain unit cost converged to French and German values during the 1970s. Third, corrected series were quite stable in Germany, the United Kingdom, and the United States but not in France.

Globally the results show that plain unit cost increased in the 1970s then decreased in the 1990s in European countries whereas corrected unit cost after the 1990s stagnated in Germany and the United Kingdom but decreased in France. In other words, based on financial origins of financial systems before financial deregulation,

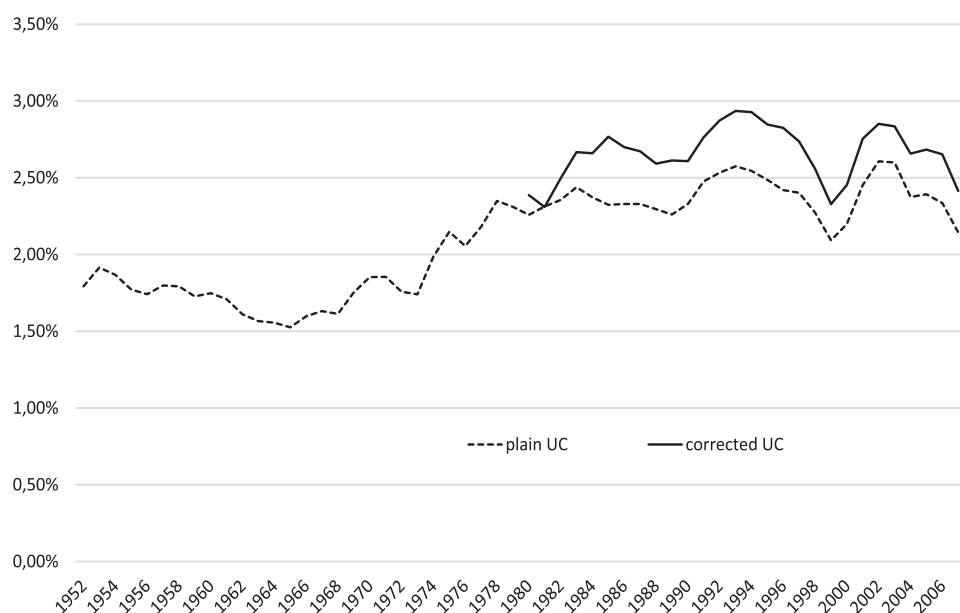


FIGURE 8. Unit cost of financial intermediation in the United States. The plain unit cost uses plain financial VA, whereas the corrected unit cost uses corrected financial income. Plain unit cost series is from Philippon (2015).

the corrected unit cost of producing or obtaining financial services stagnated in the bank-based and the market-based financial systems but decreased in the state-based financial system. The results also suggest that unit cost before financial deregulation was higher in the state-based financial system but lower in the market-based financial system.

## 4. Estimation of the European Unit Cost

### 4.1. National Series Aggregation

To obtain the indicator of unit cost for Europe, additional hypotheses are needed. This section provides two different methods of calculation. The first method uses the sum of countries' financial income divided by the sum of countries' financial outputs. The second method uses the sum of countries' unit cost weighted by each country's share in total GDP.

The calculation includes Germany, France, the United Kingdom, Italy, Spain, and the Netherlands, that is, almost 85% of Europe's GDP throughout the period under study. Since data are not available before 1970 for Italy and Spain, nor before 1961 for the Netherlands, the unit cost is estimated with the remaining countries (Germany, France, and the United Kingdom) before those years. Two things must be said in this respect. First, I do not provide a full analysis of Spain and Italy's unit cost series

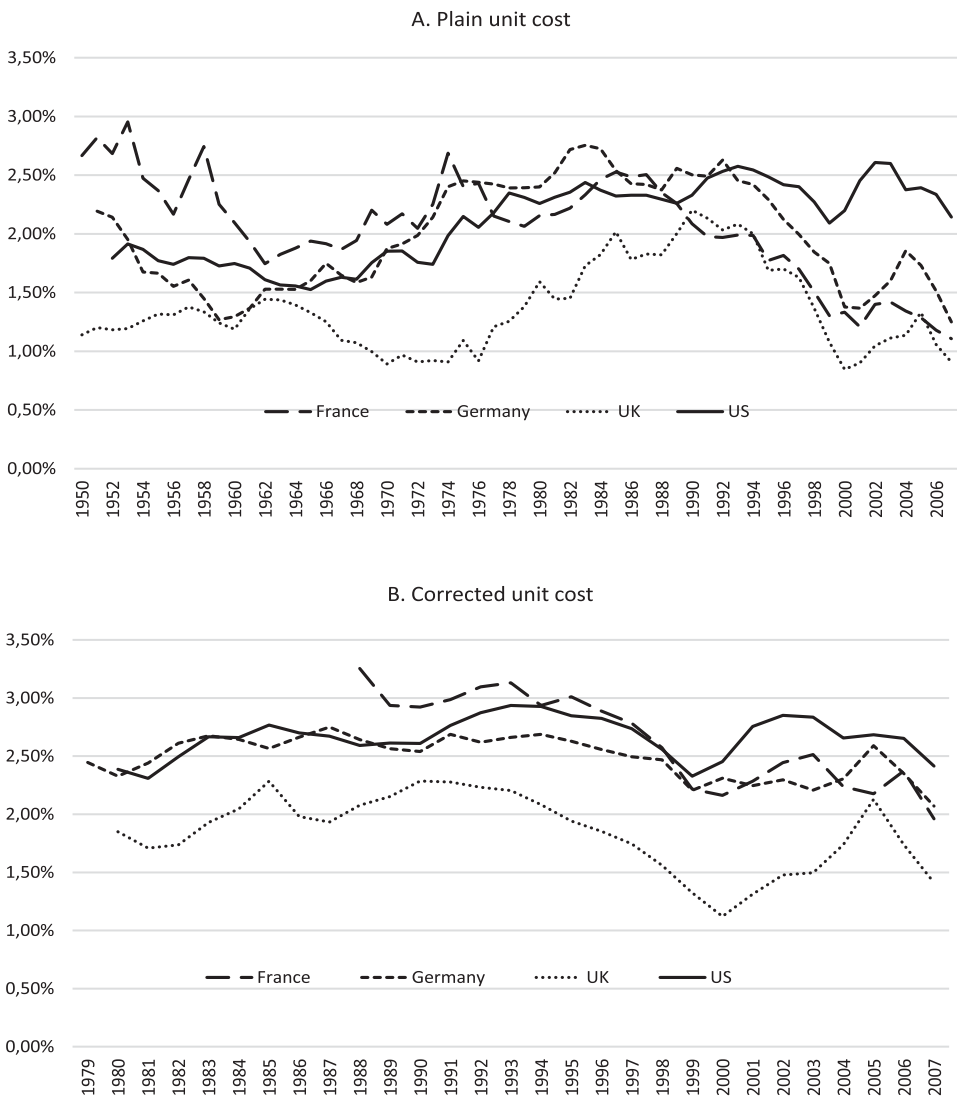


FIGURE 9. Comparing national series. Unit cost adjusts financial income for financial sector trade balance after 1992 for France and Germany and throughout the period for the United Kingdom. (A) Unit cost =  $(1 - \text{trade balance share of VA}) \times \text{plain financial income} / \text{domestic financial assets}$ ; (B) unit cost =  $(1 - \text{trade balance share of VA}) \times \text{corrected financial income} / \text{domestic financial assets}$ .

precisely because data for before 1970 are unavailable. Pre-1970 data are indeed needed to account for the effect of the sea-change during the 1970s. Second, income correction for the Netherlands is more complicated as OECD data account for business of national banks including subsidiaries inside and outside the country while including foreign banks' subsidiaries' activities too (see OECD data appendix for details), this may entail overvaluation of financial income.

Luxembourg and Ireland, countries in which financial activity is particularly thriving, are omitted because of data problems related to their international financial activities (Lane and Milesi-Ferretti 2007; Zucman 2013). Switzerland is also omitted despite large financial activities as VA data for before 1990 are unavailable.<sup>16</sup> In addition, it is hard to identify tax haven activities in the data (Zucman 2013), so the margin of error in terms of income and assets managed is large. The choice of excluding those countries from the calculation thus tends to undervalue the European unit cost after 1990. It is worth mentioning in this respect that the sum of Swiss, Luxembourg, and Irish financial VA represented 8% of EU-15 plus Switzerland financial VA in 1990 and 11% in 2005.

Due to data restrictions, the calculation includes all the countries of the panel (Germany, France, the United Kingdom, Italy, Spain, and the Netherlands) from 1970 to 2007, removes Italy and Spain from 1961 to 1970, and omits Italy, Spain, and the Netherlands from 1951 to 1961. Although Germany, France, and the United Kingdom use a “parent view” of banking income based on national banks’ activities (including foreign subsidiaries of foreign banks, excluding subsidiaries of national banks, and including national branches’ activities outside), Italy, Spain, and the Netherlands use a “country view” (banking activity within the country regardless of the national origin of the banks). If those differences are significant, then the series should diverge significantly according to the set of countries included in the calculation. In order to measure the robustness of the final series, I thus look at the evolution of the ratios of financial income to GDP whether Italy, Spain, and the Netherlands are included or not in the calculation. Figure 10 shows that the series display similar trends, suggesting that the European estimation of financial income is not dramatically affected by the heterogeneity of the OECD data.

Figure 11 plots European unit cost based on the ratio of the sum of financial income of countries  $i$  to the sum of countries’ financial output:

$$z_{Europe,1} = \frac{\sum_i \text{financial income}_i}{\sum_i \text{financial output}_i}.$$

The corrected unit cost is on the right axis of Figure 11 to make both plain and corrected series comparable. The related rescale is based on the average ratio of corrected unit cost to plain unit cost over the first three years for which the corrected series is available. Figure 11 shows a sharp rise of unit costs in the 1970s and the 1980s—that is, during the period of restructuring of financial systems and macroeconomic troubles—and a sharp decrease during the second half of the 1990s, especially for the plain unit cost. Lastly, the corrected unit cost in the 2000s appears higher than the plain unit cost in the 1960s after rescaling despite a small decrease during the 1990s. Therefore, assuming that the ratio of plain to correct unit cost is stable from 1951 to 1990, we see that the corrected unit cost did not decrease over the whole period.

16. Details on industry VA data are unavailable in the EU–KLEMS database and OECD STAN database before 1990.



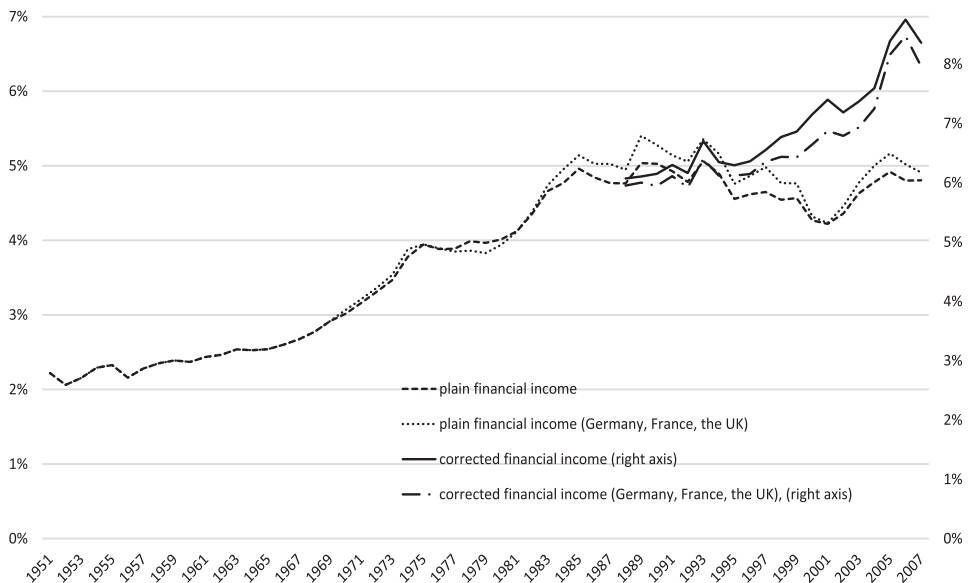


FIGURE 10. Financial income in Europe (% of GDP), first method. Financial income is measured by the ratio of the sum of countries' financial income to the sum of countries' GDP. When it accounts for all countries, plain financial income is based on German, French, and UK data from 1951 to 1960, it adds the Netherlands from 1961 to 1969, and adds Italy and Spain after 1969.

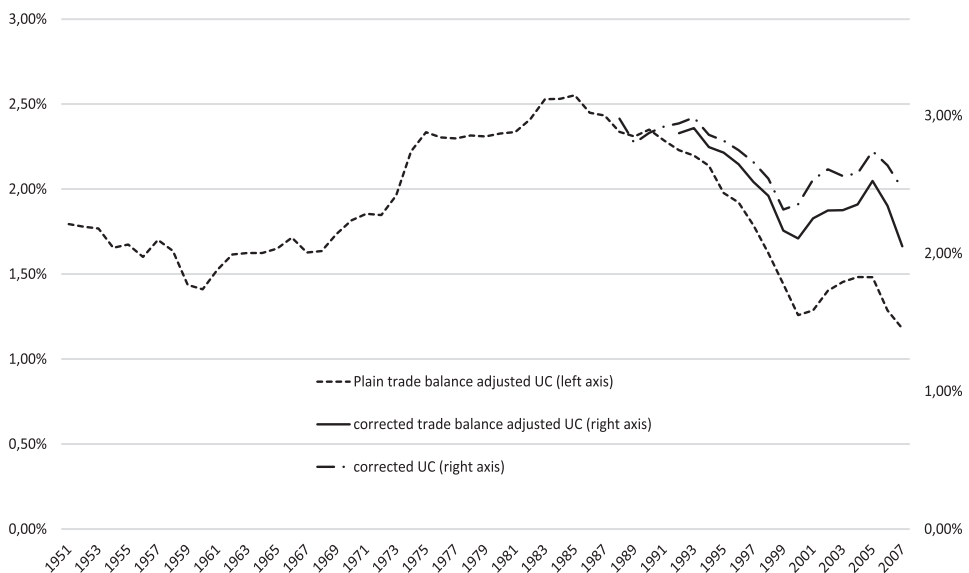


FIGURE 11. Unit cost of financial intermediation in Europe estimation, first method. The aggregation method is based on the ratio of the sum of countries' financial income to the sum of countries' financial output. The plain unit cost uses plain financial income, whereas the corrected unit cost uses corrected financial income. The unit cost is "adjusted" when financial sector trade balance is added to financial income.

Nevertheless, some questions remain as to the aggregation of countries' series. In particular, it could be argued that the series are not homogeneous. In order to address this criticism, a second method of aggregation is proposed. In this method, I multiply country's unit cost by the share of each country in total GDP and then sum the related values. The calculation of European unit cost from the set of countries  $i$  is thus

$$z_{Europe,2} = \sum_i \frac{GDP_i}{GDP_{Europe}} z_i.$$

This calculation differs from the previous European unit cost measure as it replaces the hypothesis of homogeneity among national series by the hypothesis that national series contributions to European unit cost and GDP evolve in similar proportions. The series is built using data for Germany, France, and the United Kingdom from 1951 to 1960; it adds the Netherlands from 1961 to 1969, and includes all selected countries after 1969. The results show no differences between the two methods (see figures A2 in the [Online Appendix](#)). There is thus no evidence of bias related to the method of aggregation in European unit cost estimation.

#### 4.2. Countries' Contributions to European Unit Cost

In order to know more about the contribution of each country to European unit cost I have plotted the country share of European output and the ratio of countries' financial income to European output minus the share of each country in total GDP. Two main facts arise from Figure 12. First, the contribution of France to plain and corrected unit cost decreases dramatically throughout the period whereas its contribution to total output tends to increase. Second, the UK's contribution increases in all figures, but the increase is particularly big for the ratio the UK's contribution to unit cost after 2000. Therefore, a larger share of European financial intermediation seems to have been transferred in the United Kingdom with the development of derivatives and the securities industry.

This confirms the hypothesis of increasing internationalization of financial intermediation. Asset management is a good example of such an effect as a growing amount of financial assets are managed in the United Kingdom on behalf of overseas clients. This coincides with the astonishing financial output of the United Kingdom, its large and positive trade balance, its short position on international debts (Lane and Milesi-ferretti 2007), and its increasing weight in Europe's financial income. Financial deregulation has helped with this internationalization of financial activities as international assets are managed by the UK securities industry on behalf of national and international clients. This suggests a geographic specialization of financial services with traditional activities managed locally and the securities industry, which is more skill-intensive (Philippon and Reshef 2012, 2013), located in large financial centers and London in particular.

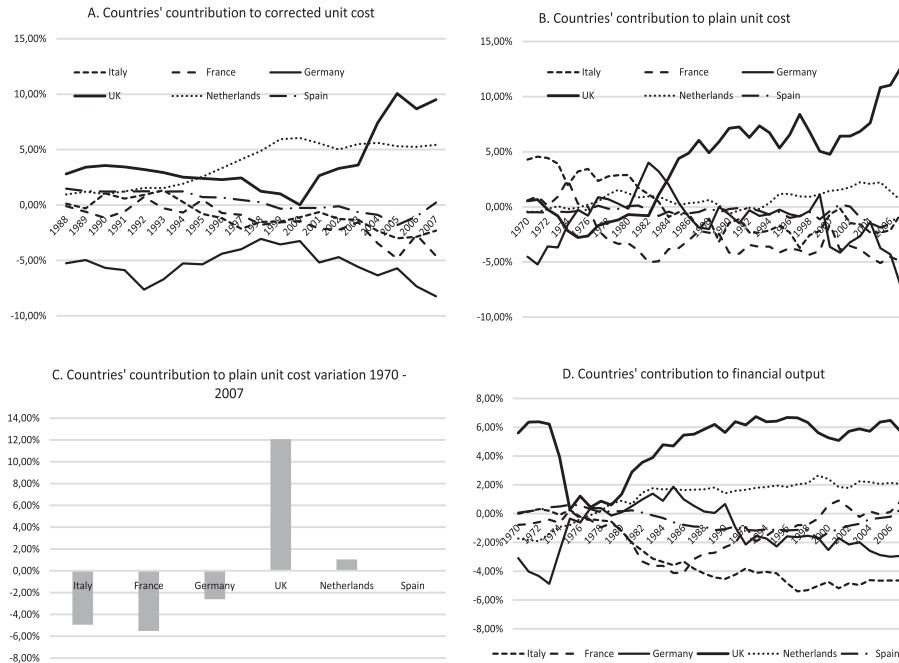


FIGURE 12. Countries' contribution to European output and unit cost minus countries' contribution to GDP.

### 4.3. Comparison with the US Unit Cost

Figure 13 plots the European and US unit costs as calculated by Philippon (2015). We see that plain unit cost in Europe and in the United States followed the same path until the early 1990s but diverged thereafter. On the other hand, comparing the US series to the European plain unit cost before 1988 and the rescaled European corrected unit cost after 1987, we see that the US and European series display positive and similar trends, although the European series decreases a little in the 1990s. This suggests that unit cost evolved negatively during the 1990s in Europe compared to the United States.

## 5. Discussion on Risk and Quality

Because financial intermediation has become more market oriented after financial deregulation, more income might be the consequence of more risk. As long as financial intermediaries manage the risk through information management, intermediaries' income may depend on the risk profile of financial assets. If so, fees and spreads on asset management are increased, financial income is raised, but the profit rate is not necessarily higher due to larger production costs. Two questions follow. Do financial intermediaries spend more to manage the risk over time? How much is the unit cost affected by the related quality of asset intermediation?

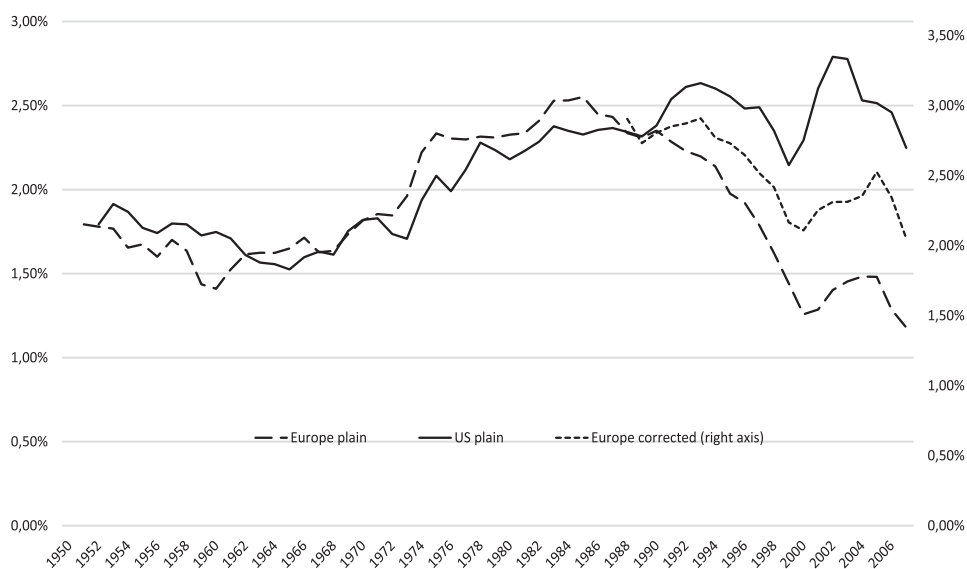


FIGURE 13. The European and US unit costs. The European series is the ratio of the sum of countries' financial income to the sum of countries' financial output. The European unit cost is adjusted for financial intermediation trade balance. The US unit cost series is from Philippon (2015).

First, intermediation quality is not necessarily the same depending on the set of assets managed, so the composition of the basket of financial services may affect unit cost. By comparing national series we can test whether the composition of this basket changes the unit cost value. If, for example, credit is more costly to manage than other components of output, unit cost should be higher in countries with a large share of credit provision, all things being equal. In other words, insofar as the output calculation stated equal quality of intermediation among assets, except for public debt, unit cost should be higher in countries with large credit to financial output ratios. By the same token, if credit increases relative to other output components in a given country, unit cost should rise in this country. In order to test for both between and within effects of asset composition, I run regressions explaining unit cost by the ratio of each component ( $j$ ) to total financial output. However, because  $\sum_j (\text{component}_j / \text{output}) = 1$  a reference has to be selected among the output components. Because the results may differ according to the variable of reference, I use a logistic transformation to include all the output components in the regressions. If  $\mu_j = (\text{component}_j / \text{output})$ , the logistic transformation of  $\mu_j$  is given by  $X_j = \ln(\mu_j / (1 - \mu_j))$ .<sup>17</sup> Because unit cost may differ due to country-specific factors and time circumstances, I add time ( $t$ ) and country ( $i$ )

17. Two additional things must be said about such a logistic transformation. First, inference statistics can become misleading when compositional explanatory variables are used directly in a linear regression model (Aitchison 1986). Second, the proposed transformation allows very high correlation between raw and transformed variables ( $\rho > 0.95$  in almost all cases).

TABLE 2. Explaining the unit cost by financial output components.

Variables	(1) plain unit cost	(2) corrected unit cost	(3) plain unit cost	(4) corrected unit cost
Credit	0.00631 (0.00615)	−0.00325 (0.00788)	0.00918* (0.00436)	0.000113 (0.00600)
Market capitalization	−0.00204 (0.00327)	−0.00163 (0.00372)	−0.00165 (0.00293)	−0.000235 (0.00401)
Broad money	0.00147 (0.00631)	0.00427 (0.00937)	0.00371 (0.00551)	0.00956 (0.00825)
Public debt	0.00230 (0.00221)	−0.00219 (0.00507)	0.00342* (0.00150)	0.000506 (0.00467)
Year			−4.50e−05 (5.43e−05)	3.73e−05 (0.000103)
Constant	0.0293 (0.0157)	0.0174 (0.0225)	0.125 (0.113)	−0.0361 (0.210)
Time fixed effect	Yes	Yes	No	No
Observations	352	187	352	187
R-squared	0.544	0.455	0.468	0.315

Note: Each regression adds country fixed effects. “Credit”, “market capitalization”, “broad money”, and “public debt” are the logistic transformation of the ratio of the related component to total output; if  $\mu_j = \text{component}_j / \text{output}$  the logistic transformation is  $X_j = \ln(\mu_j / (1 - \mu_j))$ . Standard errors include clusters at country level. Countries used in the regressions are Germany, France, the United Kingdom, the United States, from 1951 to 2007, Italy and Spain from 1970 to 2007, and the Netherlands from 1961 to 2007. The plain unit cost is the ratio of financial VA to financial output, the corrected unit cost is the ratio of corrected financial income to financial output. The plain and corrected unit costs are adjusted to account for the financial sector trade balance, throughout the period for the United Kingdom and after 1991 for France, Germany, Italy, the Netherlands, and Spain. Robust standard errors in parentheses. \* $p < 0.1$ .

fixed effects into the model. The model tested is thus

$$z_{it} = \alpha + \sum_j \beta_j X_{ijt} + \text{Country}_i + \text{Time}_t + \varepsilon_{it}. \quad (7)$$

The dependent variables are the plain and corrected unit costs. The panel includes Germany, France, the United Kingdom, and the United States, plus Italy and Spain for which data are available from 1970 to 2007, and the Netherlands for which data are available from 1961 to 2007.

Table 2 shows that the explanatory variables are insignificant in almost all regressions. Thus, we cannot reject the hypothesis that the output composition does not lead to unit costs overestimation. In other words, the assumption made about the quality of financial intermediation is not challenged by the results; so, we cannot reject the hypothesis that deregulation does not significantly modify the relative quality of intermediation of financial assets. However, we cannot rule out that the quality of intermediation of all financial assets has changed in similar proportions since financial deregulation.

Second, what would be the consequence of a quality adjustment based on Philippon’s (2015) methodology—the aim of which is to account for the increasing

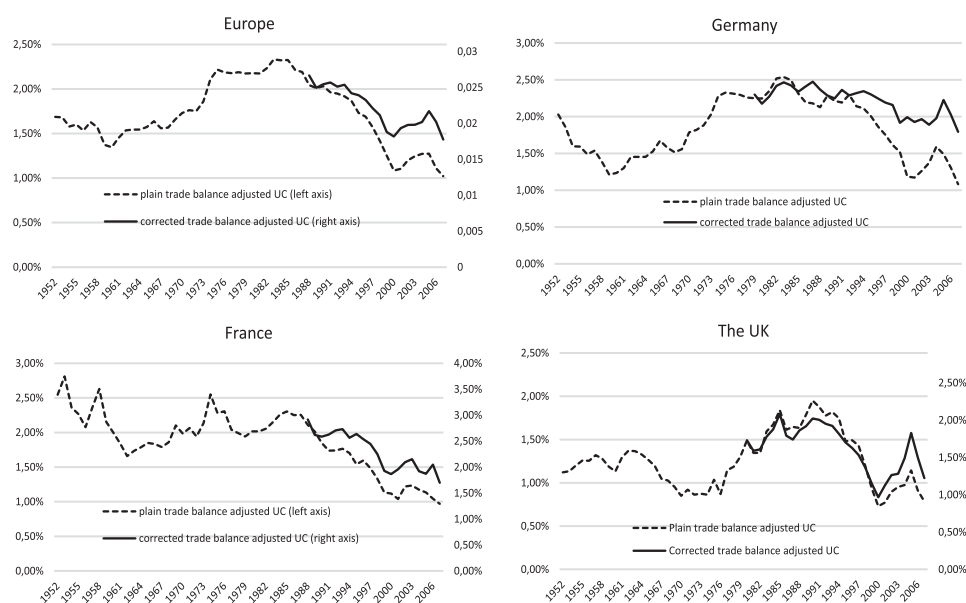


FIGURE 14. Unit cost of financial intermediation with quality adjustment. The quality adjustment unit cost multiply unit cost by quality adjustment coefficient. The quality adjustment coefficient is based on the ratio of the US unit cost to the US quality adjusted unit cost from Philippon (2015). All series are also adjusted for financial intermediation trade balance.

quality of intermediation related to poor households' and low-cash firms' access to capital? Although it is not possible to replicate Philippon's (2015) method due to data availability issues about poor households access to credit, such a quality adjustment should not have a radical effect on the results produced so far. First, the ratio of household's mortgage loans to housing stock—which accounts for households' debt (in)capacity—has increased more in the United States than in Europe over the past 20 years (Jordà, Schularik, and Taylor 2014). Second, the ratio of corporate credit to GDP has only increased slightly in Europe since the 1970s, especially in Germany, France, and Italy (Jordà, Schularik, and Taylor 2014). Despite those facts, and for the sake of robustness, I propose a quality adjustment of European countries' unit cost based on the ratio of the US quality adjusted unit cost to the US quality unadjusted unit cost calculated by Philippon (2015). In this respect, I proceed as if the effect of the quality adjustment on unit costs was the same in European countries and in the United States. Figure 14 shows that quality adjusted unit cost does not decrease in Germany, the United Kingdom, and Europe, but decreases in France.

Note to conclude this Section that another potential misspecification could stem from private financial wealth-management oversight (GSV 2014). Therefore, it is worth underscoring that the calculation of the financial output largely accounts for this particular service. The circular relationship between financial assets and liabilities implies that the sum of credit, public debt, and market capitalization should predict



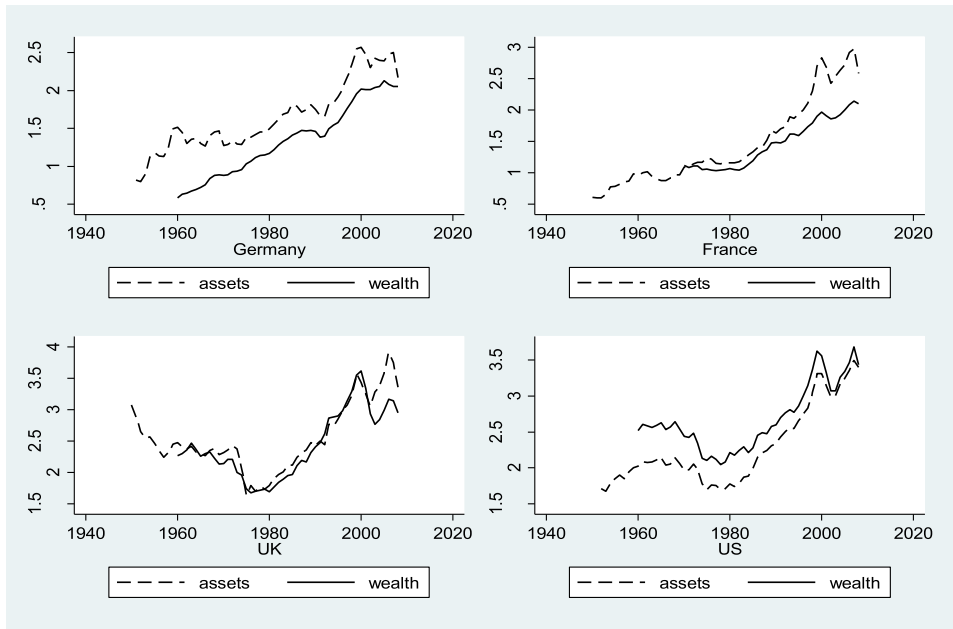


FIGURE 15. Comparison of the GDP share financial wealth and the GDP share of financial assets. “Assets” is the ratio of credit, market capitalization, and public debt to GDP; “wealth” is the private financial wealth to GDP (Piketty and Zucman 2015).

private financial wealth quite well. Using data from Piketty and Zucman (2014) and Piketty (2013) for Germany, France, the United Kingdom, and the United States, Figure 15 shows that this is indeed the case.

## 6. Discussion about Unit Cost Evolution

Unit cost calculation has revealed two main facts: (i) the plain unit cost increases during the 1970s and 1980s and decreases thereafter in all European countries under study; (ii) except for France, the gap between plain and corrected unit costs increases during the 1990s and 2000s, thereby explaining corrected unit cost remaining high over the last 20 years. In the first case we know that the 1970s and 1980s were a time of macroeconomic turmoil that affected nominal variables and raised nominal interest rates. Because nominal interest rates are directly related to the way financial intermediaries fix their interest margin, higher plain unit cost might be caused by increased nominal rates. The second case corresponds to the boom in financial development and banks’ capital income. So long as capital income is related to the joint development of financial wealth management, credit intermediation, and the securities industry, the increasing gap between plain and corrected unit costs might be due to the

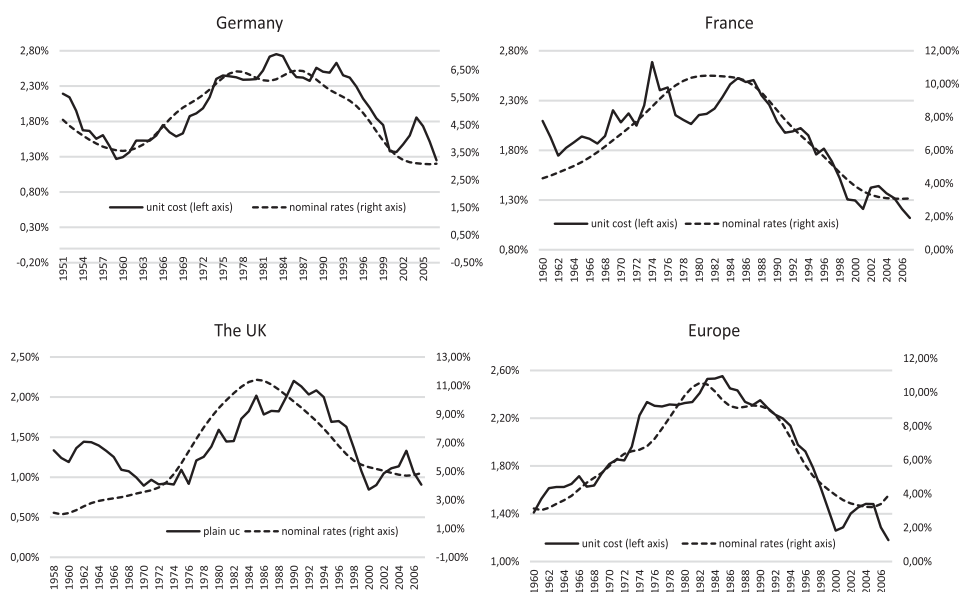


FIGURE 16. Plain unit cost and nominal rates (smoothed values). Nominal rates are smoothed based on local regressions lowess transformation (band width 0.3). The unit cost is trade balance adjusted after 1991 for France, Germany, and throughout the period for the United Kingdom.

increasing intermediation of financial assets (GSV 2014). I propose in this section to test those hypotheses and discuss theoretical arguments explaining them.

### 6.1. The Role of Nominal Rates

So as to appreciate the relationship between nominal rates and plain unit costs let us first compare the series graphically. Instead of plotting the nominal rate series directly, I however use a local regression technique (lowess) to smooth short-term nominal rates. In fact, it is necessary to smooth the series as long as past rates continue to affect financial income whereas anticipation about future rates impacts investment choices. The Figure shows that short-term interest rates are highly correlated to plain unit costs in Germany, France, and the United Kingdom, and in Europe as a whole.<sup>18</sup>

To go further I use panel data analysis to test the robustness of the correlation. The countries included in the panel are France, Germany, Italy, the Netherlands, Spain, the United Kingdom, and the United States. Because I look for the long term relationship

18. Because short-term interest rates were reduced in France before 1960 as a specific policy of the Bank of France (Monnet 2012a), I focus on post-1960s. Interest rate data are not available in the United Kingdom before 1958. Since there were no European short-term rate data until recently, additional calculations (and hypotheses) are needed to build the European series. Hence, the European rate is estimated using the GDP share of selected countries' interest rates.

TABLE 3. Westerlund test of panel cointegration (*p* value).

Variable 1	(1) Plain unit cost	(2) Plain unit cost
Variable 2	Nominal rates	Smoothed nominal rates
Gt	0.016	0.000
Ga	0.043	0.000
Pt	0.061	0.009
Pa	0.225	0.001
Trend/constant	Yes/yes	Yes/yes

Note: Westerlund test of no cointegration based on four cointegration tests from Westerlund (2007). The number of included lags is based on AIC criterion and is always equal to one. The test is based on the following error correction model:

$$\Delta z_{it} = \alpha_i + \rho_i (z_{it-1} - \beta_i' r_{it-1}) + \sum_s \delta_{is} \Delta z_{it-s} + \sum_s \mu_{is} \Delta r_{it-s} + \varepsilon_{it}.$$

Gt and Ga are the group mean test of cointegration rejection for all panel units and for at least one panel unit ( $\rho_i = 0$  for all  $i$  and  $\rho_i < 0$  for at least one  $i$ ). Pt and Pa are the pool test for all panel units and at least one panel unit ( $\rho_i = 0$  for all  $i$  and  $\rho_i < 0$  for at least one  $i$ ). The unit cost adjusts the series for financial sector trade balance throughout the period for the United Kingdom and after 1991 for France, Germany, Italy, the Netherlands, and Spain.

between unit cost ( $z$ ) and nominal rates ( $r$ ), I first run panel data cointegration tests. I use Westerlund's (2007) method developing four tests of cointegration rejection based on an error correction model. Globally the tests reject the null hypothesis of no cointegration for the whole set of countries or at least one country of the panel (Table 3). This is evidence of a long-term relationship between plain unit costs and nominal rates for the panel as a whole but also for each single country taken separately. To account for omitted variable bias, I then run panel data regressions including clusters at country level to control for cross- and serial-correlation among residuals. Because nominal rates may increase with inflation rate or public deficit and because the economic situation may affect the way financial intermediaries do their business, I control for inflation rate, GDP per capita growth, the log of real GDP per capita, and the public deficit. I also add a "high inflation dummy", the value of which is equal to 1 if the inflation rate is higher than 5% and 0 otherwise, to look at a potential threshold effect of inflation (Boyd, Levine, and Smith 2001). Because international financial management raises the complexity of financial services (Boustanifar et al. 2015), I lastly include the financial globalization index—that is, the ratio of foreign liabilities plus foreign assets to GDP—which captures the increasing role played by international financial activities. Summary statistics on the variables used in the regressions are displayed in Table 4. The tested model is

$$z_{it}^{plain} = \alpha + \beta_1 r_{it} + \sum_k \gamma_k CONTROL_{k,it} + Country_i + Time_t + \varepsilon_{it}, \quad (8)$$

where  $CONTROL$  is the set of  $k$  control variables listed w,  $Country_i$  the set of countries' fixed effects,  $Time_t$  the set of time fixed effects, and  $\varepsilon$  the residual. Table 5 shows that nominal rates are significantly correlated to plain unit costs. Based on the first

TABLE 4. Descriptive statistics.

Variables	<i>N</i>	Mean	Std. Dev.	25 percentile	Median	75 percentile
Plain unit cost	352	0.02011	0.00574	0.01589	0.02008	0.02417
corrected unit cost	187	0.02776	0.00646	0.02324	0.02719	0.03154
CII	177	1.8064	0.2762	1.6144	1.7789	1.9752
Nominal rates	340	0.0656	0.0404	0.035	0.0526	0.0893
Smoothed nominal rates	340	0.0652	0.0338	0.0383	0.0576	0.0842
Inflation rate	352	0.0532	0.0480	0.022	0.0368	0.0674
GDP per capita growth	350	0.0183	0.0201	0.00699	0.0186	0.0302
ln (real GDP per capita)	352	−1.446	0.773	−1.911	−1.458	−1.125
high inflation dummy	352	0.389	0.488	0	0	1
Financial internationalization (%GDP)	266	1.921	1.846	0.6168	1.251	2.663
Financial wealth (%GDP)	247	2.024	0.765	1.409	2.017	2.564
Government deficit (%GDP)	349	−0.0689	3.355	−0.213	0.121	1.922

Note: CII is the credit intermediation index; smoothed nominal rates is the smoothed values of nominal rates based on local regressions smoothing method (lowess); GDP per capita is in 10,000 PPP dollar per year from Angus Madison: “Statistics on World Population, GDP and Per Capita GDP, 1–2006” (<http://www.ggd.net/maddison/>). The set of countries is France (1950–2007), Germany (1951–2007), Italy (1970–2007), the Netherlands (1961–2007), Spain (1970–2007), the United Kingdom (1950–2007), and the United States (1952–2007). The unit cost is adjusted to account for the financial sector trade balance, throughout the period for the United Kingdom and after 1991 for France, Germany, Italy, the Netherlands, and Spain.

regressions from Table 5, a 10% increase in nominal rates raises the plain unit cost by 0.46 cent per euro/dollar of asset intermediated—that is, almost 25% of the average value of plain unit cost. On the other hand, including time fixed effects makes the variable insignificant. This is consistent with panel cointegration results as countries’ unit costs and nominal rates were subject to a similar sea-change during the 1970s and the 1980s. Interestingly, inflation shows no significant effect, suggesting that plain unit cost evolution is due to interest rates mechanisms linking financial costs to nominal rates.

## 6.2. *The Joint Development of Financial Wealth Management, Credit Intermediation, and the Securities Industry*

So as to test the link between corrected unit cost and the increasing intensity of financial intermediation, I calculate the credit intermediation index (CII)—that is, the number of steps a monetary unit takes as it passes from investors to final end-users of funds—from the ratio of all sectors’ liabilities to final end-users’ liabilities (Greenwood and Sharfstein 2013)<sup>19</sup>:

$$CII = 1 + \frac{\text{financial sector liabilities}}{\text{nonfinancial sector liabilities}}.$$

19. See the data appendix for details about calculating CII.

TABLE 5. Regressions explaining plain unit cost series.

	(1)	(2)	(3)	(4)	(5)	(6)
Nominal rates	0.0456* (0.0197)	0.0638*** (0.00654)	0.0498 (0.0258)			
Smoothed nominal rates				0.0739** (0.0258)	0.0894*** (0.0122)	0.0821 (0.0494)
Inflation rate	-0.0162 (0.0133)		-0.0262 (0.0161)	-0.0124 (0.0118)		-0.0212 (0.0157)
GDP per capita growth	0.0151 (0.0151)		0.0148 (0.0289)	-0.00355 (0.0186)		0.00622 (0.0315)
log gdp per capita	-0.00551 (0.0152)		-0.00827 (0.0183)	-0.00334 (0.0167)		-0.00541 (0.0195)
High inflation dummy	-0.000539 (0.00145)		-0.000502 (0.00182)	-0.000576 (0.00135)		-0.000842 (0.00172)
Government deficit	0.000363*** (8.62e-05)		0.000215* (0.000109)	0.000220** (7.50e-05)		0.000134 (9.68e-05)
Financial globalization	-0.000790 (0.000841)		-0.000486 (0.00118)	-0.000742 (0.000871)		-0.000668 (0.00122)
Trend	-2.71e-05 (0.000312)	-5.21e-05 (7.00e-05)		-2.04e-05 (0.000328)	-5.18e-05 (6.92e-05)	
Constant	0.0138 (0.0298)	0.0179*** (0.00239)	0.00689 (0.0282)	0.0144 (0.0318)	0.0162*** (0.00259)	0.0102 (0.0293)
Time fixed effects	No	No	Yes	No	No	Yes
Observations	262	340	262	262	340	262
R-squared	0.544	0.311	0.583	0.569	0.378	0.589

Note: "Nominal rates smooth" is based on local regressions smoothing (lowess) of short term nominal rates; "high inflation" is a dummy variable equal to 1 if the inflation rate is higher than 5% and 0 otherwise; financial globalization is: (foreign liabilities + foreign assets)/GDP. All regressions include fixed effects and clusters at country level. The unit cost is adjusted for financial sector trade balance throughout the period for the United Kingdom and after 1991 for France, Germany, Italy, the Netherlands, and Spain. Robust standard errors in parentheses. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

I then look at the correlation between the CII and the corrected unit cost. Because other variables may affect the unit cost, including nominal rates, I add control variables to the model, which takes the following form:

$$z_{it}^{corrected} = \alpha + \beta_1 r_{it} + \beta_2 CII_{it} + \sum_k \gamma_k CONTROL_{k,it} + Country_i + Time_t + \varepsilon_{it}. \quad (9)$$

The set of control variables is the same as in equation (9) plus the ratio of households' financial wealth to GDP, which accounts for the role of financial wealth management in the development of the securities industry (GSV 2013, 2014).

Table 6 confirms that the CII is positively and significantly correlated to corrected unit cost. Based on the first regression of Table 6, a one standard deviation increase in the CII corresponds to a 0.3 cent increase in the corrected unit cost. In the details, we see that the effect of CII is not always significant at 5% whereas it remains significant at 10%.<sup>20</sup> The regressions also show that financial globalization has some positive effect on corrected unit cost values, even though the inclusion of financial wealth management in the regressions reduces the significance of this variable while changing the sign of the effect. Lastly financial wealth has a negative and significant effect on unit cost, suggesting that increasing demand of financial wealth management is not directly responsible for the corrected unit cost remaining high in the 2000s.

### 6.3. Theoretical Arguments

What mechanisms operate behind the positive and significant correlation between plain unit cost and nominal rates? High nominal rates may first widen the gap between lending and deposit rates.<sup>21</sup> Two arguments can explain this phenomenon. First, because on-demand deposits yield no interest, the average rate on deposits is more rigid than nominal rates by definition. As nominal rates rise, the gap between total interest paid to depositors and total interest received for the use of deposits mechanically widens. Second, regulatory restriction on deposit rates—the Q-regulation in the United States and its European equivalents—led banks to raise their interest margin in periods of high nominal rates due to deposit rate rigidity (Flannery 1982; Neumark and Sharpe 1992; Craig and Dinger 2011). In other words, the lower flexibility of deposit rates compared to nominal rates widens the gap between interest incomes and interest expenses.

High nominal rates may also increase customers' demand for financial wealth management since the opportunity cost of holding noninterest bearing money increases

20. Note that removing the Netherlands from the panel due to OECD measurement issues increases CII significance dramatically in all regressions.

21. Data from the World Bank demonstrate this relationship in Germany, France, and the United Kingdom (see Figure A3 in the Online Appendix). Although the fit appears tenuous in the case of the United Kingdom, it is particularly accurate in the case of France and Germany, countries in which finance depends mostly on banks.



TABLE 6. Regressions explaining corrected unit cost series.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CII	0.0115* (0.00509)	0.0101*** (0.00119)	0.0152* (0.00761)	0.0188* (0.00784)	0.0105* (0.00474)	0.00996*** (0.00111)	0.0120 (0.00671)
Nominal rates	0.000393 (0.0205)	0.0109 (0.0127)	0.0423 (0.0279)				
Smoothed nominal rates							
Inflation rate	-0.00167 (0.0364)	-0.0282 (0.0197)			0.0303 (0.0198)	0.0198 (0.0171)	0.0914 (0.0501)
GDP per capita growth	0.00767 (0.00923)	0.00977 (0.0127)			-0.0122 (0.0284)	-0.0290 (0.0185)	
log gdp per capita	-0.0223** (0.00687)	-0.0196*** (0.00318)			0.00245 (0.0119)	0.00750 (0.0122)	
High inflation dummy	0.00225 (0.00127)	0.000859 (0.000578)			-0.0193** (0.00707)	-0.0179*** (0.00385)	
Government deficit	-0.000156 (0.000113)	-2.04e-05 (2.55e-05)			0.00210 (0.00118)	0.000941 (0.000579)	
Financial globalization	0.00182* (0.000763)	-0.000794 (0.000452)			-0.000182 (0.000105)	-4.69e-05* (2.03e-05)	
Financial wealth		-0.0018** (0.000312)			0.00177* (0.000786)	-0.000848* (0.000410)	
Constant	-0.027*** (0.00507)	-0.018*** (0.00338)	-0.00458 (0.0113)	-0.00539 (0.0132)	-0.023*** (0.00593)	-0.00185** (0.000492)	-0.00314 (0.00950)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	177	148	177	177	177	148	177
R-squared	0.784	0.920	0.673	0.648	0.786	0.921	0.703

Note: CII is the credit intermediation index; nominal rate smooth is based on local regressions smoothing (lowess) of short term nominal rates; high inflation is a dummy variable equal to 1 if the inflation rate is higher than 5% and 0 otherwise; financial globalization is: (foreign liabilities + foreign assets)/GDP. All regressions include fixed effects and clusters at country level. The unit cost adjusts the series for the financial sector trade balance throughout the period for the UK and after 1991 for France, Germany, Italy, the Netherlands, and Spain. Robust standard errors in parentheses. \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

when nominal rates rise (Lucas 2000). As a consequence, fees and spreads related to financial wealth management should increase more rapidly than financial assets intermediated (Lucas 2000), especially when intermediaries wield substantial market power due for instance to customers' trust (GSV 2014). A rise in nominal rates may thus lead financial intermediaries to raise their rent.

However, nominal rates do not appear significantly correlated to corrected unit cost. A key difference between plain and corrected unit costs holds in property income and capital gains, the value of which increases dramatically during the 1990s. Because such income depends less on nominal rates than traditional income, the development of hybrid financial intermediation may help explain the gap between plain and corrected series. In fact, the joint development of financial wealth management, credit intermediation and the securities industry—captured by the CII—coincides with corrected unit cost values remaining high after the mid-1990s despite the fall in nominal rates.

Various channels may explain the positive correlation between corrected unit cost and CII. First, as shown by GSV (2013) in their model of shadow banking and securitization, when households' financial wealth is too high, intermediaries cannot provide riskless claims without reducing the interest rate paid to investors—and thereby increasing their profit. Whenever the regulation system does not impede the development of securitization, more financial wealth entails higher CII and unit cost. Second, GSV (2014) show that households are closer to financial intermediaries when financial wealth increases. This raises the amount of financial wealth intermediated and generates more trust between households and financial intermediaries. As a result, the increasing market power of intermediaries raises financial wealth management cost. Third, as shown by Acharya, Schnabl, and Suarez (2013), the development of the securities industry has allowed banks to reduce their capital requirement. Shadow banking activities were used as a regulatory arbitrage and aimed at increasing banks' credit provision without transferring the risk to outside investors.<sup>22</sup> Fourth, the development of banks' securities activity was all the more profitable since the access to governments' safety nets encouraged banks to take more risks without paying the related management costs (Acharya 2009). Fifth, the securitization of mortgage credit may have helped financial intermediaries to reduce their credit risk management for profit reasons. Three arguments support this point: (i) credit development is largely due to mortgage lending in which the collateral tends to discourage monitoring and screening behavior (Manove et al. 2001); (ii) banks rely increasingly on hard information instead of soft information (Rajan et al. 2010); (iii) securitization tends to lead to lax screening (Keys et al. 2012) due to the distance between a loan's originator and the bearer of the loan's default risk (Petersen and Rajan 2002).

Nevertheless, correlation is not causality, so that high CII does not necessarily cause high corrected unit cost values. Therefore, it is hard to know whether the rise in

22. Recent studies by Basu, Inklaar, and Wang (2011) and Colangelo and Inklaar (2012) for the United States and Europe show that banks did indeed bear more risk in the 2000s.

CII is the cause or the consequence of credit and financial wealth development and risk-taking, all of which may affect unit cost values. On the one hand, if the development of credit intermediation and the securities industry has arisen from the financial system's need to manage the increasing amount of financial wealth (GSV 2013, 2014), higher corrected unit cost might be the consequence of increasing demand for financial intermediation. The amount of risky investment in such a case needs to increase to ensure financial wealth is invested. On the other hand, if the development of credit intermediation and financial wealth management has been caused by the development of the securities industry, high corrected unit cost might be the consequence of high CII. This supply-side approach of the issue coincides with financial intermediaries increasing their securities business in order to: (i) avoid costly regulation (Acharya, Schnabl, and Suarez 2013), (ii) take advantage of government safety nets, and thereby (iii) take more risk without paying the related management costs.

## 7. Conclusion

This paper aimed to assess financial intermediation efficiency in the largest European economies (Germany, France, and the United Kingdom) and to estimate it for Europe more broadly. To that end, I measured the unit cost of financial intermediation based on the ratio of financial income to financial assets intermediated. I then proposed to measure unit cost in two different ways depending on whether banks' capital income is taken into account or not in the calculation.

The main results have shown that the German and UK unit costs did not fall after the 1990s when capital income is taken into account whereas unit cost declined overall in France. On the other hand, in the 1990s the plain unit cost measure fell back to its 1960s value, except in France where its decline was continuous. In addition, both plain and corrected national series tended to converge throughout the period. Lastly, the European unit cost appears to have increased since the late 1960s but in smaller proportion than in the United States.

In all cases, national plain unit costs increased during the 1970s, after the end of the Bretton Woods system. The data show that another break occurred in the 1990s as fees and banks' capital income rose along with the development of hybrid financial system, thereby widening the gap between plain and corrected unit costs. The econometric analysis shows that the high unit cost values of the 1970s and 1980s coincided with the increase in nominal interest rates. On the other hand, despite the fall in nominal rates, high unit cost value during the 1990s and the 2000s seem to have coincided with the joint development of financial wealth management, credit intermediation, and the securities industry.

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## Supplementary Data

Supplementary data are available at [JEEA](https://academic.oup.com/jea/article/16/1/123/3061249) online.