Institut des Politiques Publiques

IPP REPORT N°8 – MARCH 2015

Measuring and Explaining the Evolution of Financial Efficiency

Guillaume BAZOT

L'Institut des politiques publiques (IPP) est développé dans le cadre d'un partenariat scientifique entre PSE-Ecole d'économie de Paris (PSE) et le Centre de Recherche en Economie et Statistique (CREST). L'IPP vise à promouvoir l'analyse et l'évaluation quantitatives des politiques publiques en s'appuyant sur les méthodes les plus récentes de la recherche en économie.

www.ipp.eu

Institut des
Politiques Publiques

IPP REPORT N°8 – MARCH 2015

Measuring and Explaining the Evolution of Financial Efficiency

Guillaume BAZOT

THE AUTHOR

Guillaume Bazot

Guillaume Bazot is associate professor (*maître de conférence*) at Paris VIII University. His research topics include economic history, monetary policy and financial macroeconomics.

Corresponding address:
Université Paris VIII
2 rue de la liberté
93200 Saint Denis
EMAIL: gbazot@gmail.com
PERSONAL WEBSITE:
https://sites.google.com/site/up8led/members/internal-members/bazot-g

Acknowledgment

I thank Antoine Bozio, Greg Ford, Benoît Lallemand, Eric Monnet, Thomas Piketty, Thomas Philippon, Thierry Philipponnat, Angelo Riva, Moritz Schularick and Gabriel Zucman for helpful comments and suggestions. This research has been financially supported by Finance Watch.

SUMMARY

Finance has played an increasing important role in European economies, growing from 2.3 per cent of GDP in 1951 to 8.2 per cent in 2007. But since the subprime mortgage crisis, the role and size of finance in our societies has been hotly debated. A key question in the debate is whether recent financial developments justify the accrued importance of finance in our economies and whether, as some propose, regulation should be aimed at reducing its importance. This report proposes a measure of the unit cost of the production of financial services over the long term in some European countries, as a way of assessing the efficiency gains in financial services production. The results show that finance in Europe has become more “expensive" since the 1970s, just when deregulation was intended to make it more productive. The growth in intermediation costs between 1970 and 1990 can nevertheless be explained by macroeconomic and monetary conditions. By contrast, the increase in unit cost after 1990 in some countries coincided with the development of modern finance that gives a greater role to market activity.

Contents

General Introduction

While financial deregulation allowed the development of new financial services, the growing economic significance of finance seems to have produced some excesses. The crisis of 2008 was one of the most visible of them. Several experts and political leaders have argued that finance has now become too important and that new kinds of regulations must aim to limit its role.

This debate follows a period in which, from the 1980s, financial deregulation policies were introduced in Europe and the United States with the aim of reducing the costs of financial intermediation by stimulating competition between financial actors. Thirty years later, the effects of that deregulation have not been established. A recent study by Thomas Philippon (2014) shows that the production cost of financial services has not decreased in the US since the 1990s, though it had been hoped that efficiencies would result from a deregulated industry.

Are the results found for the US applicable to Europe? What mechanisms determine the evolution of the unit cost of financial intermediation over the long term? This report presents a review of European finance data from 1950 to 2007 and tries to provide some answers to these questions.

Methodology: measuring the unit cost of financial intermediation

What is a unit cost? Let's take the example of the electricity industry in order to restate the basic logic of this idea. The total cost of production or of consumption of electricity is what society pays for electricity provision given the cost of raw material such as oil or uranium. The unit cost of providing electricity thus corresponds to the income earned by the electricity industry divided by total production of electricity. From this calculation derives the average cost, or unit cost, of electricity provision, in a given period. Such a calculation can seem redundant however, given that the price of a kilowatt hour is regularly published in numerous sources.

The situation is different in the finance sector, where the heterogeneity of services renders impossible the use of pricing to measure unit cost. To measure the cost of finance, we thus must rely on aggregate data. The methodology used in this report is inspired by the work done with American data by Philippon (2014) and relies on macroeconomic data on the EU's finance sector. It aims to measure the unit cost of financial intermediation, defined as the real cost of the creation and maintenance of one euro's worth of financial services over one year. The unit cost corresponds to the ratio of the domestic income of the financial sector to the quantity of domestic financial services produced.

Measuring the income of finance

The income of the finance industry, measured as a percentage of GDP, gives an idea of the rhythm of the annual growth of domestic financial consumption and of the economic significance of the finance industry. According to national accounting principles for calculating value added (VA), this income can be measured in two ways: as the sum of revenues received by the finance industry minus the consump-

tion required for the production of financial services, or as the sum of profits, wages and taxes distributed by the financial industry for its domestic services. The latter measure refers to the simple principle of redistribution of income from activities.

However, the specificities of the finance sector do not always allow the equating of these two measures, especially in the banking sector. Indeed, some activities are not considered in the national accounts to be the products of a separate activity of financial intermediation, even though they give rise to profits, wages and taxes. This is the case, for example, with gains on the sale of assets and dividends, and interest margins on securities reported on the balance sheet. These incomes are linked to activities of portfolio management and market-making, and in that sense constitute income from financial intermediation. Unlike the VA calculated in the national accounts, banking income measured by private accounting takes these revenues into account.

To the extent that total consumption of banking financial services corresponds to the transfer of income from the non-banking sector to the banking sector, 'banking income' is a reliable measure of that consumption. Domestic financial consumption is therefore estimated by the total of banking income plus the value added of the insurance sector and other financial intermediaries.

Measuring the quantity of financial services produced by the finance industry

Unlike in the energy industry, where the total production of electricity is easily quantified, the identification of volume produced by finance remains complex. In order to measure these quantities, we must count the services underpinning financial intermediation activities.

Economic theory counts two types of service rendered by the financial industry: the transfer of funds and the provision of liquidity. The transfer of funds is the

allocation of capital towards their highest yield. The finance industry plays a double intermediation role here. First, it manages savings by proposing different ranges of placement products from which the profits depend on the risks. Second, it assures the financing of the economy by selecting and overseeing borrowing projects. The servicing of liquidity is the creation and provision on demand of liquidity. Banks are, for example, able to provide liquidity to their depositors despite the use of those deposits for long-term operations.

In order to provide their services, financial intermediaries produce and manage financial assets. These assets are called “real" when they directly serve the real economy. They are distinguished from “derivative" assets, which derive from other financial assets. The real assets are mediated 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 or securities—after the transformation of the debt into negotiable securities—whose management also depends on financial intermediaries. Thus, the volume of services produced by the finance industry coincides with the volume of intermediated real financial assets. These assets are loans, transferable securities (stocks and bonds) and the money supply in the broad sense. The loans and transferable securities correspond to the activity of the transfer of funds; the indicator of broad money corresponds to the provision of liquidity, including the creation of liquid assets in the parallel banking sector, which operates outside banking regulations.

Finally, in order to measure the total production of financial services starting with intermediated financial assets, it is important to account for assets' intensity of intermediation, that is, the energy spent by intermediaries on managing financial assets. If the average intensity of intermediation of a loan is greater than that of a security of the same value, then the volume of financial service produced by the

creation and or maintenance of a loan is greater than that for a security. Series are then controlled to take into account these differences.

Results and explanation

Chapter 1 details the calculation of the unit cost of finance in Europe and its three largest components—that is, Germany, France and the UK—from 1950 to 2007. The unit cost has also been calculated for Italy and Spain but detailed analysis is not proposed because series are not available for before 1970.[1] The main results are displayed in Figures 1.1 and 1.2. Figure 1.1 shows that the economic significance of the finance industry (contribution of financial intermediation income to GDP) and financial development in the broad sense (quantity of financial services in GDP) grew during the period in all the countries under consideration. In particular, the weight of finance in Europe went from 3.4 per cent of European GDP to 8.2 per cent between 1970 and 2007. Figure 1.2 shows that unit cost evolution is not homogeneous among countries. The unit cost increases in all countries during the 1970s and remains high during the 1980s; thereafter, it decreases in France, Italy and Spain but keeps high values in Germany and the UK. Aggregating national series, we see that the unit cost is globally increasing in Europe.

How to explain these facts? Because deposit rates do not move as quickly as market rates, the report shows that high unit cost values iin the 1970s and 1980s are mostly explained by the increasing rate spread with deposit rates. But why do some countries display high unit cost values after the 1990s while others reveal a decreasing trend?

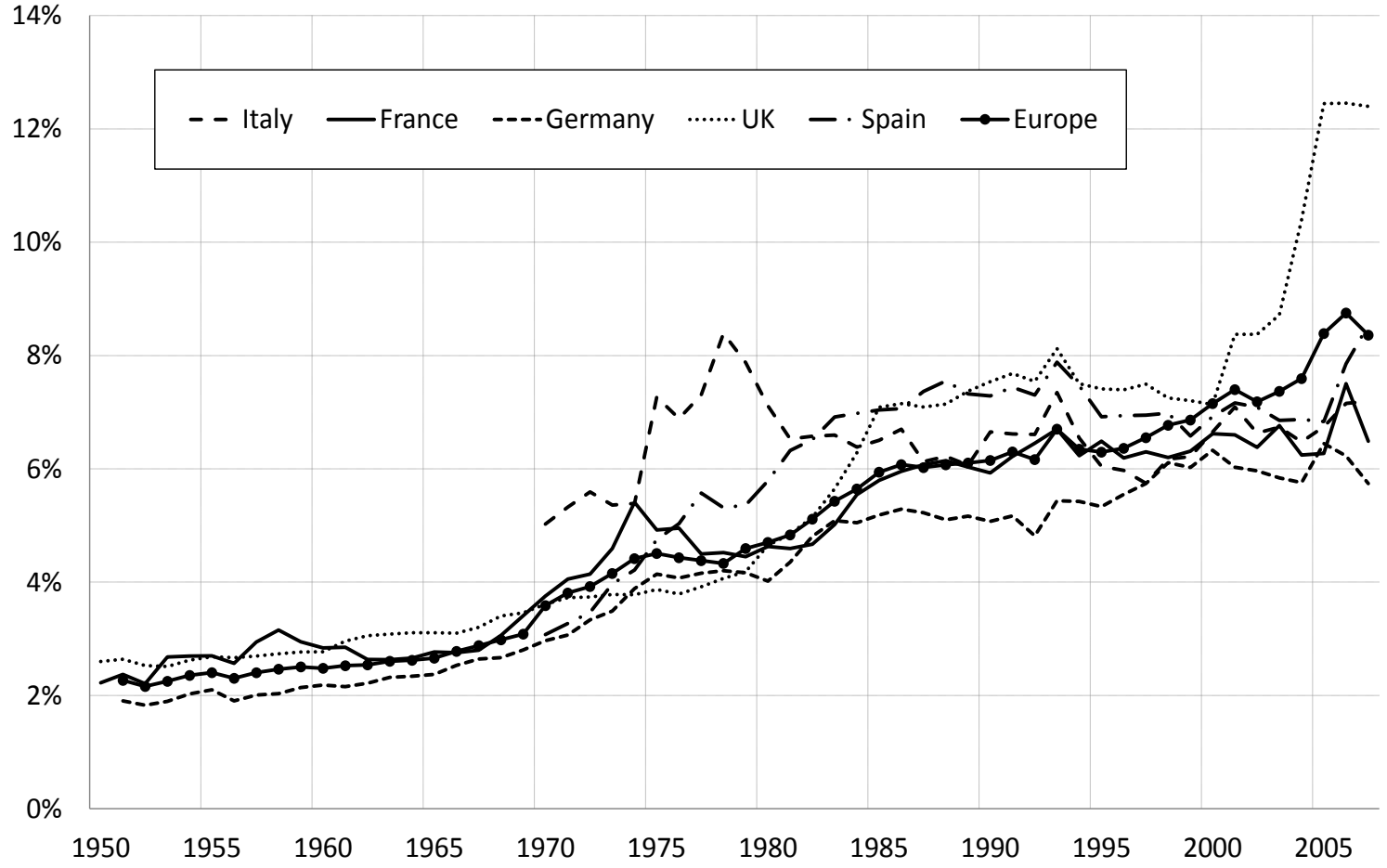
Chapter 2 proposes a new theoretical model to account for the heterogeneous evolution of unit cost after 1990. The model shows that the joint development

[1] Series also exist for the Netherlands, but they present difficulties for interpretation and therefore, are only used to extrapolate the European unit cost.

of the securities industry and credit intermediation increases the weight of the financial industry, raises the unit cost of financial intermediation and increases the volume of outstanding low-quality securities such as subprime mortgages. In other words, the unit cost tends to increase along with the interaction between market and bank-based financial activities.

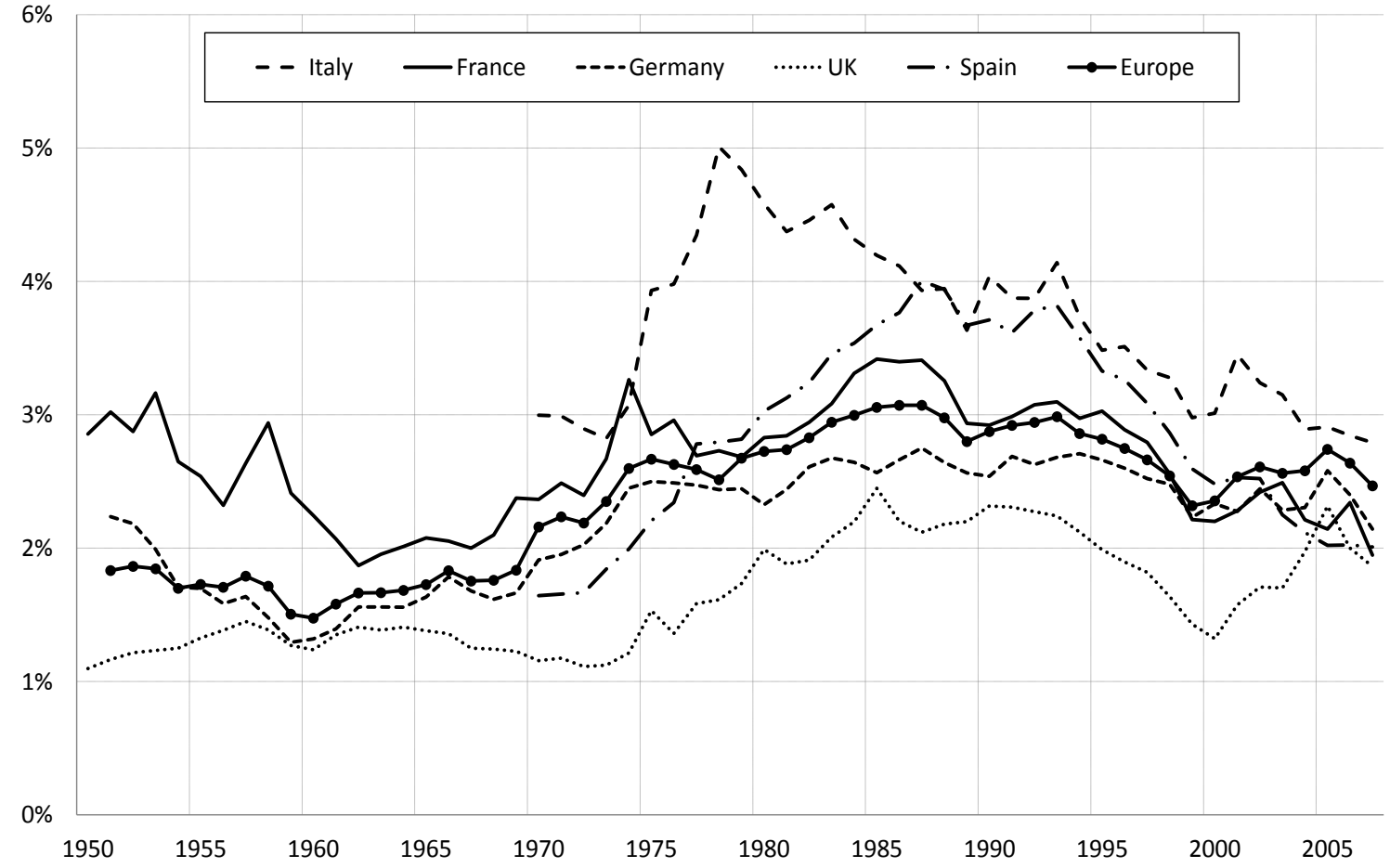
To account empirically for those mechanisms, the study looks at the effect of banks' share of capital income, the development of securitization and the credit intermediation index on the unit cost of finance. Based on different econometric estimations the analysis robustly matches the theoretical prediction. In particular, the credit intermediation index—which mostly accounts for the joint development of the securities industry and credit intermediation—explains particularly well post-1990 unit cost evolution.

Figure 1.1: The weight of finance in Europe



Note: The weight of financial industry is the measured by the ratio of financial income to GDP.
Sources: The author calculation, this report.

Figure 1.2: The unit cost of finance in Europe



Note: The unit cost the ratio of financial income to the weighted sum of outstanding end-users financial assets.
Sources: The author calculation, this report.

Chapter 1

Measuring Financial Efficiency in Germany, France, the UK and Europe (1950-2007)

Introduction

The main function of finance is to transfer resources from actors who have them to those who need them. In this process, financial intermediation pools the risks, provides the liquidity, and reduces the information asymmetries that impede the transfer of funds. According to this view, financial intermediation should enhance growth in two ways: it remunerates savers according to their risk aversion, thereby encouraging saving and investment; and it allocates funds according to their best use. So long as financial intermediation facilitates the efficient allocation of funds, more finance should trigger more growth. However, other factors may reduce this effect. In particular, the frequency of financial crises has upset the idyllic vision of financial development and raises new questions about the effects of the size of the financial sector on financial efficiency (Haldane et al. 2010, Philippon 2014). A key question in the debate is whether recent financial developments justify the ac-

crued importance of finance in our economies and whether, as some commentators propose, regulation should be aimed at reducing its importance.

The reduction of regulatory barriers (figure 2.1.1.1) and the increasing size of the financial industry since the early 1980s have come with financial innovation but it also raised new intermediation costs. First, fees and remunerations in finance have soared due to new, human capital-intensive activities (Philippon and Reshef 2012, 2013) although no evidence has been found that active investors have been able to outperform the market (French 2008, Fama and French 2010). Second, entry by financial intermediaries as financial wealth increase means that investor portfolios may shift to riskier and more expensive financial products (Gennaioli, Shleifer and Vishny (GSV henceforth) 2014). Third, the "too big to fail" problem emerged following banks' restructuring, which increased banks' leverage ratio (Blundell-Wignall 2009), encouraged risk-taking, and raised profits (Acharya 2009 and Acharya, Schnabl, and Suarez 2013). Following Philippon's (2014) study of the US case, this chapter proposes to calculate the unit cost of financial intermediation for Germany, France, the UK, and Europe [1] as a whole from 1950 to 2007 as a way to account for positive and negative consequences of financial deregulation on the cost of finance. This unit cost, defined as the average cost of producing and maintaining one unit of a synthetic financial service for one year, is calculated from the ratio of the domestic income of the finance sector to the quantity of domestic financial services produced.

The income from financial services is commonly assessed through financial VA (Berger and Humphrey 1992, Philippon 2014, and Philippon and Reshef 2013). This choice is straightforward: it ignores the hidden costs of systemic risk, but accounts for all fees and spreads. However, banking institutions have consider-

[1] Since the relevant data are not systematically available for all European countries, "Europe" here includes its largest economies, Germany, France, the UK, Italy, Spain, and the Netherlands. This simplification is unproblematic because these countries account for more than 85% of Europe's GDP over the period covered.

ably increased the volume of securities held in their balance sheets over the past 30 years. These securities create income for banks in the form of dividends and interest on securities and capital gains that are not captured from a national accountant's perspective (Stauffer 2004). Because such income belongs to banks' risk management strategy (Diamond and Rajan 2009) and because banks increasingly substitute non-traditional income for interest income (Stiroh 2004), capital income is akin to an implicit consumption of financial services. This generates a transfer of income from the economy to the financial industry which is not transferred to banks' investors—e.g. depositors. Although this issue should not dramatically affect results for the US, due to the limited share of banking activities in total financial activity there, it could have a great impact in Europe, where banks—along with their subsidiaries—are the principal financial intermediaries, including in the UK. In this respect, this paper proposes to "correct" financial VA, using banking income instead of banking VA in the calculation. This correction proves to be of prime importance since, unlike the ratio of "plain financial VA" to GDP, which leveled off in most European countries in the 1990s (Philippon and Reshef 2013), the ratio of "corrected financial VA" to GDP increased continuously over the period covered.

The "financial output" series aims to take into account all services produced by the financial industry—namely, transfer of funds and liquidity provision. In order to provide those services, financial intermediaries produce and manage financial assets. Assuming that a financial asset needs to be intermediated, either at the time of issue or during its lifetime, I measure the output through the sum of extant domestic financial assets in the economy regardless of the economic usefulness of those assets and their risk. For all the countries under study, the ratio of financial output to GDP increased quickly and continuously after financial deregulation.

The unit cost calculation shows that the cost of producing financial services in Europe turned around 2% to 3%. Thus, it cost from two to three euro-cents to create and maintain one euro of financial asset in the period under consideration. In

addition, national unit costs tended to converge after the 1990s along with financial globalization. More importantly, the unit cost increased over the period, except in France. European economies pay more to intermediate their financial assets today than in the 1960s, regardless of the risk and composition of the assets. Comparing the result with the US series, I show that European and US unit costs followed very similar paths over the period considered. Lastly, the unit cost does not decrease whatever the hypotheses used in the calculation, including the hypothesis of stable intensity of financial intermediation. Therefore, higher intensity of intermediation due to risky borrowers access to credit cannot explain high unit cost values in the 1990s and the 2000s.

Finally, I rely on recent financial intermediation theories to discuss the puzzling evolution of unit cost. In this chapter I look at nominal interest rates based on the opportunity cost of detaining non interest bearing money (Lucas 2000) and deposit rate rigidity (Flannery 1982). I find that the high unit costs in the 1970s and 1980s can be explained statistically by changes in the nominal rates of interest. The unexplained part of unit cost—assessed through the residual of a regression explaining the unit cost by nominal rates of interest—tended to rise after the 1990s in Germany, the UK, and Europe more broadly. Explaining the rise of the unexplained part of the unit cost is the object of the next chapter. However it is already worth mentioning that new credit intermediation models helped financial intermediaries source new income through the development of the securities industry (capital income and transaction fees) at the expense of interest income. Using the credit intermediation index (CII)—that is, the number of steps a monetary unit takes as it passes from investors to end users—to capture the joint development of the securities industry and credit intermediation (Greenwood and Scharfstein 2013), chapter two displays a positive and robust correlation between the unexplained part of unit cost and the CII. Because financial income depends less on interest income due to the joint development of credit intermediation and the securities industry, the re-

duction of nominal rates of interest in the 1990s does not dramatically affect the unit cost.

All those results finally challenge empirical analyses showing that regulation increases the costs of financial intermediation (see Demirguç-Kunt et al. (2004) among others and Levine (2011) for a review of literature). One possible explanation is that, unlike these studies, this calculation accounts for the whole financial industry, not just banks and interest spreads. In fact, the deregulation of banking may have reduced interest margins because banks have developed profitable market activities on the shoulders of traditional ones. The development of shadow banking raised the number of transactions involved in the intermediation process (Greenwood and Scharfstein 2013) and thereby increased market-based income (most often capital income and fees) at the expense of bank-based (interest spreads) income.

The rest of this chapter is organized as follows: Section 1 explains the method used to calculate the unit cost of financial intermediation; section 2 presents the German, French, and UK cases in detail; section 3 proposes an estimation of the unit cost of financial intermediation for the whole of Europe; and section 4 relies on financial intermediation theories to discuss the evolution of unit cost until the early 1990s; section 5 adds a final discussion on the unit cost calculation.

1.1 Measuring financial consumption, financial output and the unit cost of finance

The heterogeneity of financial services renders impossible the use of pricing to measure unit cost. To measure the cost of finance, I thus rely on aggregate data. The methodology used in this chapter is inspired by the work done on American data by Thomas Philippon (2014) and relies on macroeconomic data on the finance sec-

tor. It aims to measure a unit cost of financial intermediation, defined as the real cost of the creation and maintenance of one euro of financial service over one year. The unit cost hence corresponds to the ratio of the domestic income of the finance sector to the quantity of domestic finance services produced.

1.1.1 Financial consumption

The income of the finance industry, measured as a percentage of GDP, gives an idea of the rhythm of the annual growth of domestic financial consumption and of the economic significance of the finance industry. According to national accounting principles for calculating value added (VA), this income can be measured in two ways: on the one hand, as the sum of revenues received by the finance industry minus the consumption required for the production of financial services and on the other hand, as the sum of profits, wages and taxes distributed by the financial industry for its domestic services. However, the specificities of the finance sector do not always allow the equating of these two measures, especially in the banking sector. Indeed, some activities are not considered in the national accounts to be the products of financial intermediation, even though they give rise to profits, wages and taxes.

Therefore, a puzzle emerges as we compare the value added calculated by national accounts with the net incomes of financial institutions. In particular, banks have increased considerably the volume of securities held in their balance sheets over the last 30 years. Securities bring income to financial institutions–especially dividend and interest on securities and capital gains–that are not counted in a national accountant's perspective (Stauffer 2004) even though they increase wages and profits [2]. These incomes are linked to activities of portfolio management and

[2]It appears in particular that the compensation share of finance becomes much higher than the GDP share of finance over the past 20 years even though compensations series ignores 'other remunerations'—like stock options or fees back—that increase dramatically during the period.

market making and in this sense constitute income from financial intermediation. In fact, banks use traditional activities to develop new market activities and vice versa.[3] While banking VA measures banking intermediation in a limited way, notably to respect the homogeneity of the accounting framework in other economic sectors (the calculation of VA does not take into account income from property or from capital gains in other sectors), banking income measures intermediation in a broad sense. For that reason, we should not rely only on a national accountant's perspective to address the issue of financial services consumption.

I use two different indicators of the consumption of financial intermediation services, in this regard. I first take the "plain" value-added series calculated by the national accountant. Second, I address the issue revealed by Stauffer (2004) using a bank's perspective of income using OECD data on banking income [4]. Because the data does not cover the whole considered period, I use the average growth rate of the difference between banks' value added and banking income to extend the series to 1950. So as to measure financial income I simply add insurances and other intermediaries value added to banking income. I call this series 'corrected value added' or 'corrected VA'.

[3]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 September 9, 2013: "when trading was small in proportion to everything you could have a group of high bonus professionals that you treated differently and it didn't 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 didn't go through, his colleague wasn't 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 (...)."

[4]Along with differences vis-a-vis capital income, it is worth noting that some charges are excluded from the VA but included in banking income. Those charges are mostly related to the definition of intermediary consumption. However those charges represent a small a constant part of banking income, at least in Germany and France for which data helps do this calculation.

1.1.2 Financial industry output

Financial output is supposed to account for all services provided by financial intermediaries. The calculation includes transfer 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 real financial assets intermediated (Philippon 2014).[5] Two questions emerge about this calculation. First, what is a real intermediated asset? Second, is the calculation able to take all kind of financial services into account?

A real intermediated asset is an asset that provides a financial service to non-financial industry customers that must be intermediated. The real 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 or securities–after securitization–whose management also depends on financial intermediaries. Thus, the volume of services produced by the finance industry coincides with the volume of intermediated real 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 corresponds to the activity of the transfer of funds; the indicator of broad money corresponds to the service of liquidity, including the creation of liquid assets in the parallel banking sector that operates outside banking regulations. The sum of credit and market capitalization accounts for both supply and demand sides of the transfer of funds services. Insofar as financial assets are most often owned by asset managers, capital management

[5]Philippon (2014) estimates the financial output compiling two different estimations. The first estimation is the one used in this chapter. The second estimation use the flow of credit, money and security issuance. I do not use this method here due to data availability issue. It is however worth noting that both estimations are very similar in Philippon's study. There is thus no reason to think that this simplification could bias the results.

service is captured by the calculation (see discussion in section 4.3). Because credit entails monitoring and screening services, and because market capitalization is related to the emission of securities, both series capture financial services related to capital provision.

The calculation does not add derivatives for three reasons. First, derivatives "derive" from real financial assets. These contracts are of zero net supply. Second, although derivatives help financial intermediaries access to external funds by spreading the idiosyncratic risk of financial assets, the related positive effects of risk management are supposed to include that it increases the volume of financial services (e.g. the amount of domestic credit). This is thus accounted in the output calculation. Third, the liquidity service related to shadow banking, if any, is captured by broad money aggregate that account for shadow banking risk-free asset creation.[6] Lastly, some derivatives are supposed to provide a direct service to the economy especially through risk management—$e.g.$ interest rate risk management through plain vanilla swaps. This represents less than 10% of all derivatives in 2007 according to the BIS. Based on ISDA data, 10% of the 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 approximatively to B$ 330, that is, less than 0.5% of European total assets intermediated. Therefore, ignoring such services does not have any effect on the series.

So as to compile financial assets into one synthetic series it is important to account for assets intensity of intermediation. Because such information is hard to obtain quantitatively, I do the hypothesis that each asset has the same intensity

[6]As theoretically explained by Gorton and Metrick (2012) and Sunderam (2012), shadow banking liabilities constitute substitutes for money. In particular, repos and money market funds share might be seen as shadow deposits. This is why I use M3 monetary aggregate to account for shadow banking risk-free assets. However, it is worth noting that the money service provided by shadow banking assets remains inferior to deposits and decreases with size. Shadow banking assets are not government guaranteed and rely on more volatile secondary markets. In addition, the money service declines with the quantity of shadow banking assets produced, as they tend to be backed by riskier assets.

of intermediation, normalized to unity, except in the case of public debt which is discounted by a factor ten[7]. 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, however, conservative as financial innovation tends to reduce the incentive for financial intermediaries to screen and monitor borrowers. Because those assumptions may affect the results, I discuss their potential effects on the shape of the unit cost curve in section 2.5 and section 3.4.[8]

1.1.3 The unit cost of financial intermediation

Given both parts of the calculation (domestic consumption of financial services and financial output), the unit cost (z) of financial intermediation is obtained through the following formula:

$$z = \frac{financial\ consumption}{credit + money + capitalization + 0.1debt}$$

According to the indicator of financial consumption used in the calculation, two different series are produced. The first one, use corrected financial VA and is simply called 'unit cost'; the second one use plain financial VA and is called 'plain unit cost'.

It is finally worth noting that because the unit cost calculation entails numerous sources, details on series calculation and sources are provided in the data appendix joined to this report.

[7] In fact, government debt is weakly intermediated, although debts must be traded and generate duration risk (Philippon 2014). It is therefore assumed that the management of public debt is less intensive.

[8] It is however worth noting that price series in traditional industries rarely account for goods quality. For instance, we all know that the average price of a meter squared in Paris, London or New York has dramatically increased over the past 20 years. But this information does not account for real estate quality improvement. By the same token, Paris' average meter squared price does not make any distinction between 'in front of the Louvre' flat and 'in front of the train tracks' one.

1.2 Three European cases: Germany, France and the UK

Because Germany, France and the UK account for more than 60 per cent of European GDP throughout the period under study, it is important to examine the specific evolution of the unit cost in those countries.

1.2.1 Germany

1.2.1.1 German bank-based system, some historical facts

Bank-based financial systems are characterized by the role of banks in capital allocation (Allen and Gale 2001). Germany is often considered the prototype of bank-based financial systems, with particularly powerful banks.[9] Along with the role of banks in capital allocation, Germany is also known for its so-called universal banks. The main characteristic of universal banking is that it follows companies all along their live, thanks to the scope of its financial activity. The costs and advantages of universal banking are hard to assess, though, depending crucially on regulation and on trade-offs between competition and stability (Carletti and Vives 2009). While universal banking may have ambiguous effects on risk taking, it is often argued that it decreases competition and increases the cost of financial services. Nevertheless, two points must be taken into account while considering the “universal" nature of German banks. First, financial markets were weak throughout the second half of the twentieth century (see figure 2.2.1.2 below); unlike in the US and the UK, the scope of bank activity in Germany was hampered by the difficulty of acting in financial markets, at least before the reforms of the 1990s. Second, as documented by Fisher and Pfeil (2004), business activities are highly separated among banking institu-

[9] As documented by Vitols (2003), the proportion of banking system assets total financial assets in 2003 are 74.3 per cent in Germany and 24.6 per cent in the US.

tions. In particular, investment banking has not been a significant area of business for most saving and cooperative banks, so, universal banking in the modern sense–that is, banks doing business in both retail and investment banking–concerned only a small number of large commercial banks (Deutsche Bank, Dresdner Bank and Commerzbank) rather than German banking as a whole before the mid-1990s. The German bank-based system was, until twenty years ago, mostly characterized by banks whose role was to collect deposits and provide credit.

Whether regulation helped to shape or was dependent on this financial system is hard to know, but the Bundesbank was a fervent defender of the financial system status quo. Because of its anti-inflation policy, the central bank was comfortable with the existing financial system as it assisted its monetary policy objectives. Indeed, because the financial market can generate monetary instability, the Bundesbank feared losing control over monetary policy. As a consequence, financial reforms occurred later in Germany than in other European countries.

Although Germany was less regulated than other OECD countries till the 1980s [10], the liberalization of the German financial system began slowly, with the abolition of the “gentleman’s agreement" in 1985. The possibility of a foreign financial institution being a lead underwriter of DM-denominated issues of foreign entities was a first step toward more competition. Nevertheless, because financial markets had been weak till the 1990s, the wave of deregulation and liberalization created by the European Directive of 1992 (implemented in 1994) on developing financial markets had important consequences on the development of market activities. The full effects of the reforms are not clear, however. It appears that the German financial market, in particular, did not experience the success that reformers expected. Although IPOs increased quickly after the creation of the *neuer market*, this proved to be short-lived; it was declared a failure in 2003. In addition, the distribution of German financial system liabilities by type of financial institutions barely

[10] Regulation of interest rates was abolished in 1967, while branching was permitted in 1959.

changed between 1993 and 2003 (Vitols 2003), with banks keeping high market share despite the liberalization. On the other hand, bank deposit margins–that is, the difference between money-market rates and rates for time and savings deposits of equal maturity–decreased significantly with the opening of money market funds in 1994 (Domanski 1997 and Fisher and Pfeil 2004). However, this decrease might have been more than compensated for by new income, which evolves in proportion to assets managed and brings about capital income.

1.2.1.2 Financial consumption and financial output

One of the main problems in evaluating financial costs in Germany stems from the way banking income data are provided. Whereas the evaluation must account for domestic activities, the OECD data relies on German banking activity both in Germany and abroad. Since the data account for the subsidiaries of foreign banks but exclude the foreign subsidiaries of German banks, we can simply assume that foreign banks have to create subsidiaries in order to access the German market and vice versa.

Figure 2.2.1.1 plots the evolution of GDP share of finance in Germany with both Śplain' financial VA and with its corrected estimation adding banks' capital income. In both cases, the GDP share of finance increases over the covered period. Moreover, the figure shows that using banking incomes in the calculation has no impact on the shape of the curve before 1992, that is, until after the second European banking directive liberalizing market activities. After that year, the series diverge increasingly.

Figure 2.2.1.2 plots the ratio of financial output to GDP in Germany per type of assets. We can see that credit–of which almost the entire part is composed of bank loans–is 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 occurs after the mid-1990s is due to post-EU 1992 directive on mar-

ket capitalization. This confirms the new orientation of German financial system, although, as argued in the preceding paragraph, this does not mean that non-bank financial intermediaries kept banks out of financial market business.

1.2.1.3 The unit cost in Germany

Figure 2.2.1.3 plots the unit cost of financial intermediation depending on whether or not bank capital income is used in the calculation. This figure shows that overall, the unit cost increases when banking incomes are included. Because Germany is a bank based financial system I also plot the ratio of banking income to total credit as a robustness check. Indeed, as argued in section 2.2.1.1, financial liberalization in Germany has not produced dramatic modification of the financial system. Figure 2.2.1.4 shows that such alternative measure of the unit cost does not have any effect on the result. It appears in both measures that the unit cost remains fairly constant from 1970 to today, suggesting that financial reforms, although not as tough as in France and the UK, did not have any impact on the cost of intermediation.

This puzzle is all the more salient since the 'plain unit cost' increased during the 1970s then decreased in the 1990s, returning to its 1960's value. This result suggests that similar forces have pushed up both 'unit cost' and 'plain unit cost' in the 20 years following 1970. On the other hand, those forces seem to have vanished in the 1990s, thereby reducing plain unit cost. High unit cost values during the 1990s should thus be explained by factors asymmetrically affecting the unit cost and the plain unit cost after that date. As is shown in section 4 below, increases in nominal rates of interest during macroeconomic turmoil explain very well the rise in the unit cost before the 1990s. When nominal rates decreased, the plain unit cost decreased too. On the other hand, the unit cost remained high after that date. Because the difference between plain unit cost and unit cost series arises from capital incomes, those incomes – and all things promoting their development – might have been responsible for the unit cost remaining high (see chapter 3).

1.2.2 France

1.2.2.1 The French financial system after WWII: from the state to the market

The French financial system was subject to numerous evolutions in the second half of the twentieth century. From the Reconstruction to European monetary union, it had to adapt continuously to new economic and political agendas. From the end of the WWII to the early 1980s, the French government was broadly active in credit markets. Commercial banks supplied short and middle-term credits, while semi-public institutions (Crédit National, Caisse des Dépôts, etc.) provided long-term loans. The control of long-term credit was an element of the strategy of coordination that the French government pursued to accelerate economic recovery. The related semi-public banking system, with the French Treasury at its core, thus aimed to encourage investments in strategic sectors to spur economic growth (Monnet 2012a and Quennouëlle–Corre 2000 and 2005). At the same time, the Bank of France aimed at controlling inflation and stabilizing the franc against the dollar. The discount rate followed the FED rate to prevent capital movement, while credit controls were used to manage inflation (Monnet 2012b). However, this strategy generated some market distortions. In particular, it discouraged competition, kept alive inefficient banks and created rents for incumbents. The financial system was not without consequences for the development of financial markets, either. The availability of low-cost credit discouraged firms from issuing securities for their investment (Marnata 1973) while the private sector was too small to provide the depth that the financial market needed to function correctly (Hautcoeur 1996).

During the 1970s, it became evident that the institutional environment inherited from the Reconstruction and the Bretton Woods era was not adapted to new circumstances. First, economic openness and the end of Bretton Woods changed dramatically the international equilibrium. National institutions had to adapt to a new set of constraints, which contributed to monetary instability (Loriaux 1991).

Second, inflation grew too high to be ignored by the French government. In order to tackle inflation and monetary instability, the Bank of France was urged to put a permanent cap on commercial bank lending ('encadrement du credit'). However, the crisis of 1973 and its consequences for firms' profitability encouraged the government to intervene even more in the credit market. Thanks to subsidized loans, para-public banks–under control of the Treasury–were encouraged to extend their credits to support private investment and export. Because those banks were not subject to the Bank of France 'encadrement' policy, subsidized loans progressively crowded out commercial loans. The contradiction between the objectives of the Bank of France and those of the government exacerbated inflation (Blanchard 1997) and damaged the allocation efficiency of credits (Bertrand et al. 2007). In addition, firms became so highly indebted that new solutions had to be found to restore their financial health and profitability. The set of constraints that predominated in the early 1980s thus encouraged the structural reform of the financial system. Last but not least, because of public debt increase, the government found advantageous to open financial markets.

The related deregulation and liberalization were not instantaneous though, and it was not until 1984 – after the failure of the nationalization of the banking system – that Laurent Fabius' center-left government carried out a significant deregulation of the financial system which impacted on both financial and intermediaries markets. The reforms of 1984 and 1986 encouraged direct funding on the market, while the banking reform act of 1985 increased bank competition and transparency (Lacoue–Labarthe 2001). The wide-ranging privatization reforms also gave the depth that financial markets needed to work more efficiently. Firms and investors were all encouraged to "play" on financial markets, since securities turned out to be readily tradable. The so-called "disintermediation" of the financial system was the most visible consequence of this structural change.

1.2.2.2 Financial consumption and financial output

As for Germany, although OECD data cites French bank activities in both France and abroad, banking income data include the subsidiaries of foreign banks in France but not the foreign subsidiaries of French banks. I therefore do the same hypothesis as for Germany. Based on Fournier and Marionnet (2009) analysis, this hypothesis seems unproblematic.

Figure 2.2.2.1 plots the evolution of GDP share of finance in France either with plain financial VA or with its corrected estimation that adds bank capital income. In both cases, the finance sector share of GDP increases over the covered period. The figure shows that using banking incomes in the calculation has no impact on the shape of the curve before 1990. After that, the ratio of financial VA to GDP decreases while the ratio of corrected financial VA to GDP continues to increase. It is also worth noting that, unlike in Germany, the difference between both series was already high in the 1980s. However, this might be due to the conservative hypothesis I do to extend the banking income data before 1988 (see on line appendix for details).

Figure 2.2.2.2 displays financial output. As in the German case, credit accounts for a large part of the financial output in France from the late 1960s to the early 1990s. Before the 1970s, liquidity management was the most important aspect of financial intermediation. The 1984-86 reforms show clearly in the data as the weight of market capitalization increases significantly in the 1980s. Unlike in Germany, market capitalization is not the only variable explaining post-1990s financial output increase in France. In fact, credit and broad money rose rapidly throughout the last 20 years of the sample. This is typical of blurred financial systems where bank-based and market-based businesses are tied closely together.

1.2.2.3 The unit cost in France

Figure 2.2.2.3 plots the unit cost according to whether bank capital income is included in the calculation or not. It shows that the unit cost is stagnant overall when capital incomes are used but decreases otherwise (plain unit cost globally decreasing). Interestingly, we see that the post mid-1980s unit cost decreases, suggesting that, unlike in Germany, financial deregulation might have reduced financial costs in France. In fact, credit control and subsidized loans during the 1970s may have helped French banks to make rents (Monnet 2012a). This is all the truer since firms could not turn their back on the banks because financial markets were not sufficiently developed to offer alternatives to bank loans. For that reason, because credit control and subsidized loans are mostly used in France from the late 1950s to the early 1980s, the higher unit cost observed in France compared to other countries before the 1990s is not highly surprising.[11]

1.2.3 The UK

1.2.3.1 The UK market-based system, some historical facts

The UK's financial system did not follow the same path as the French and German ones. Although financial regulation was tough till the 1970s, the UK financial system allowed more room for financial market activity. Firms could obtain long-term funds on the market, while banks helped enterprises in their need for short-term liquidity. The financial system was less centralized than in France and Germany despite financial intermediaries that behaved much like a cartel. The Bank of England had to comply with government economic policy and exchange controls. Its rates movement was mainly used to maintain sterling value while not jeopardizing government borrowing (Monnet 2012b). Like the Bank of France, the Bank of England resorted to credit ceilings to achieve its monetary objectives. So as to cope

[11] It is worth noting that Italy, which followed similar policies, displays similar results.

with new economic constraints (especially the development of international trade and inflation), the 1971 reform was the first attempt to deregulate the post-war financial system. The 'new approach' called Competition and Credit Control (CCC) aimed at promoting competition among banks and used interest rates to control monetary growth and inflation. This reform was tailored to suppress credit ceilings and restrict banks' so-called rents. However, it proved to be a monetary failure. By relaxing some of the previous lending constraints, the CCC encouraged financial institutions to increase their credit considerably, thereby increasing the amount of outstanding money and inflation. The Bank of England reacted at the end of 1973 with the Supplementary Special Deposit (SSD), a device forcing banks to make non-interest-bearing deposits with the Bank of England whenever their interest-bearing eligible liabilities grew too great. Nevertheless, the SSD did not prevent the banking crisis of 1974, and economic troubles and inflation continued to plague the economy, due to the 1973 petroleum crisis. The sterling crisis of 1976 then led the government to adopt monetary targets (Davies 2012) that remained in place for two decades.

The end of exchange control under the new conservative government of Margaret Thatcher was a major change. This rupture helped the application of monetarist principles. Along with the privatization of the economy and the reduction of state spending, the government aimed to control inflation through monetary policy. Furthermore, the 'big bang' of 1986 put an end to fix commission and brokers' single capacity, encouraging market funding and financial innovation in an increasingly internationally competitive environment (Michie 1999). Freed from previous restrictions, financial intermediaries started to deal with new financial market businesses. This encouraged universal banking business, wherein economies of scope helped banks to grow rapidly and to concentrate. The 'small bank crisis' of 1991-94 marked a rupture. Many small banks collapsed thanks to their ineffective efforts to mimic the US model of investment banking in a highly deregulated and glob-

ally competitive environment (Logan 2000). The activity of Wall Street investment banks squeezed both merchant bank resources and profits. The restructuring took many years – especially after the UK's short-lived commitment to the European Monetary System (1990-92) – and it was not before the 2000s that the UK financial system really stabilized. The stabilization came, however, at the cost of financial enterprises passing into foreign hands; between 1995 and 2000, a large part of the investment banking sector was sold to overseas owners (Roberts 2005).[12] Nevertheless, the legal framework of UK financial market activity proved to be so attractive that London became a central hub of the world capital market, thereby attracting capital from around the world and redistributing it to its best remuneration in the UK and abroad.

1.2.3.2 Financial consumption and financial output

Accounting for financial costs in the UK is difficult because of the increasing role played by the London financial market: it is hard to separate domestic from international financial services. The first thing to do is to control for trade balance of financial activity, but this is not sufficient to account for capital gains made by UK banks abroad. I therefore make the conservative hypothesis that the share of domestic capital gains is the same as the share of domestic financial VA. It is also worth noting that banking income data account for largest banking group[13] activ-

[12]To quote Roberts (2005): "As the investment banking business globalised, the UK merchant banks found themselves struggling because of the huge advantage enjoyed by the US firms, whose domestic market constituted half the world market. (...) [T]he sales of UK merchant banks in the 1990s were shrewd cash outs at the top of the market cycle from an industry which had been artificially cosseted by barriers to entry and cartel-like practices. (...) ". In other words : "By the beginning of the twenty-first century more than half of the City's workforce worked for foreign banks or foreign financial firms, and amongst the top international investment banks not one was British. It was a state of affairs sometimes compared to Wimbledon tennis tournament, for which the UK provides the venue and sells the strawberries and cream but where most of the players, and winners, are foreigners".

[13]Barclays Group; Bradford and Bingley Group (included in the coverage starting 1999); HSBC Bank Group; Lloyds Banking Group (comprising the former LloydsTSB Group and HBOS Group, included in the coverage starting 1996); Northern Rock Group (included in the coverage starting 1997); Santander UK Group (including the former Abbey National Group, the Alliance and Leicester Group, included in the coverage starting 1996); Royal Bank of Scotland Group. Prior to 1996, the

ities in the UK and abroad. While the data does not account for foreign banks business in the UK, it does include the overseas activities of UK banks. Therefore, the fact that the UK banking system is highly concentrated may help to account for the many activities of bank subsidiaries, especially market activities that are most often declared in tax havens.

Figure 2.2.3.1 plots the GDP share of finance, using financial VA in its plain and corrected forms. It shows that the GDP share of finance increases overall during the period. It also shows that a major change occurred in the early 1980s, that is, after the financial reforms of 1979. This is evidence of the impact of the liberalization and deregulation of the UK financial system on the increasing role role played by the financial industry. A comparison of the two series shows that corrected financial VA tends to move away from financial VA in the late 1990s, that is, with the boom of credit and securitization.

Figure 2.2.3.2 plots the GDP share of financial output. The UK financial output increases at the same pace as GDP till the early 1980s. After that, this ratio increases steeply until 2008. Unlike in Germany and France, the role of market capitalization is very important throughout the covered period, so that credit development – in particular, banking credit – helps to explain most of the financial output increase over the last 30 years of the period. Interestingly, the credit development inflection point corresponds to 1979. As in France, credit volume and market capitalization increase together after the mid-1990s, thereby feeding each other. This is why the financial output share of GDP reaches the astonishing value of 457 per cent in 2006, with credit explaining 45 per cent of financial output compared with 34 per cent in 1979.

Standard Chartered Group was included.

1.2.3.3 The unit cost in the UK

Figure 2.2.3.3 plots the unit cost according to whether banking incomes are included in the calculation or not. It shows that the unit cost increases overall when banking income is used in the calculation. However, the plain unit cost increases during the 1970s then decreases in the 1990s to come back to its 1960s. It is worth underscoring that the shape of the unit cost follows specific historical facts. First, the increase occurring from mid-1970s to early 1990s corresponds to the period of deregulation but also to the Bank of England's monetarist policy. Second, the decrease during the 1990s corresponds to banking restructuring and monetary crisis. Third, the increase following 2000 is characterized by the development of originate-to-distribute finance following financial innovation, along with the rebirth of London as a first order financial center.

It is important to note that the plain unit cost decreases during the 1990s, moving away from the unit cost. Like in the German case, it appears that nominal rates of interest explain quite well the evolution of the unit cost till 1990 (see section 4). Therefore, the unit cost increase we can observe after 2000 might be related to bank capital income increase too (chapter 3).

It is finally worth noting that the international character of the UK financial industry makes the unit cost calculation difficult. Unlike France and Germany, whose financial industries are highly domestically focused, the UK financial industry depends increasingly on international capital and activities. Due to the difficulty to disentangle national from international businesses in the data, the overall analysis of the unit cost tends to be less precise.

1.2.4 Accounting for banks capital income in the US

Because Philippon (2014) does not account for bank capital income, this section proposes to "correct" the US estimation of the unit cost. Hence, I merely substitute

VA in banking for banking income. Because data are not available before 1980 I use the same process as for Germany, France and the UK, to extrapolate the series from 1950 to 1980.

Figure 2.2.4.1 plots the GDP share of finance using plain VA and corrected VA. We see that the series move away from each other during the mid-1980s but remain stable thereafter. Unlike in European countries, accounting for capital gains does not greatly affect the US series. This is probably due to the lesser importance of banking in the US financial system. As a comparison, while the financial VA share of the Federal Reserve bank, credit intermediation and related activities decreases from 51 per cent in 1978 to 45 per cent in 2007 in the US, the financial VA share of banking goes from 75 per cent to 68 per cent in Germany.

Figure 2.2.4.2 plots the unit cost of financial intermediation in the US using both corrected VA and plain VA. Although the unit cost is 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. Philippon's main finding thus remains.

1.2.5 Comparing national series

To give a broader view of the co-evolution of national unit costs, figure 2.2.5.1 plots all national series calculated hitherto. This figure also adds the US unit cost calculated by Philippon (2014). Although national unit costs evolve in a quite similar way over the period–increasing during the 1970s and stagnating thereafter, with the exception of France, where it decreases after 1990–differences can be substantial across countries. However, the series tend to converge progressively over the period (figure 2.2.5.2). The US unit cost is close to the mean value, suggesting that the US case is "normal". On the other hand, the French unit cost appears far higher throughout the covered period. The end of credit control and subsidized loans devices in the 1980s might explain why the French unit cost decreases after

the 1990s while it overall stagnates in other countries.

Comparing national series can also help us deal with the hypothesis made about financial asset intensity of intermediation. Using simple econometric devices it is possible to look at the effect of the output share of each kind of financial asset on the unit cost. The mechanism is the following: if the intensity of intermediation of one kind of asset is underestimated, an increase of its output share should reduce the unit cost. For example, assume that the intensity of intermediation of credit is higher than one – that is, higher than the intensity of intermediation of equities and broad money –, any increase of the output share of credit should impact positively the unit cost due to misspecification. Therefore, if the output share of credit increases in a country A but not in a country B we should observe an increase of the unit cost in A but not in B. This is the effect econometric analysis helps account for. Let's first compare the case of Germany with the case of the US to understand the logic at stake. The output increase occurring after 1990 in Germany is due to market capitalization while the output increase in the US is due to credit. Insofar as we do not observe any impact of those shifts on the unit cost either in Germany or in the US, we cannot reject the hypothesis stating that the intensity of financial assets is the same for credit as for equities. This is what confirms the OLS-within regression including all four countries of interest plus Italy and Spain for which data is available from 1970 to 2007[14]. Regressions cover the whole period and two sub-period lasting from 1950 to 1990 and from 1991 to 2007. Table A shows that the explaining variables are not significant whatever the period used for the analysis. This tend to confirm that the hypotheses made about financial assets intensity of intermediation do not bias the results either before 1990 or after 1990.

[14]Two things must be added in this respect. First, I do not provide full analysis of Spain and Italy unit cost series precisely due to data availability issues before 1970. Pre-1970 data is indeed essential to account for the effect of the 1970s rupture. Second, as shown in the next section of the chapter some data exists for the Netherlands too. I do not account for this country here as banking income data seem abnormally high after 1990. However, including the Netherlands into the data does not change the results.

It is finally worth noting that national unit costs converge around 2 and 2.3 per cent after the liberalization of capitals movement occurring in the 1980s. This coincides with alternative measure of the cost of financial intermediation in the US (see Mehra et al. 2011 and GSV 2014). In other words, in all four countries for which the unit cost has been calculated, it costs about 2 and 2.3 cents to create and maintain one monetary unit of financial asset in 2007.

1.3 Estimation of the European unit cost

So far, this study has focused on national series, thereby ignoring banks' foreign activities. However, the national view does not account for all European financial business, especially in the case of the UK, which exports many financial services to other European countries. Calculating the unit cost for Europe avoids this problem.

To obtain the indicator of the unit cost of financial intermediation for Europe additional hypotheses are needed. This section provides two different methods of calculation. The first uses the sum of the countries' Ścorrected value added' divided by the sum of their Śfinancial output'. The second method uses the weighted sum of countries' unit cost based on the share of each country in the total GDP. In both cases, the international activities of financial intermediaries are captured in the calculation. Those activities are assumed to be provided in favor of other European countries. In other words, Europe is seen as a closed economy, in which financial activities are unequally spread over its individual parts. This point is particularly important in the case of the UK since the calculation now accounts for its positive financial intermediation trade balance. Nevertheless, because banking income data do not always account for banks' overseas activities, the aggregate corrected VA can be either overestimated or underestimated. It will be underestimated if the data does not capture such activity in countries that export a lot of financial services. It will be overestimated if the data accounts twice for banks' off-shore ac-

tivities, in countries exporting and in countries importing financial services. Finally, it is worth recalling that the data are not systematically available for all European countries so the calculation includes only Germany, France, the UK, Italy, Spain and the Netherlands. This simplification is unproblematic because these countries account for almost 85 per cent of Europe's GDP throughout the period under study.[15] Since data is not available before 1970 for Italy and Spain, nor before 1961 for the Netherlands, the unit cost is estimated with the remaining countries before those years.

1.3.1 Method 1: Summing national series

In this subsection, the unit cost of financial intermediation is estimated using the sum of countries' Ścorrected value added' divided by their Śfinancial output'. Three different calculations are proposed. The first ("Europe 1") takes all the countries of the panel (Germany, France, the UK, Italy, Spain and the Netherlands) into account and runs from 1970 to 2007. The second ("Europe 2") takes Italy and Spain out of the equation and runs from 1961 to 2007. The third calculation ("Europe 3") takes out Italy, Spain and the Netherlands, and runs from 1951 to 2007. Due to data restrictions, the final European series is estimated using "Europe 3" from 1951 to 1961, "Europe 2" from 1961 to 1969 and "Europe 1" from 1970 to 2007. Comparing the three series also helps assess the robustness of some of the hypotheses used to estimate the European unit cost. It helps to know first, whether data unavailability before 1970 biases the series and second, whether the series is over, or underestimated. While Germany, France and the UK use a "parent view" (activities of national banks and foreign subsidiaries in the country) of banking income, Italy, Spain and the Netherlands use a "country view" (banking activity inside country

[15] It is worth noting too, that Luxembourg and Ireland, countries in which financial activity is particularly important because of their tax-haven status, are not included because of data problems. As a consequence, the European unit cost estimation might have been undervalued after 1990.

regardless of the national origin of the banks). If those differences are significant, then the series should diverge significantly.

In order to gauge the robustness of the final series, let us look at the evolution of the ratios of the corrected financial VA to GDP and financial output to GDP. Figure 2.3.1.1 shows the results of the ratio of the corrected financial VA to GDP using all types of calculations. The three calculations provide close results. Overall, the ratio displays an increasing trend throughout the period as the GDP share of financial income equals 2.2 per cent in 1950 and 8.3 per cent in 2007. Similarly, figure 2.3.1.2 plots the ratio of financial output using all three calculations. Results are also very close, whichever set of countries is used in the estimation. The ratio increases slowly before the 1990s and exponentially thereafter. In both figures 2.3.1.1 and 2.3.1.2, the series are almost the same whatever type of calculation is used. Therefore, the hypotheses used to estimate the European unit cost before 1970 should not have distorted the results. This result is not really surprising as Germany, France and the UK account for the largest part of all six countries' GDP all over the period. Finally, figure 2.3.1.3 plots the unit cost of financial intermediation using all three calculations. As with the previous results, the series prove to be very similar. The set of selected countries used in the calculation seems not to distort the estimation of the European unit cost.

Figure 2.3.1.3 shows that the unit cost of financial intermediation increases throughout the considered period. A sharp rise occurs during the 1970s and the 1980s – that is, during the period of restructuring of financial systems and macroeconomic troubles. The unit cost then tends to decrease during the second half of the 1990s and increases again after 2000. Overall, the unit cost never returns to its initial level of the 1960s, demonstrating that it is costlier to obtain one unit of financial service today than it was 50 years ago. Indeed, it cost 1.4 cents to create and maintain one euro of financial asset in 1960, while it cost 2.4 cents to create and maintain one euro of financial asset in 2007. In other words, given that I did

not control for the evolution of the intensity of intermediation of financial assets, for the unit cost to be the same in 2007 and 1960, the overall intensity of intermediation needs to be 71% higher in 2007 than in 1960. Based on the results obtain in section 2.5, this turns out to be improbable (see also the discussion in sections 3.4 and 4.2 below).

Nevertheless, some questions might be raised about this conclusion. In particular, it could be argued that the series are not homogeneous. In order to address such potential criticism, another method of aggregation is proposed.

1.3.2 Method 2: the country-weighted view

In this section, the unit cost of financial intermediation is estimated using the weighted sum of countries' unit costs based on the share of each country in total GDP. The series is built using Germany, France and the UK from 1951 to 1960; it adds the Netherlands from 1961 to 1969, and includes all selected countries after 1969. Figure 2.3.2.1 plots this new series along with the series calculated using the first method. It shows that differences between the two series are small. There is thus no evidence of bias related to aggregation methodology.

Because the results are very similar regardless of the method used for the calculation, it is possible to deconstruct the financial output per type of financial asset without the risk of generating misleading facts. Figure 2.3.2.2 shows that the distribution of financial assets in Europe is not greatly different today than it was in the 1960s. In fact, the relative size of each component did not change dramatically except in 1970s and 1980s, because of a reduction in market capitalization. This is an important fact, as value differences between 1951 and 2007 unit costs barely depend on the relative weight of each series in the financial output calculation.

1.3.3 Comparison with the US unit cost

In order to ensure the robustness of this calculation, it is useful to compare the European unit cost with the US one, calculated in section 2.4. In addition, comparing these series using banking VA in lieu of banking income provides new clues about the effect of capital income on the shape of the unit cost curve. The “plain" unit cost is calculated using the first method–that is, with the ratio of the sum of selected countries' VA to the sum of selected countries financial output.

Figure 2.3.3.1 shows that European and US unit costs follow a very similar path over the period. Both increase during the 1970s and reach a plateau in the 1980s. The European unit cost appears slightly higher from the early 1970s to the mid-1990s, then joins that of the US in the late 1990s.

Comparing European the US “plain" unit costs provides interesting facts, too. In particular, figure 2.3.3.2 shows that both series follow the same path until 1990 but diverge thereafter. This is evidence of the increasing role of bank capital income in European financial intermediary business. The deregulation of financial systems seems thus to have increased bank capital income in larger extent in Europe than in the US. This result is probably due to the fact that the financial system depends dramatically more on banks in Europe than in the US. Because financial wealth management depends on mutual funds business, financial wealth management income in the US is largely accounted by financial VA through fees. This is not the case in most European countries (even in the UK), where financial wealth management income emerges due to banks' capital income. Therefore, national accounts must underestimate financial VA the higher as banks dominate financial intermediation.

1.3.4 Robustness check and quality adjustment discussion

Because the way banking income is estimated in the UK accounts for all UK banking group business, including their overseas subsidiaries, overlapping data with other European series could overstate the European unit cost.[16] Hence, the unit cost was calculated using UK plain financial VA instead of banking income. This prevents the calculation from taking UK banks' capital income into account, thereby understating the unit cost. Figure 2.3.4.1 shows that, despite such underestimation, the European unit cost still increases over the covered period. A small difference emerges with regard to the initial estimation after 1999, probably due to the boom of financial market activities and banks' capital gains in the UK after that date.

Since insurance companies also provide non-financial services to their client, I exclude insurance VA[17] from the calculation. Based on the preponderant role played by banks and insurances companies in European countries' financial systems, withdrawing insurance VA from financial consumption is akin to look at banking income only. This robustness check is not too restrictive in the case of Europe since banks represent by far the largest part of the financial intermediation business. Figure 2.3.4.2 shows that the shape of the unit cost is left unchanged when insurance VA is not taken into account, thereby confirming that banking incomes increase more rapidly than the financial output.

The weight attributed to each series composing the financial output does not affect the result, either. I compare the evolution of corrected value added with the evolution of each single series used in the output calculation. In all cases, the ratio of corrected VA to the volume of selected asset increased over the period. Because the relative size of market capitalization diminished dramatically in the 1970s and

[16] It is worth noting, however, that the UK series does not account for foreign bank activity in the UK. This therefore underestimates the corrected VA and might compensate for any overestimation. In addition, because Luxembourg and Ireland are not included in the calculation, the estimation is naturally biased downward.

[17] It is worth noting that statistical publication does not make distinction between insurances and pension funds.

'80s, and because financial market activities were not particularly active in Europe during that time, except in the UK, I plot an alternative unit cost, which ignores market capitalization. Because this unit cost displays a similar shape, figure 2.3.4.3 shows that market capitalization does not affect the result.

Finally, since the calculation of the output does not account for the evolution of financial assets intensity of intermediation, the main conclusions might be driven by output misspecification. Let's discuss this point in details. First, credit development is largely due to mortgage credit, whose collateral size tends to discourage monitoring and screening behavior (Manove et al. 2001). At the same time, because rating agencies use hard information such as credit scoring or loan-to-value ratio for notations, banks relied increasingly on hard information too (Rajan et al. 2008) which is less intensive to manage. In addition, securitization tends to lead to lax screening (Keys et al. 2012). These effects should diminish the intensity of intermediation. Second, the rise of market capitalization in Europe is largely due to the wave of privatization occurring from the mid-1980s to the late 1990s, activity for which intermediation intensity should not have been great. Third, so long as diseconomies of scale do not prevail at the industry level, there is no reason for financial wealth management to be more intensive today than it was in the 1960s. In fact, today's comparison between active and passive funds manager profit does not display any superiority of the former over the latter (Fama and French 2010).

Even though I do not make quality adjustment of the series what would happens if I had used Philippon's (2014) methodology—which the aim is to account for the increasing intensity of intermediation related to poor households and low cash firms access to credit. Based on the results found and methodology used by Philippon (2014) this should not have a radical effect on the results produced here for two reasons. First, households income inequalities have increased more in the US than in Europe (Alvaredo et al. 2013). Therefore, the related cost of poor household access to credit must have been higher in the US than in Europe. Second, the

economy as been less subject to IPO in Europe after the 1990s, so that low cash firms should have not had a better access to credit in Europe than in the US. This is all the truer since corporate credit tends to be stable in France and Germany after 1970. Because the US unit cost remain increasing after quality adjustment and because both European and US unit costs have similar shape, there is thus no reason for the European adjusted unit cost to not increase over the past 30 years.

1.4 Discussion on unit cost evolution

This section discusses the evolution of unit cost based on recent theories of financial intermediation. As shown throughout this paper, two ruptures occur in the data. The first rupture corresponds to the sharp increase of the GDP share of finance and unit cost during the 1970s. The second rupture corresponds to the boom of financial development and banks' capital income in the 1990s. Based on the theories on the opportunity cost of non interest bearing money and the cost of liquidity management (Lucas, 2000), I look at the correlation between nominal rates of interest and unit cost to account for the first rupture. I account for the second rupture and its consequences on unit cost in the next chapter.

Looking at the shape of unit cost series, either in their plain or corrected forms, it is easy to identify increasing values during the 1970s and 1980s. Those years were a time of macroeconomic turmoil which affected nominal variables. Nominal interest rates are important in the case we are dealing with because financial intermediation seeks to manage nominal stocks and flows. In other words, nominal interest rates are directly related to the way financial intermediaries fix the price of their services.

According to Lucas (2000) the effect of the nominal interest rate on the unit cost depends on the banks' function as liquidity provider. Keeping unproductive funds in order to meet depositors' demands for cash is considered an opportunity cost, the value of which increases as nominal interest rates rise. Because demand deposits

yield no interest rate, the average yield on deposits is more rigid than nominal rates by definition. This is particularly true in bank-based countries where the ratio of demand deposits to broad money is high. In addition, Smith (2003) and Paal, Smith, and Yang (2013) show that banks must cope with a contradiction between liquidity provision and investment strategy. Banks are consequently encouraged to expand their credit when nominal rates increase, at the expense of their cash reserves. Such a trade-off means that the ratio of credit to reserves is a positive function of the nominal interest rate. Even though the impact of an increase in nominal rates of interest on the interest spread is ignored, the unit cost of financial intermediation must increase with nominal rates of interest.

Another effect of the nominal interest rate emerges with the asymmetric evolution of nominal rates and deposit rates. Indeed, so long as deposit rates are sufficiently rigid in relation to nominal rates (Flannery 1982), a rise in the latter increases the spread between lending and deposit rates. Figure 2.4.1.1 demonstrates this positive relationship in Germany, France, and the UK. Although the fit appears tenuous in the case of the UK, it is particularly accurate in the case of France and Germany, countries in which finance depends mostly on banks.

Because nominal rates of interest are directly related to interest margins, it is worthwhile comparing them with the unit costs. Instead of comparing the two series directly, I use a lowess-smoothing of short-term rates to deal with the volatility of the series. In addition, smoothed values are necessary so long as past rates continue to affect financial intermediation. Figure 2.4.1.2 shows that short-term interest rates explained the unit cost until 1990 in Germany, France[18] and the UK[19], and in Europe as a whole[20]. On the other hand, we can see that the distance be-

[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-1960.

[19]Interest rate data are not available in the UK before 1958.

[20]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.

tween both (scale-adjusted) series increased after that date. This coincides with the development of market-based activities – generating capital income – built on the shoulder of bank-based activities—the income of which comes from interest spread. In other words, because capital income has developed at the expense of interest spread, the effect of nominal rates of interest on banks' profit and unit cost decreases steadily during the 1990s.

1.5 Discussion

The inquiry produced so far have assumed that the output measure is unbiased although some misspecification may have driven the results. I already discussed the potential effect of financial asset intensity of intermediation hypotheses on the results in sections 2.5 and 3.4. I found no reason to fear for the results to depend on those hypotheses. Another potential misspecification could stem from private financial wealth-management oversight (GSV 2014). However, 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 private financial wealth quite well. Using the data proposed by Piketty and Zucman (2013) about Germany, France, the UK and the US, Figure 2.4.3.1 shows that it is indeed the case.

Tax havens may have had an impact on the output calculation too. Nonetheless, this should not artificially increase the unit cost. Two examples can help account for the consequences of capital transfers on the unit cost. First, let us suppose that a French bank manages a mutual fund affiliated in Luxembourg. The bank transfers 1$ from France to Luxembourg at no cost. We know that 1$ of liquidity generates a VA of $\alpha$$. This transfer of funds has two opposing effects on the unit cost of financial intermediation in France. The transfer of 1$ of liquidity reduces the financial output by 1$ and reduces the VA by $\alpha$$. Therefore, the unit cost of

financial intermediation decreases if $\alpha > z$, that is, α higher than the average cost of producing 1$ of financial service. Second, let us suppose that a French investor invests 1$ in a hedge fund domiciled in Jersey. We know that 1$ managed by a hedge fund generates a VA of $\beta$$ while an investment of 1$ provides the French investor with a VA of $\mu$$ when invested in a French financial institution. Therefore, the unit cost of financial intermediation decreases if $\mu < \beta$.

Although it is hard to know whether $\alpha > z$, there are two reasons to think that $\mu < \beta$. First, hedge funds activities are opaque and largely unregulated. This provides them with substantial market power over investors even though investors earn significant benefits thanks to the defining characteristics of a tax haven. Second, limited liability encourages some of these institutions to take excessive risks in order to raise their profits. Because they keep the gains when they succeed but do not suffer the losses when they fail, β must be higher than μ. Therefore, since a large share of those activities are not counted in the French VA–though they use French investor capital and can work on French territory–the unit cost of financial intermediation may be undervalued.

It is finally worth noting that financial intermediaries may have helped produce indirect services like, say, price discovery. However, the aim of the unit cost calculation is to account for the price of financial intermediation in a partial equilibrium way. Externalities, which can also be negative—e.g. governments deficit boom following the subprime crisis—, must not be accounted in this calculation. As a comparison, the price of energy does not account for the fact that electricity has improved industrial production around the world.

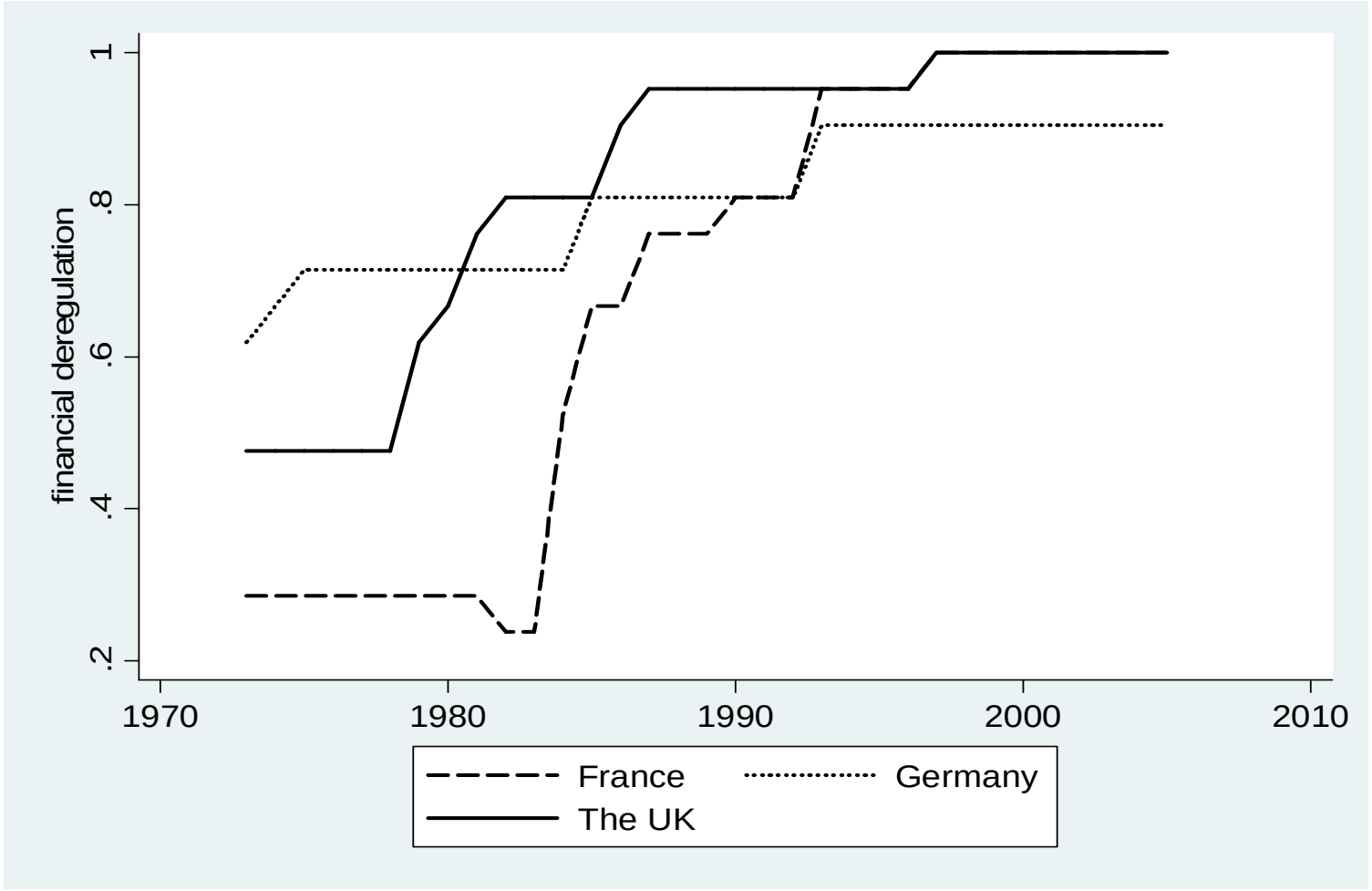
Conclusion

This chapter aimed to measure the cost of financial intermediation in the largest European countries (Germany, France and the UK) and to estimate it for Europe

more broadly. Following Philippon (2014) I calculated the unit cost of financial intermediation using financial intermediaries' income divided by financial output. In order to obtain a European series, I compiled national series, taking national financial intermediation trade balances into account.

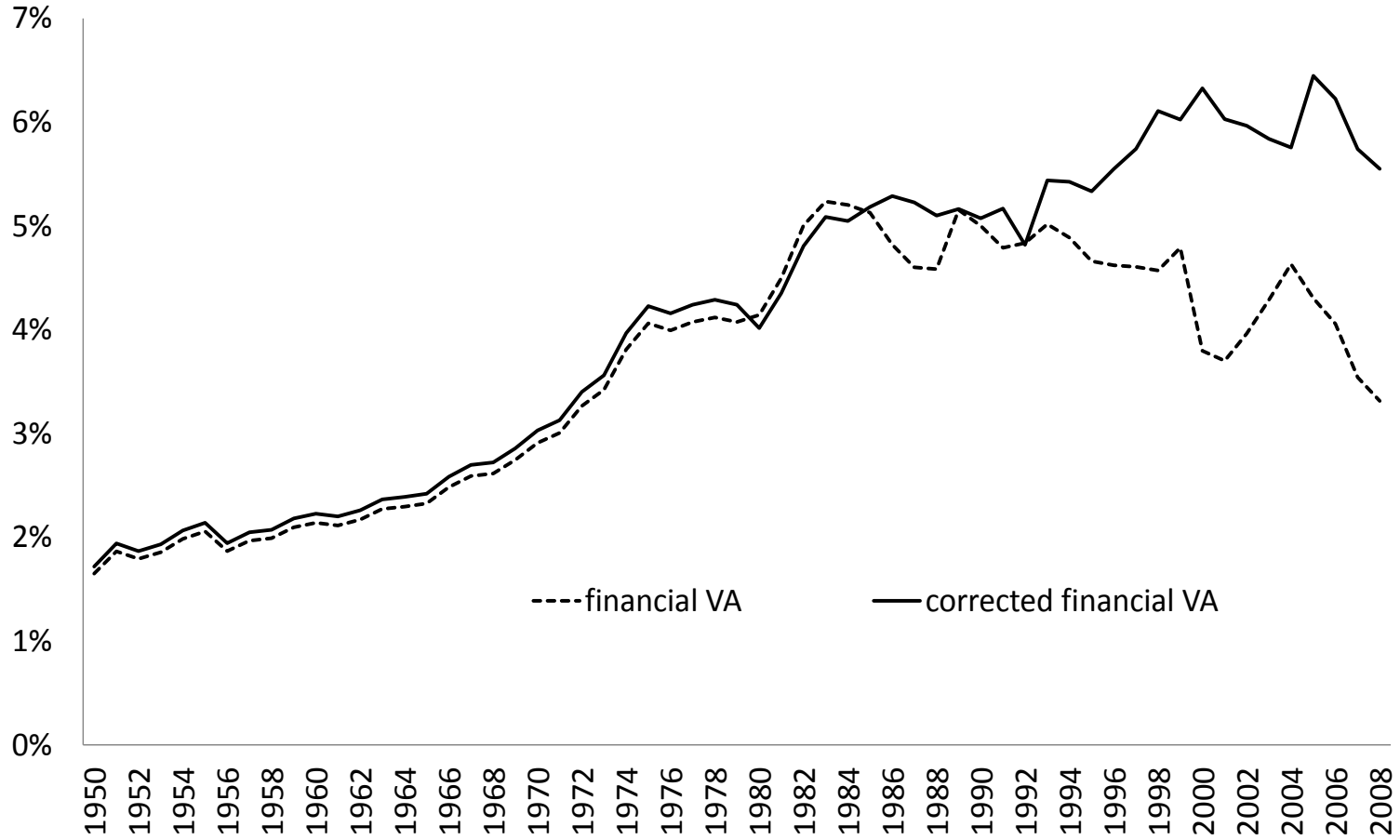
The main results have shown that the European largest countries' unit costs globally increase (Germany and the UK) or stagnate (France), while the series tend to converge throughout the period. The European unit cost also appears to increase overall. In all cases, the unit cost increased during the 1970s, after the end of the Bretton Woods system. I show that 1970s and 1980s high unit costs can be explained by the increase of nominal rates of interest following macroeconomic turmoil, which increased interest spreads and reduced the production of financial services. On the other hand, high unit cost values after the mid-1990s remain unexplained. It is finally worth noting that comparison with US unit cost shows that the US and European series follow the same trend over the considered period, suggesting that similar causes have produced similar effects.

Figure 2.1.1.1: Index of financial deregulation in Germany, France and the UK



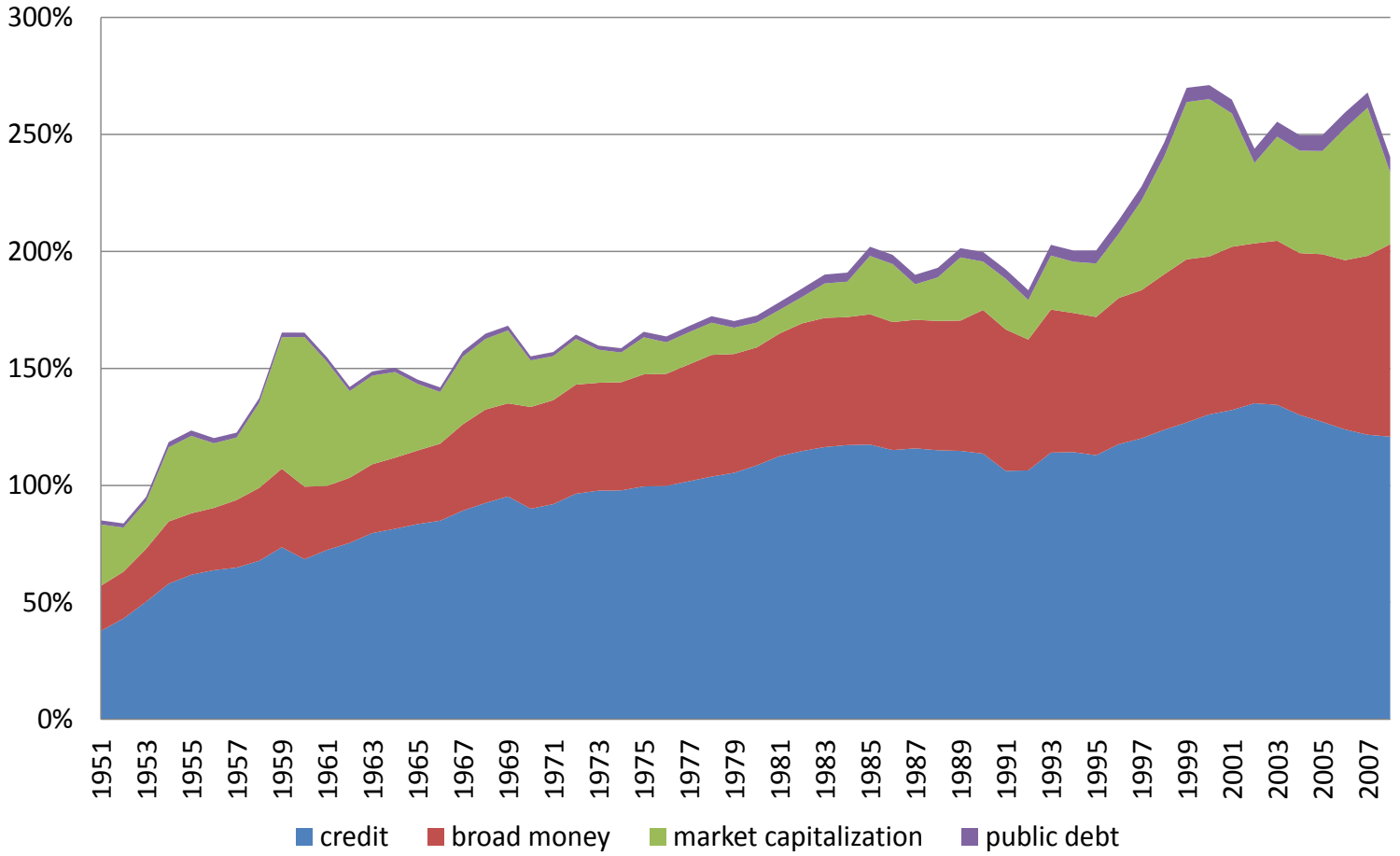
Note: The index of financial deregulation is from Abiad et al. (2007).

Figure 2.2.1.1: GDP share of finance in Germany



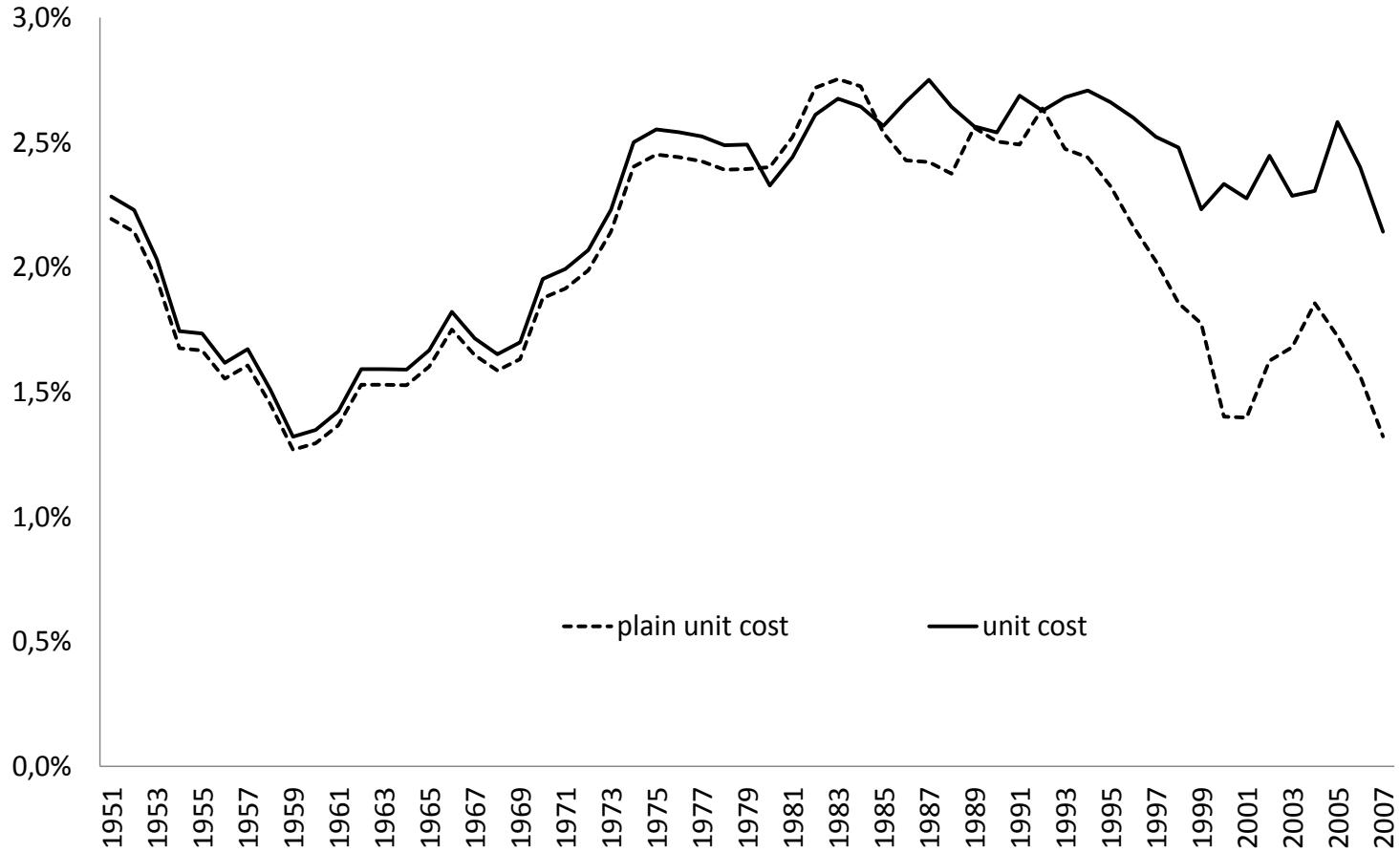
Note: corrected financial VA is the addition of net banking incomes + VA of insurances + VA of other financial intermediaries. The data for net banking incomes is available from 1979 to 2008. Before 1979 the corrected VA is estimated assuming that the difference between this series and financial VA decreases at the same pace as the growth rate of this difference between 1980 and 1990.

Figure 2.2.1.2: Financial output to GDP in Germany per output components



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

Figure 2.2.1.3: Unit cost of financial intermediation in Germany



Note: The plain unit cost uses financial VA, while the unit cost uses corrected VA.

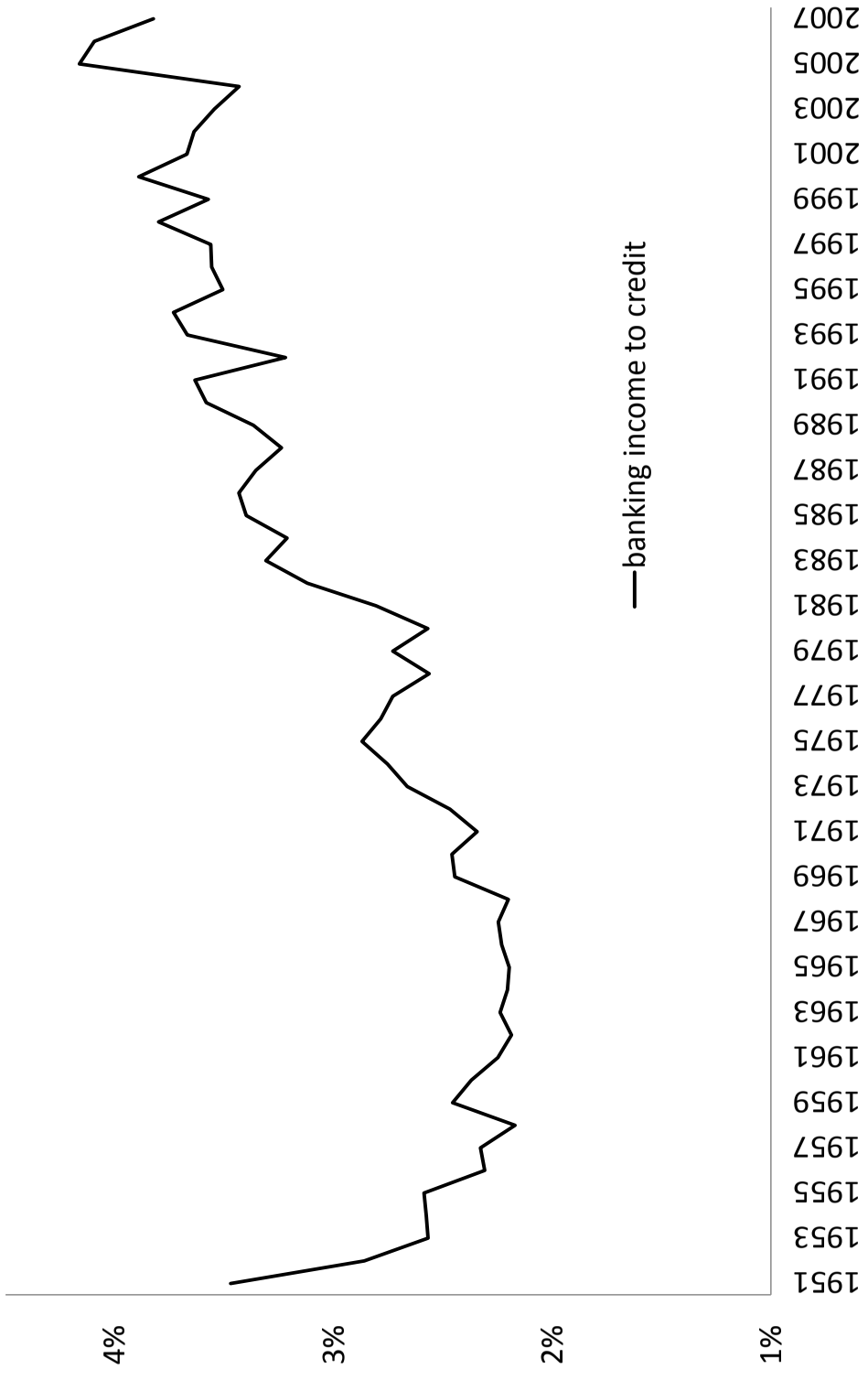
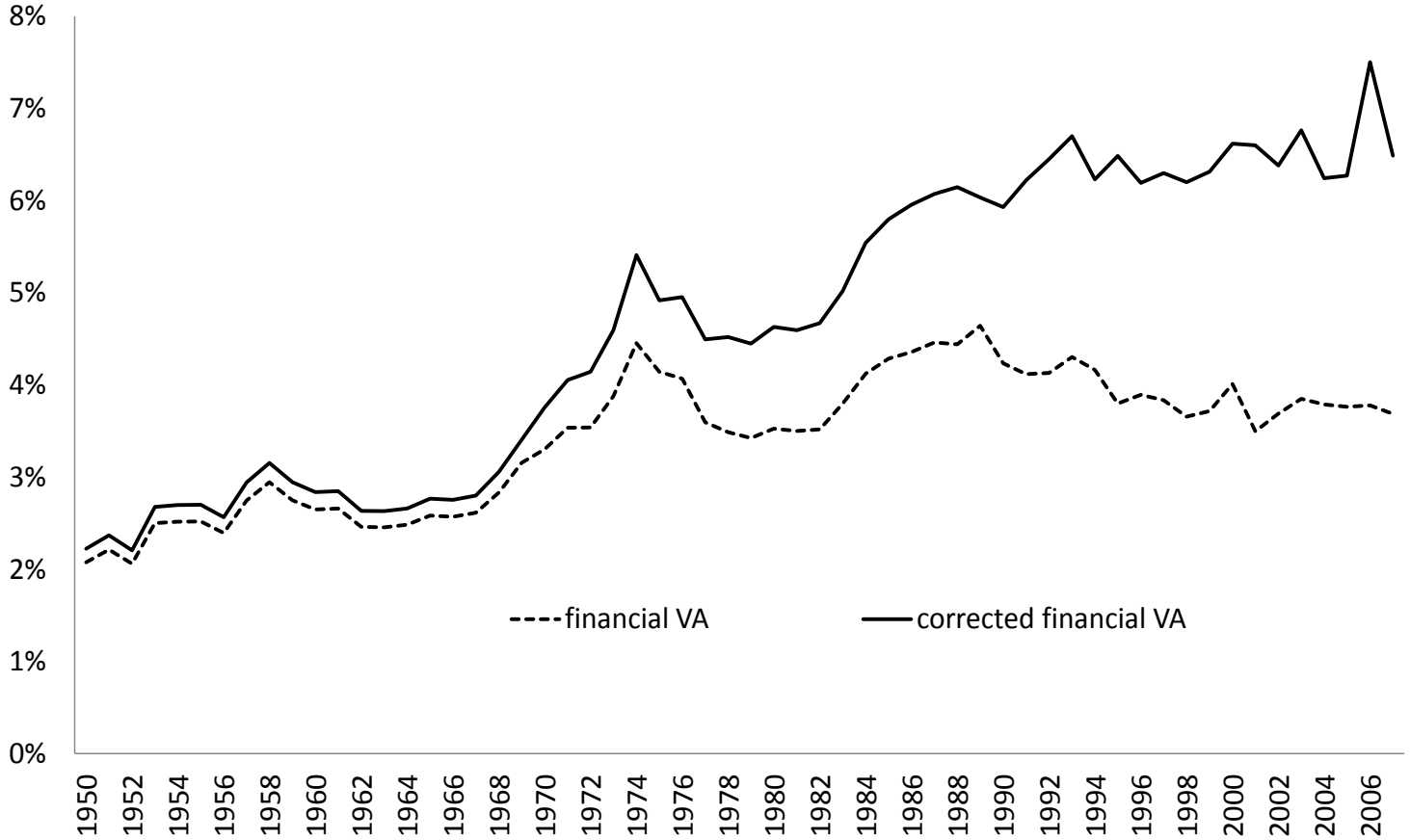


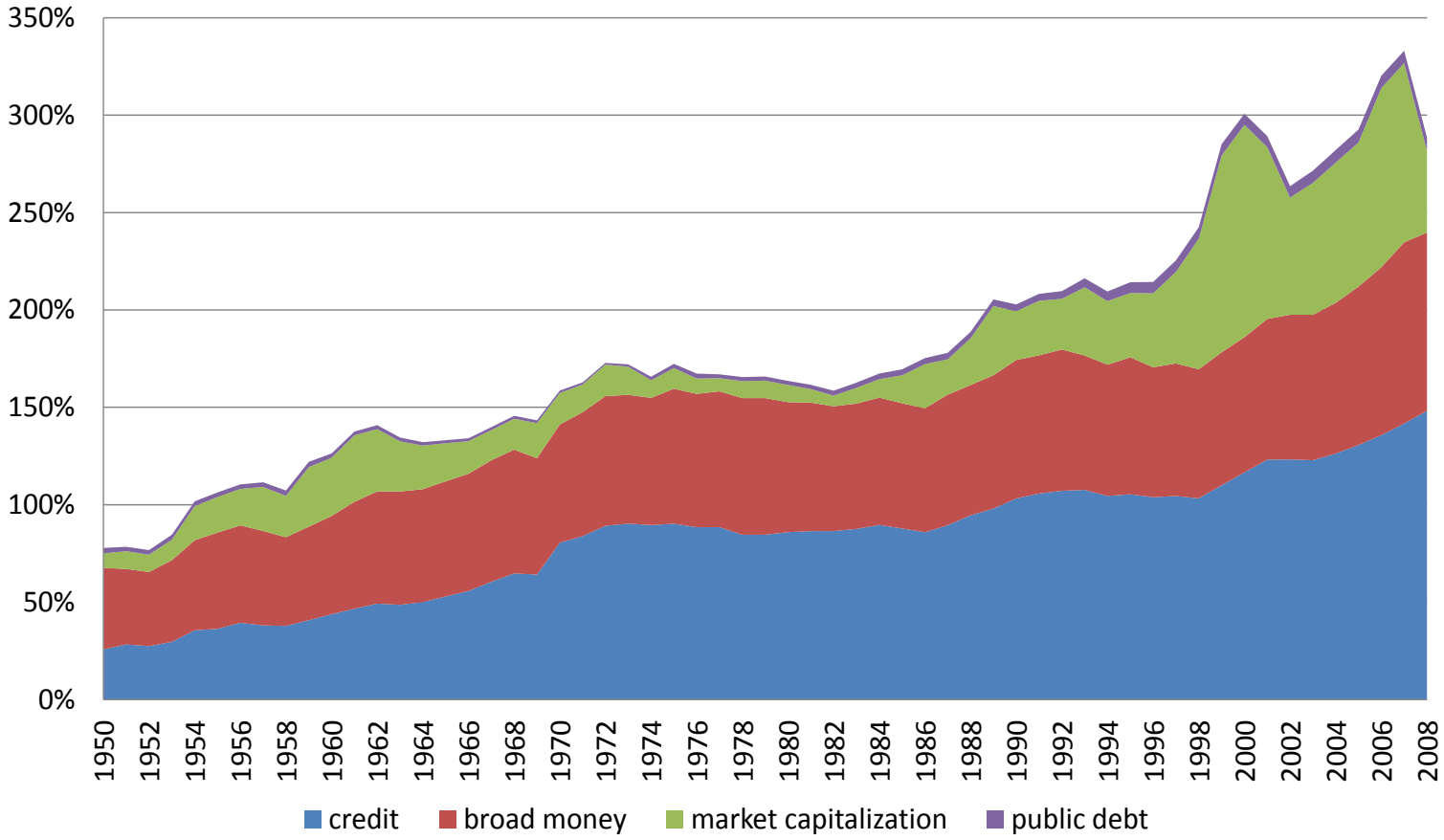
Figure 2.2.1.4: Banking income to credit in Germany

Figure 2.2.2.1: GDP share of finance in France



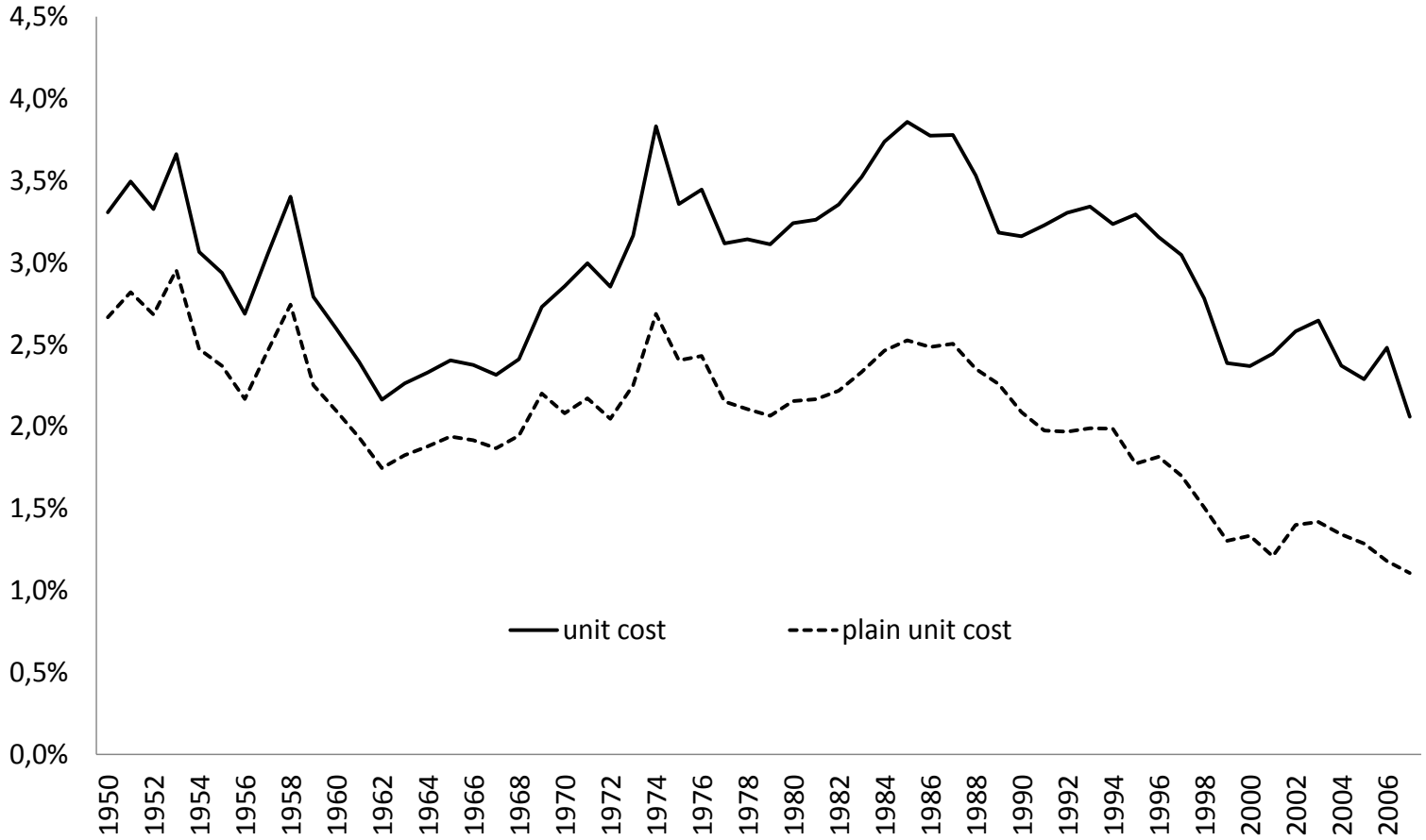
Note: corrected financial VA is the addition of net banking incomes + VA of insurances + VA of other financial intermediaries. The data for net banking incomes is available from 1988 to 2008. Before 1988 the corrected VA is estimated assuming that the difference between this series and financial VA decreases at the same pace as the growth rate of this difference between 1988 and 1995.

Figure 2.2.2.2: Financial output to GDP in France per output components



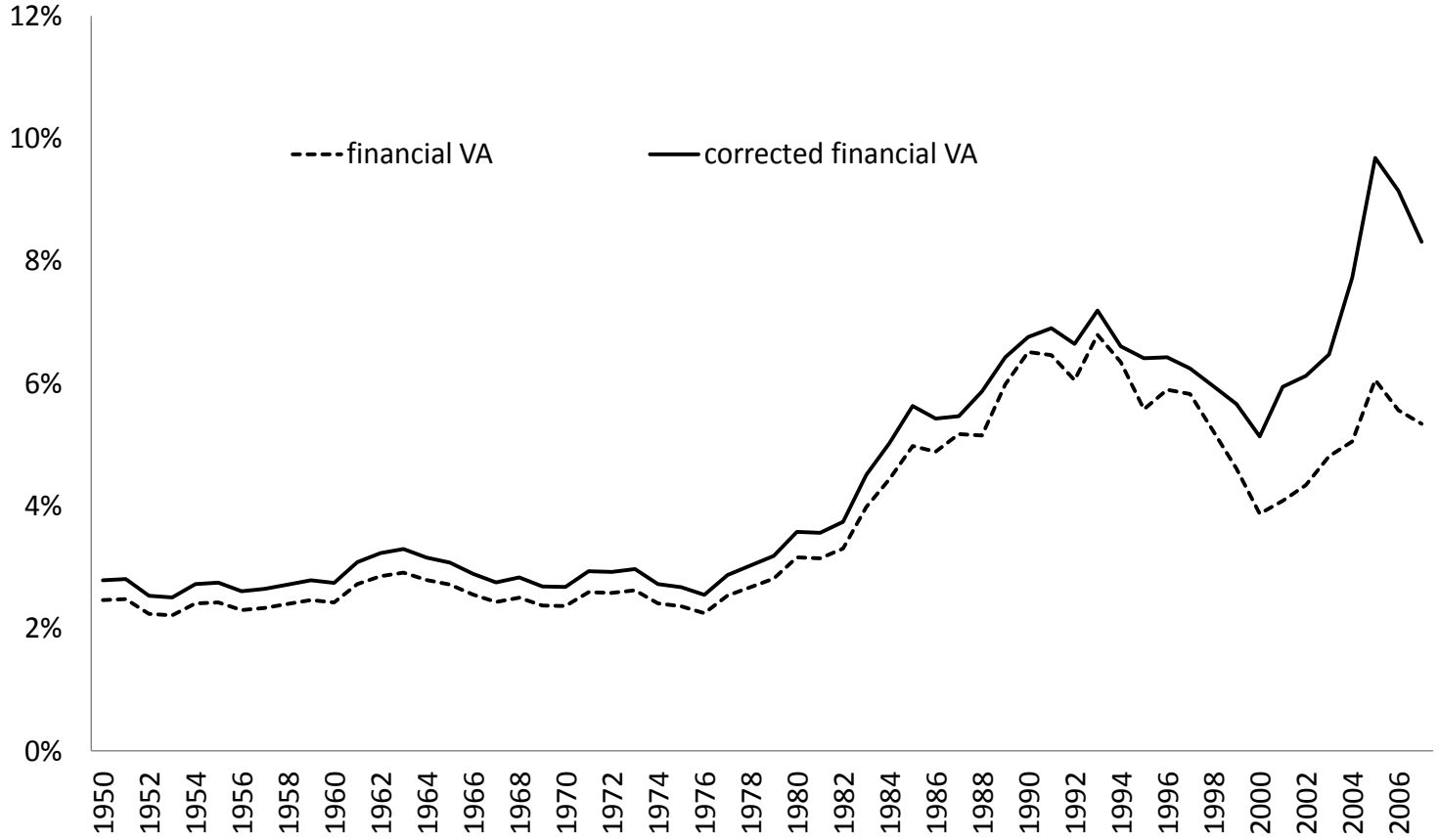
Note: the financial output is estimated through the sum of private credit, broad money, market capitalization and public debt discounted by a factor of 10. Sources are provided in the data appendix.

Figure 2.2.2.3: Unit cost in France



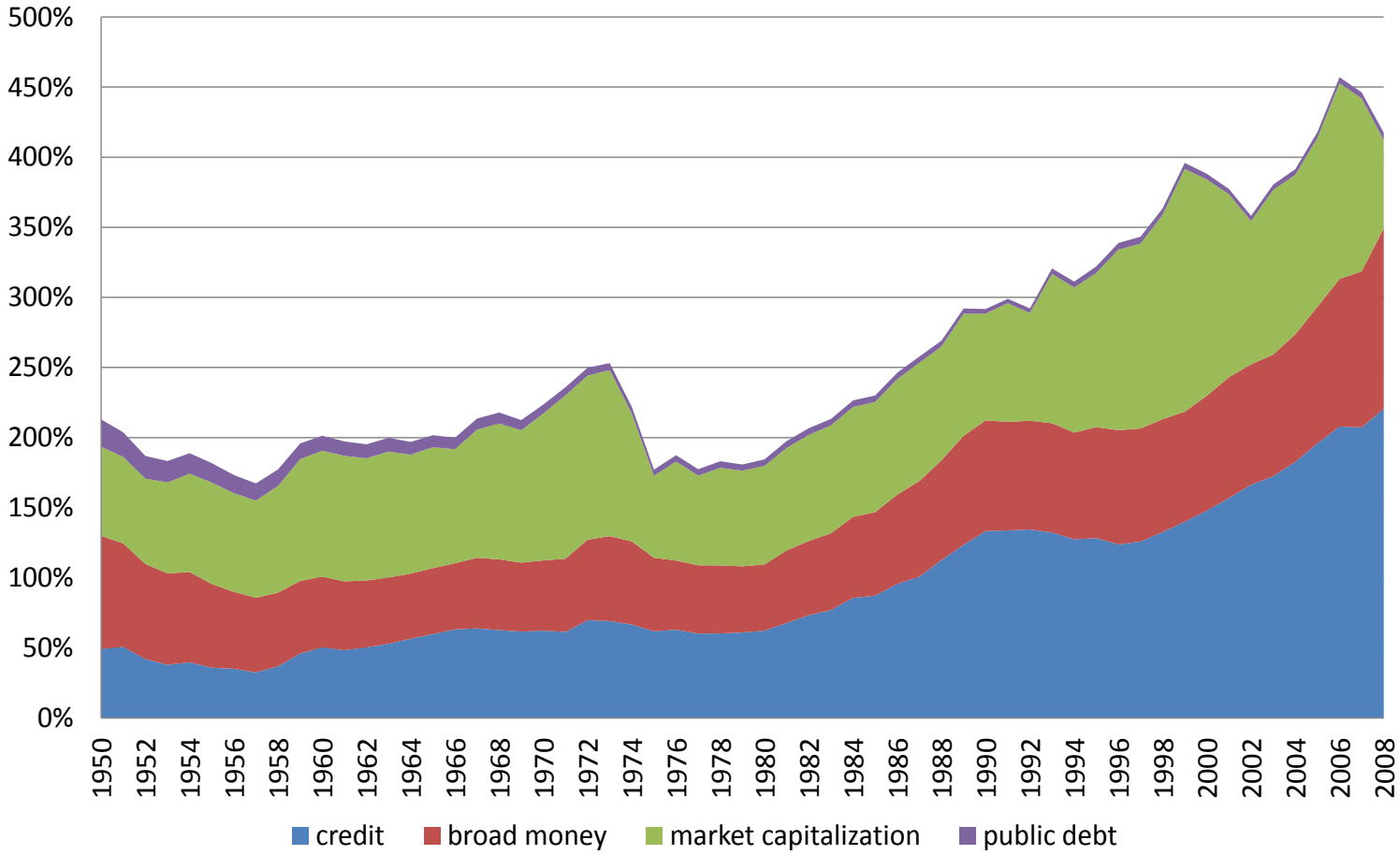
Note: The plain unit cost uses financial VA while the unit cost uses corrected VA.

Figure 2.2.3.1: GDP share of finance in the UK



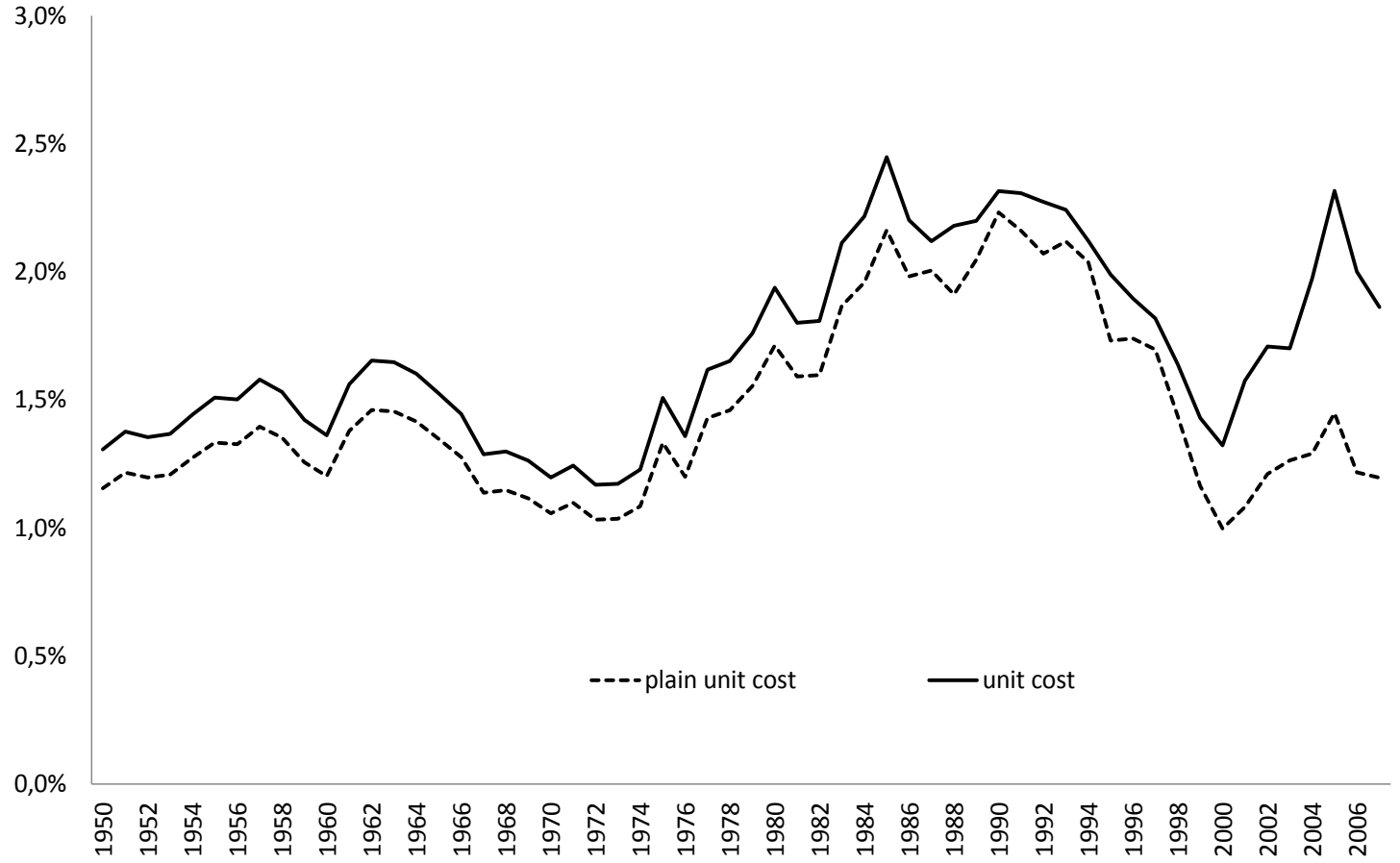
Note: corrected financial VA is the addition of net banking incomes + VA of insurances + VA of other financial intermediaries. The data for net banking incomes is available from 1980 to 2007. Before 1980 the corrected VA is estimated assuming that the difference between this series and financial VA decreases at the same pace as the growth rate of this difference between 1980 and 1990. Both series are adjusted to account for trade balance of financial services.

Figure 2.2.3.2: Financial output to GDP in the UK per output components



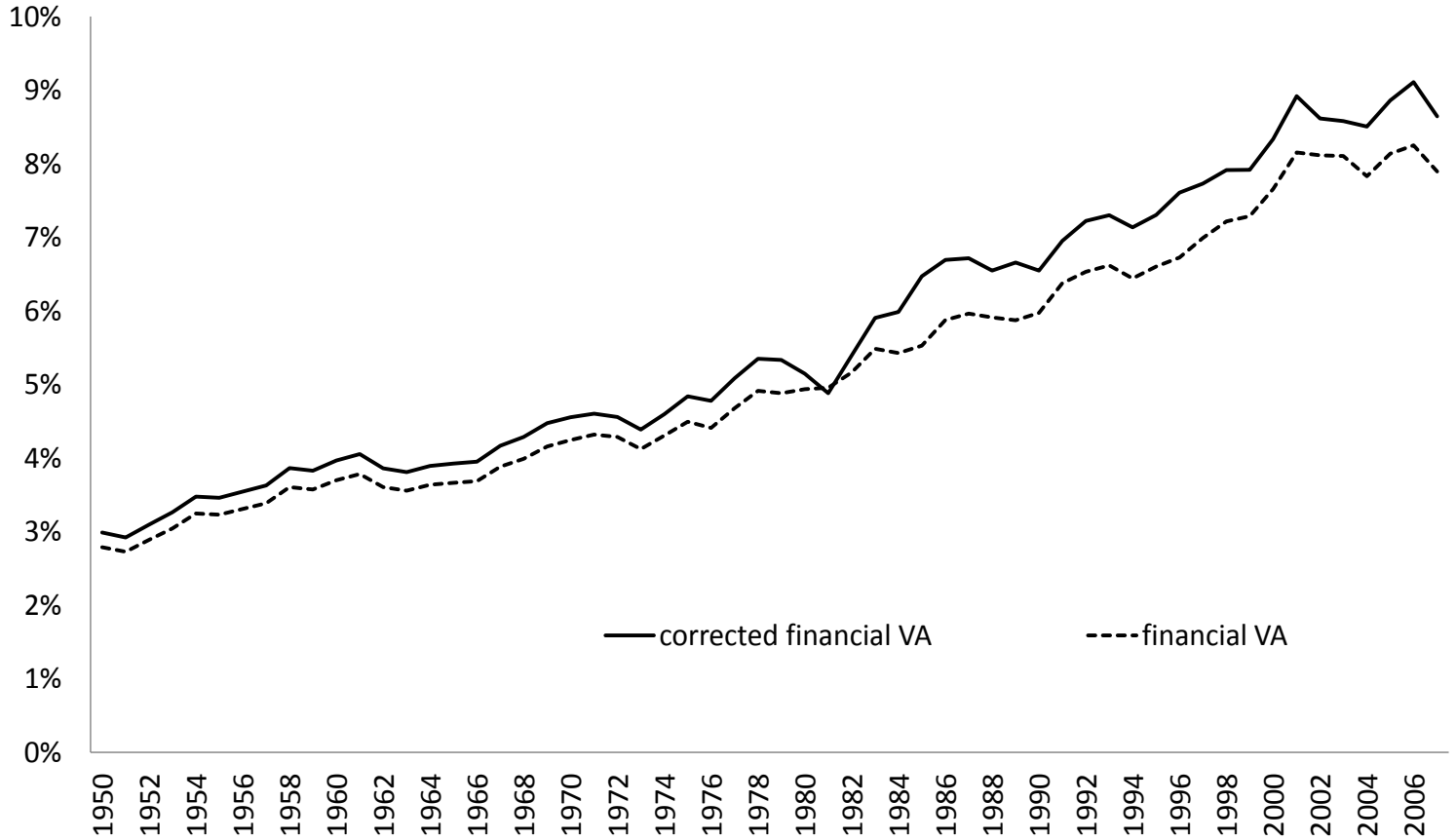
Note: the financial output is estimated through the sum of private credit, broad money, market capitalization and public debt discounted by a factor of 10. Sources are provided in the data appendix.

Figure 2.2.3.3: Unit cost of financial intermediation in the UK



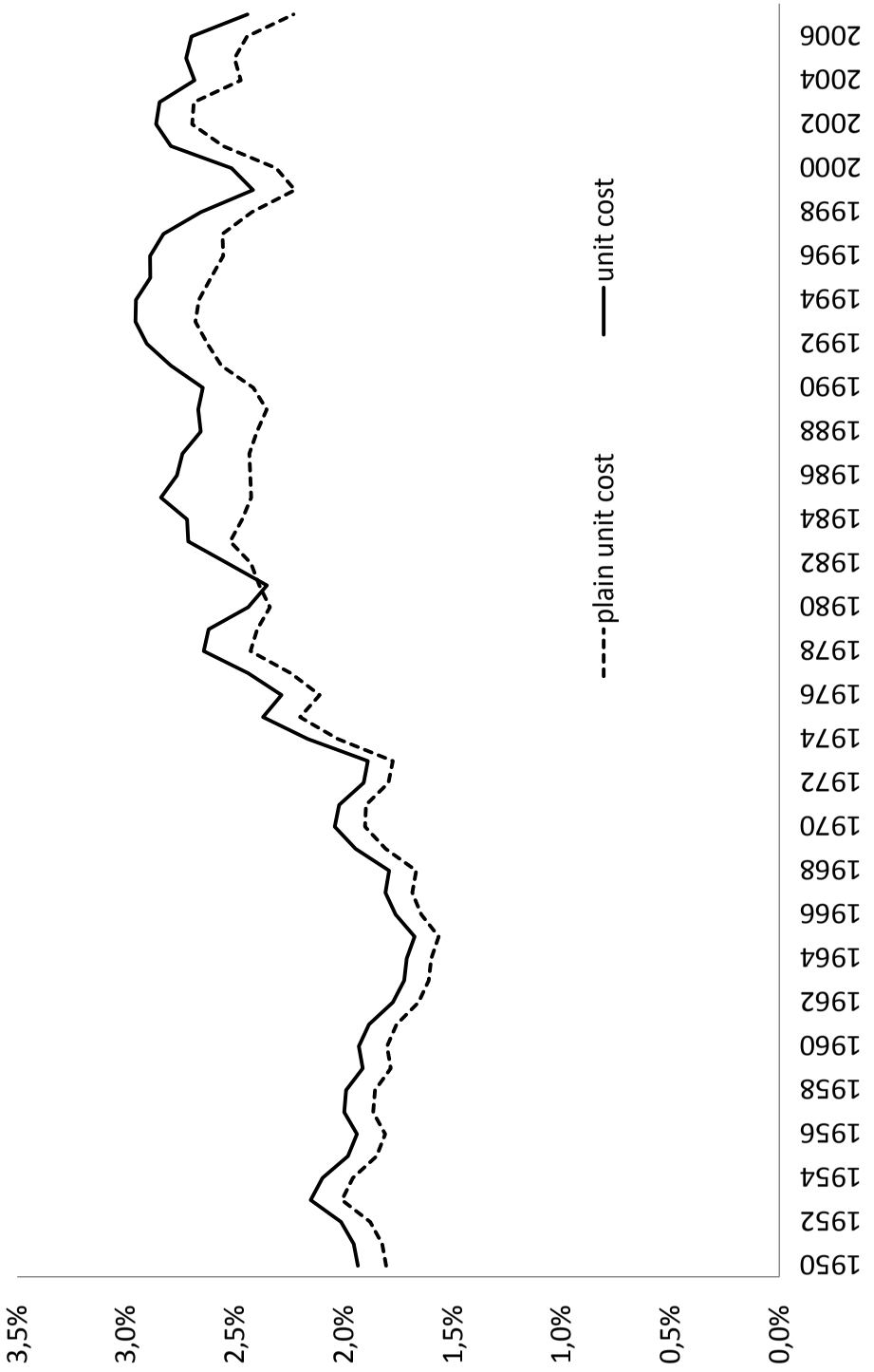
Note: The plain unit cost uses financial VA while the unit cost uses corrected VA.

Figure 2.2.4.1: GDP share of finance in the US



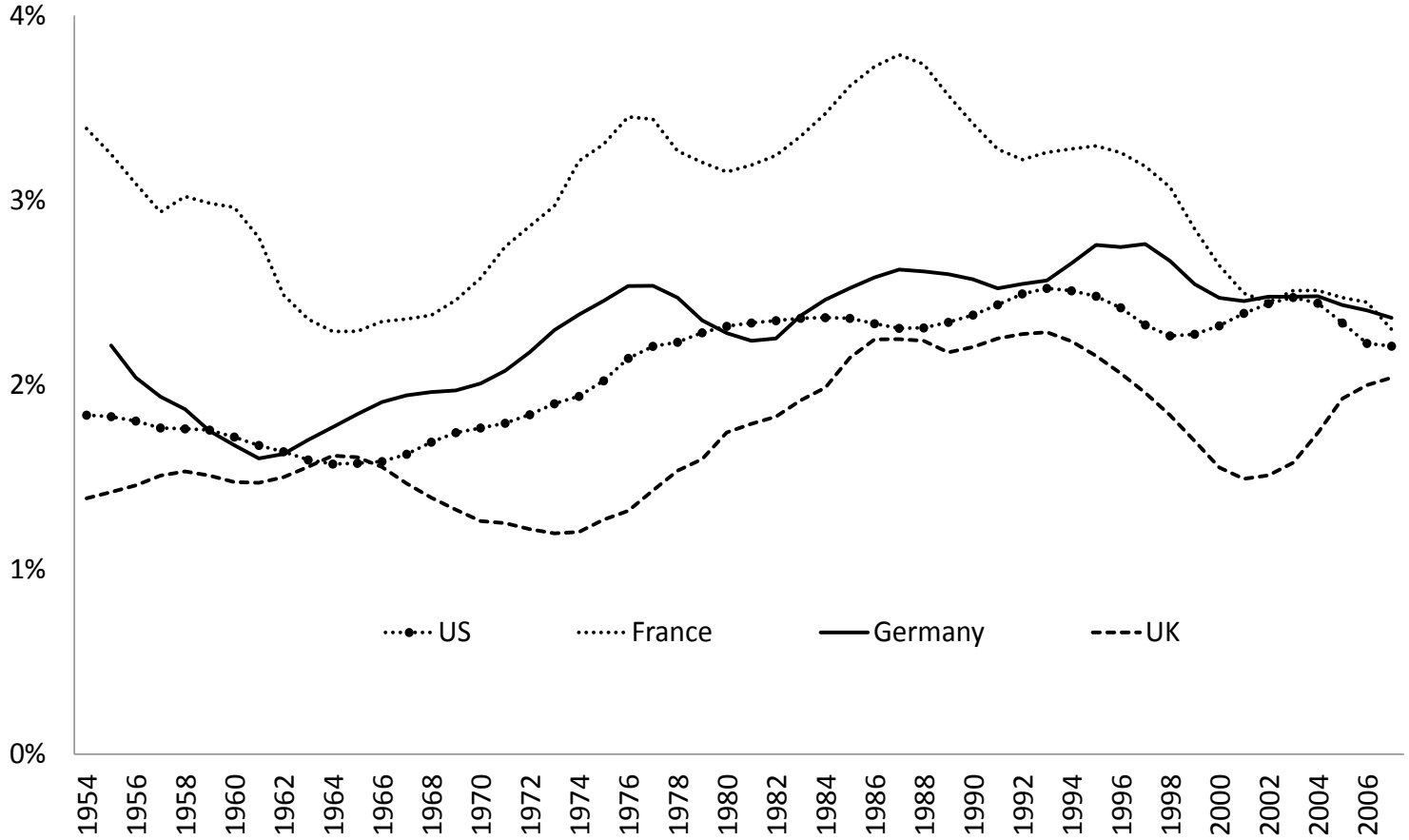
Note: corrected financial VA is the addition of net banking incomes + VA of insurances + VA of other financial intermediaries. The data for net banking incomes is available from 1980 to 2007. Before 1980 the corrected VA is estimated assuming that the difference between this series and financial VA decreases at the same pace as the growth rate of this difference between 1980 and 1990.

Figure 2.2.4.2: Unit cost of financial intermediation in the US



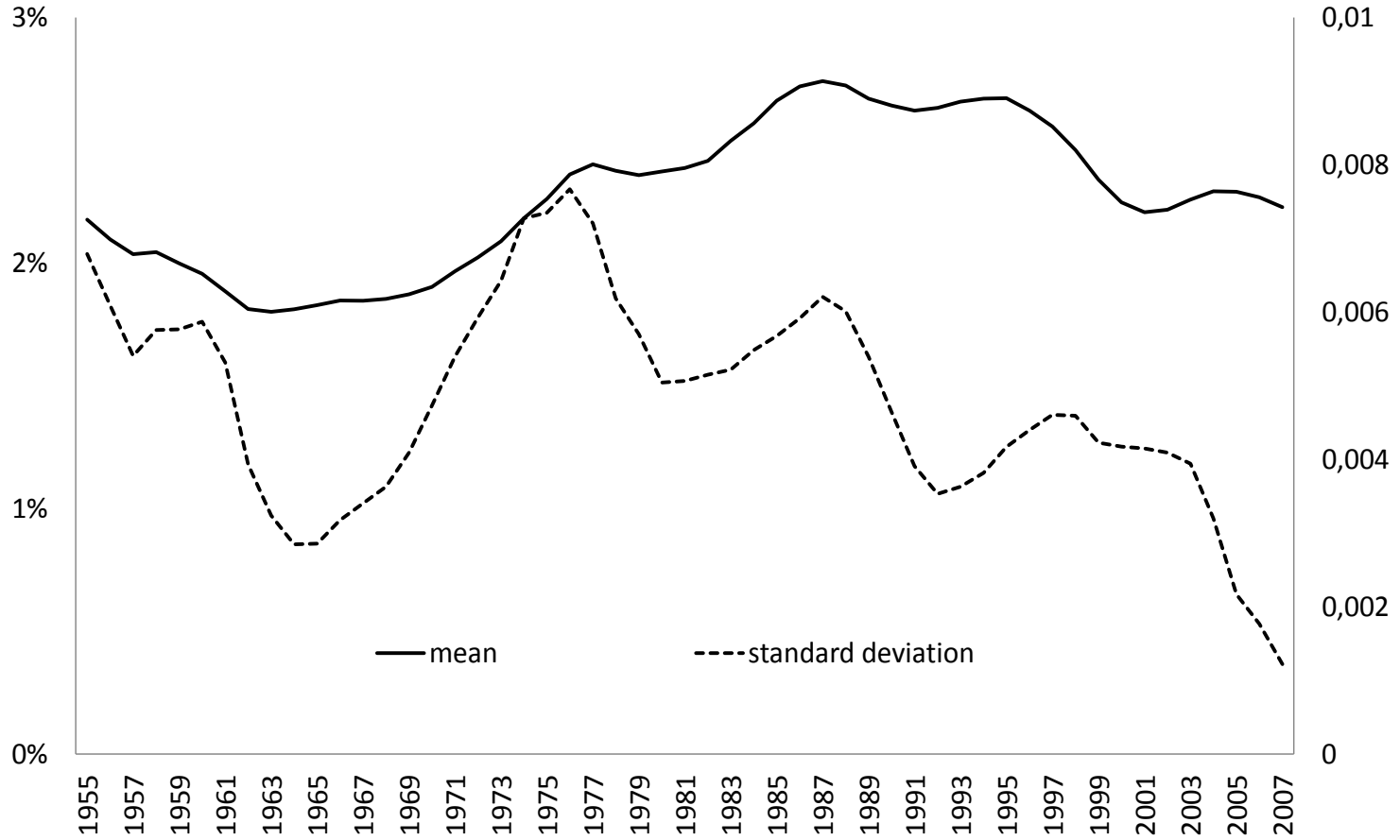
Note: The plain unit cost uses financial VA while the unit cost uses corrected VA.

Figure 2.2.5.1: National unit cost (4-year moving average)



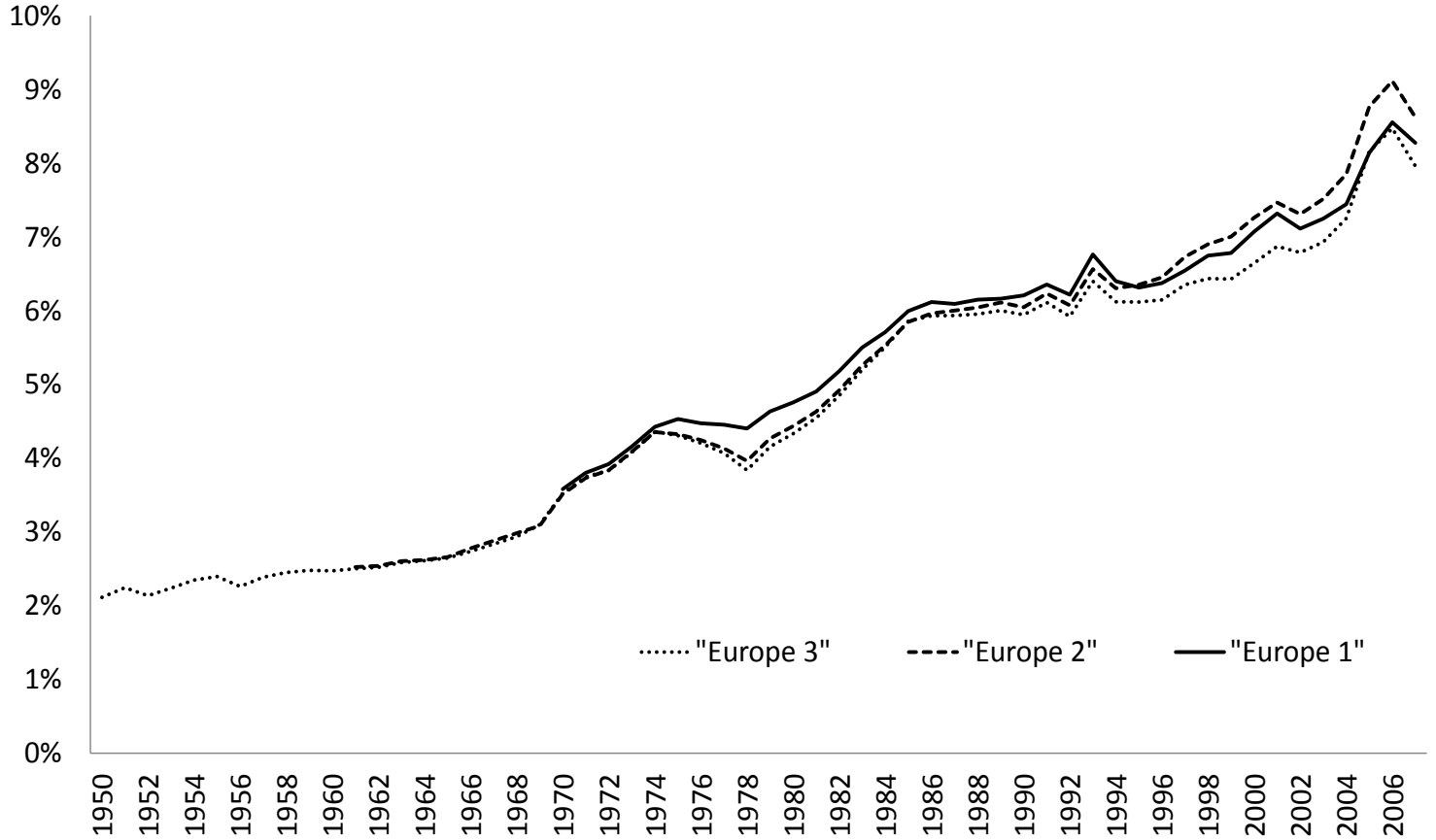
Note: US unit cost from Philippon (2012), level estimation. The US series does not use bank capital gains. Unit costs calculation details for Germany, France and the UK are provided in the preceding paragraphs of this section.

Figure 2.2.5.2: National unit costs and mean values and standard deviation



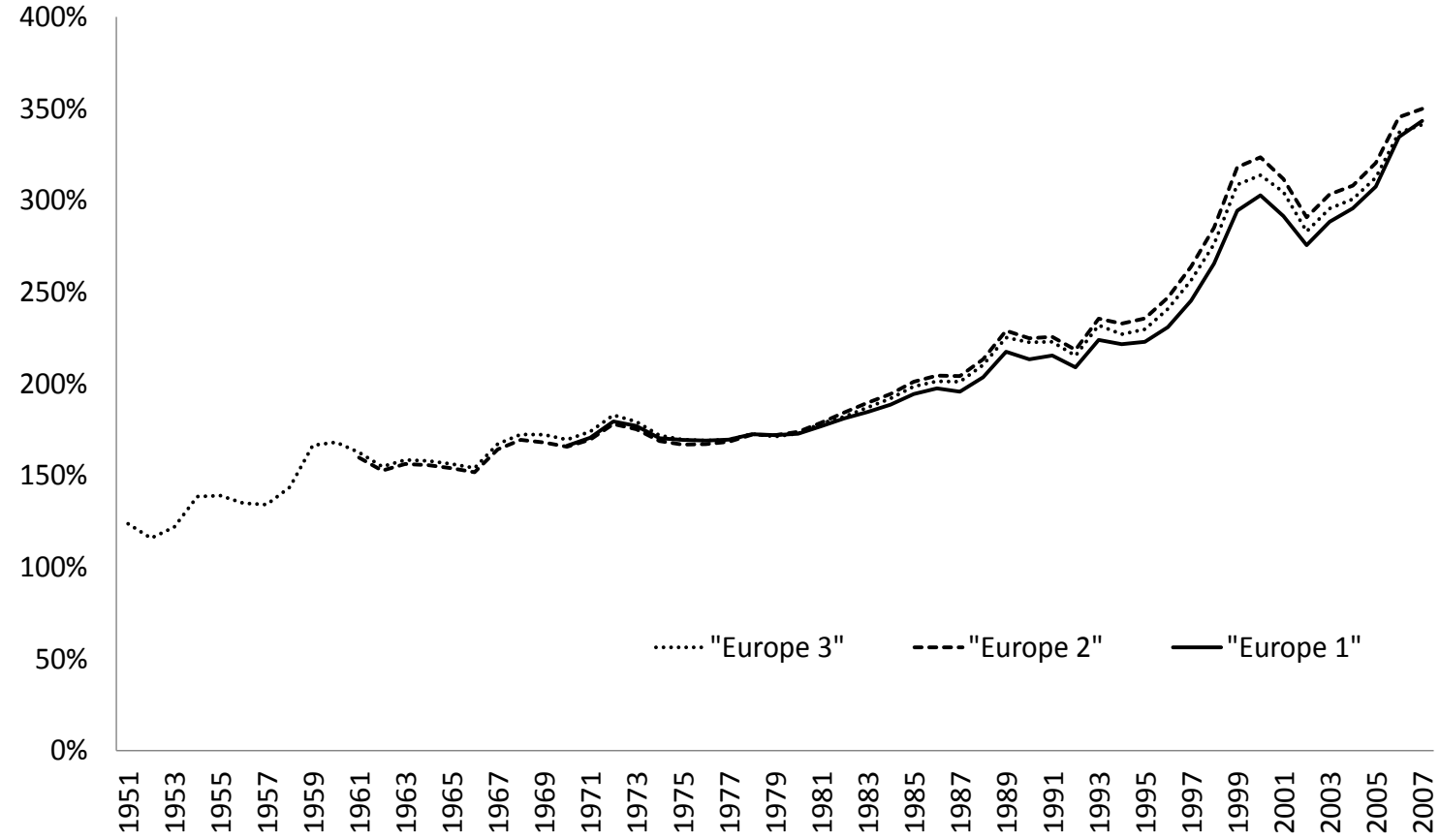
Note: the mean and standard deviation calculation use un-weighted national series. Mean on the left axis, Standard deviation on the right axis.

Figure 2.3.1.1: Corrected financial VA to GDP, European estimation, first method



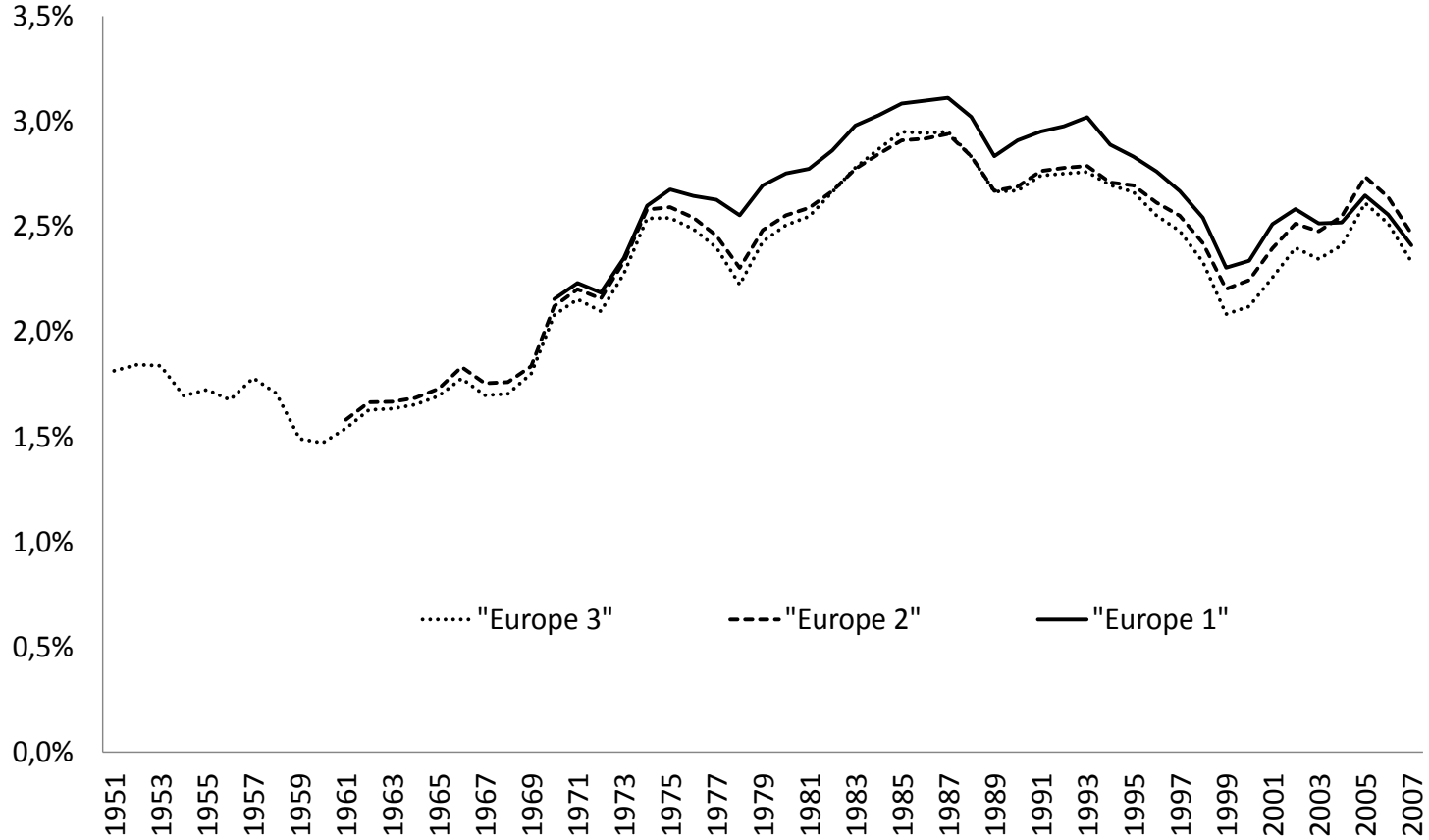
Note: The first method uses the sum of the country series – that is the ratio of the sum of countries' corrected financial VA to the sum of countries' GDP. "Europe 1" accounts for Germany, France, the UK, Italy, Spain and the Netherlands. "Europe 2" accounts for Germany, France, the UK and the Netherlands. "Europe 3" accounts for Germany, France and the UK.

Figure 2.3.1.2: Financial output to GDP, European estimation, first method



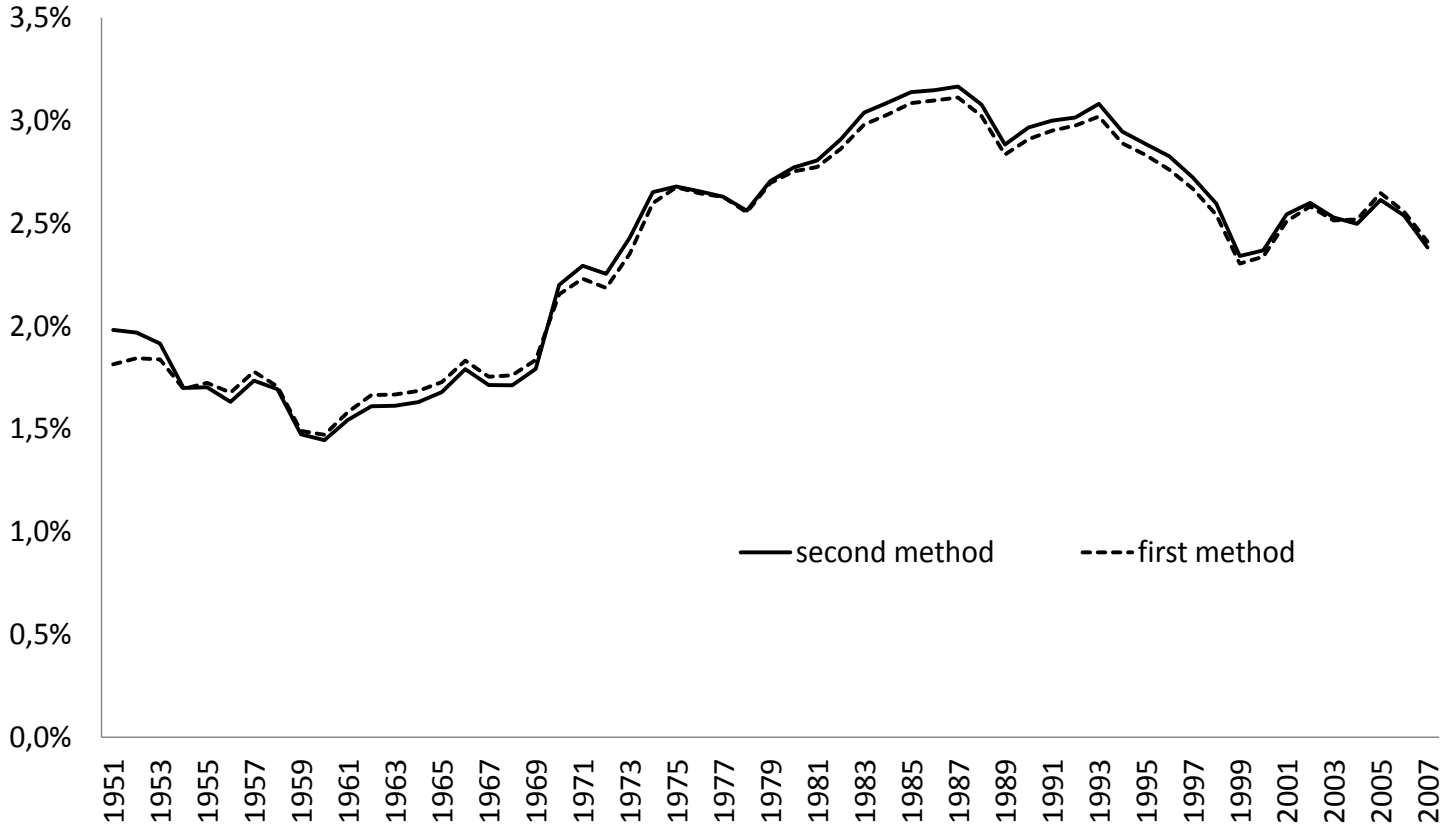
Note: The first method uses the sum of the country series – that is, the ratio of the sum of countries' financial output to the sum of countries' GDP. "Europe 1" accounts for Germany, France, the UK, Italy, Spain and the Netherlands. "Europe 2" accounts for Germany, France, the UK and the Netherlands. "Europe 3" accounts for Germany, France and the UK.

Figure 2.3.1.3: Unit cost of financial intermediation, European estimation, first method



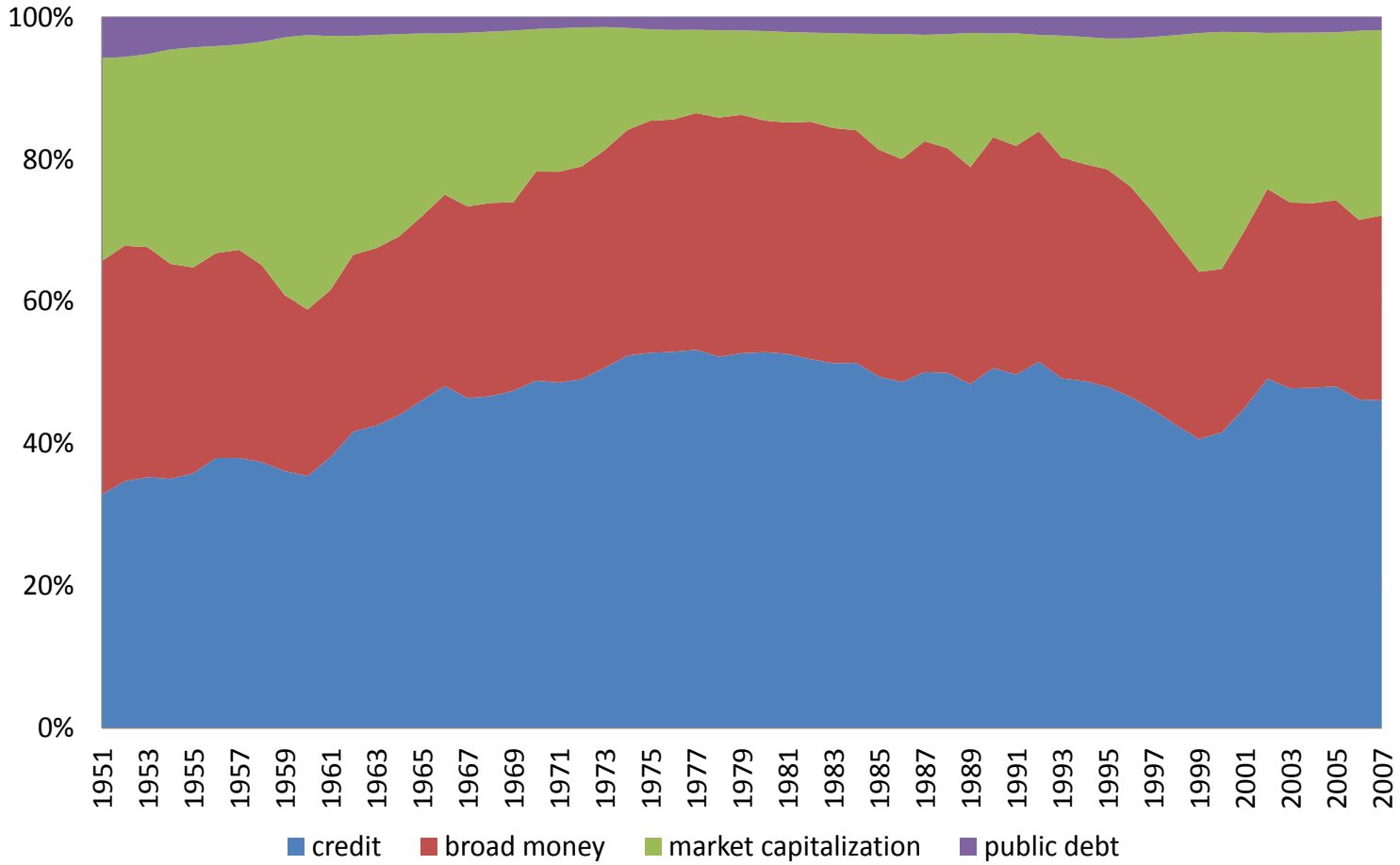
Note: The first method uses the sum of the country series – that is, the ratio of the sum of countries' corrected financial VA to the sum of countries' financial output. "Europe 1" accounts for Germany, France, the UK, Italy, Spain and the Netherlands. "Europe 2" accounts for Germany, France, the UK and the Netherlands. "Europe 3" accounts for Germany, France and the UK.

Figure 2.3.2.1: Unit cost of financial intermediation, European estimation, first and second methods



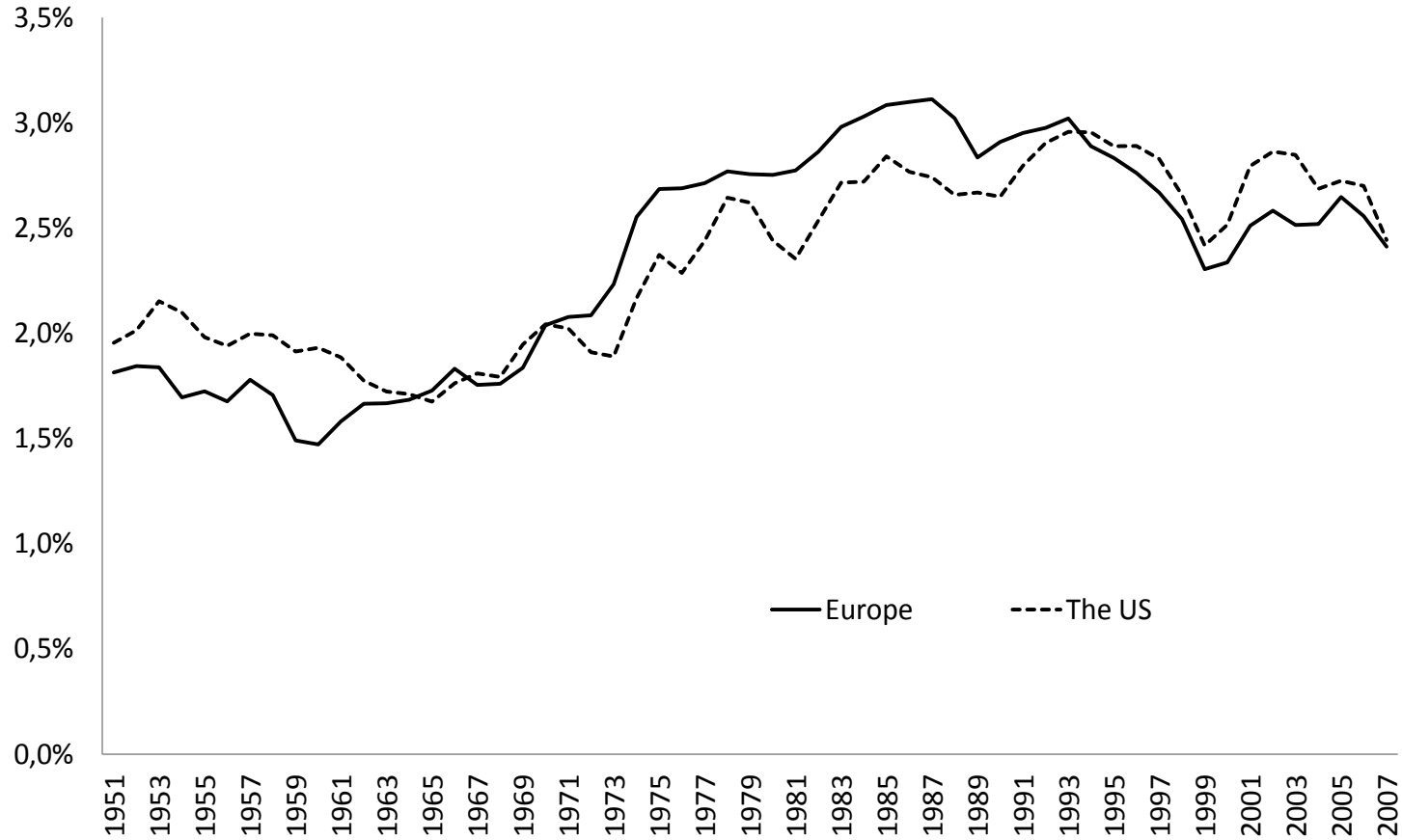
Note: The first method uses the sum of country series – that is, the ratio of the sum of countries' corrected financial VA to the sum of countries' financial output. The second method uses the weighted sum of countries' unit cost based on the share of each country in total GDP. Both series are built using Germany, France and the UK from 1951 to 1960, Germany, France, the UK and the Netherlands from 1961 to 1969, and Germany, France, the UK, Italy, Spain and the Netherlands from 1970 to 2007.

Figure 2.3.2.2: Financial output decomposition per asset



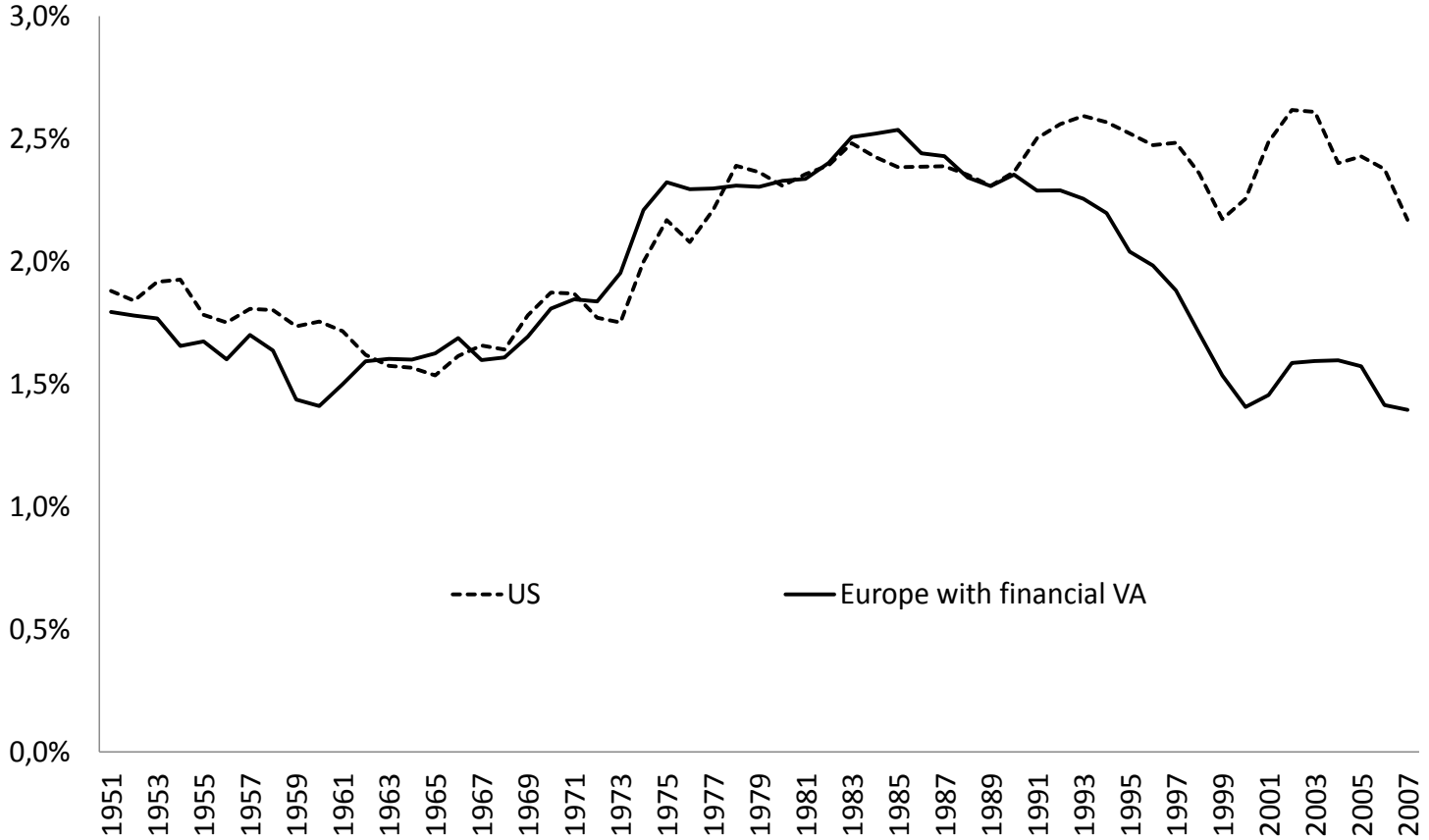
Note: each series is calculated summing countries' assets weighed by their GDP share.

Figure 2.3.3.1: European and the US unit costs



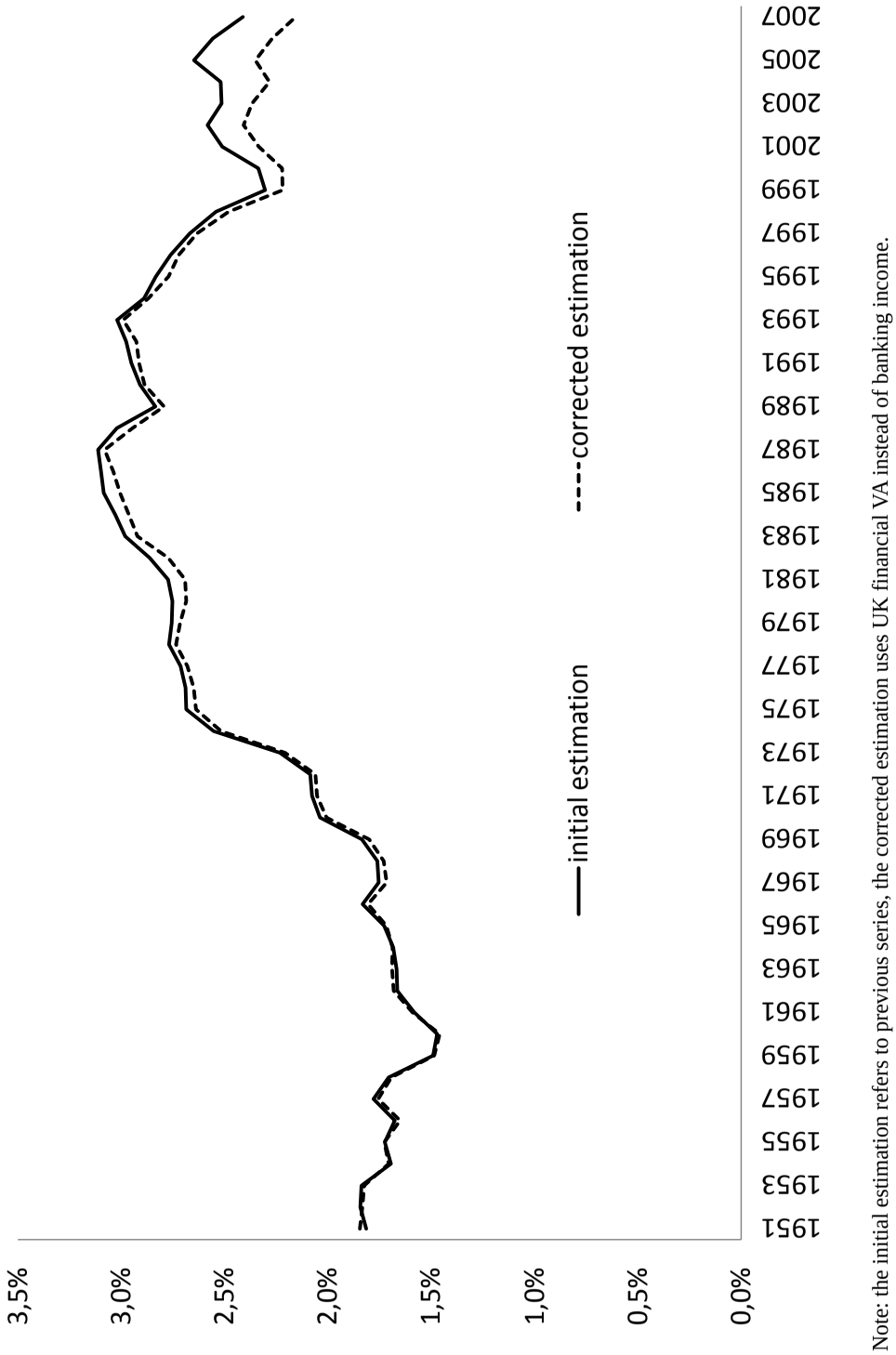
Note: The European series is the ratio of the sum of countries' financial income to the sum of countries' financial output. Both European and the US unit costs account for bank capital income. US series is from Philippon (2012).

Figure 2.3.3.2: Comparison of European and the US plain unit cost



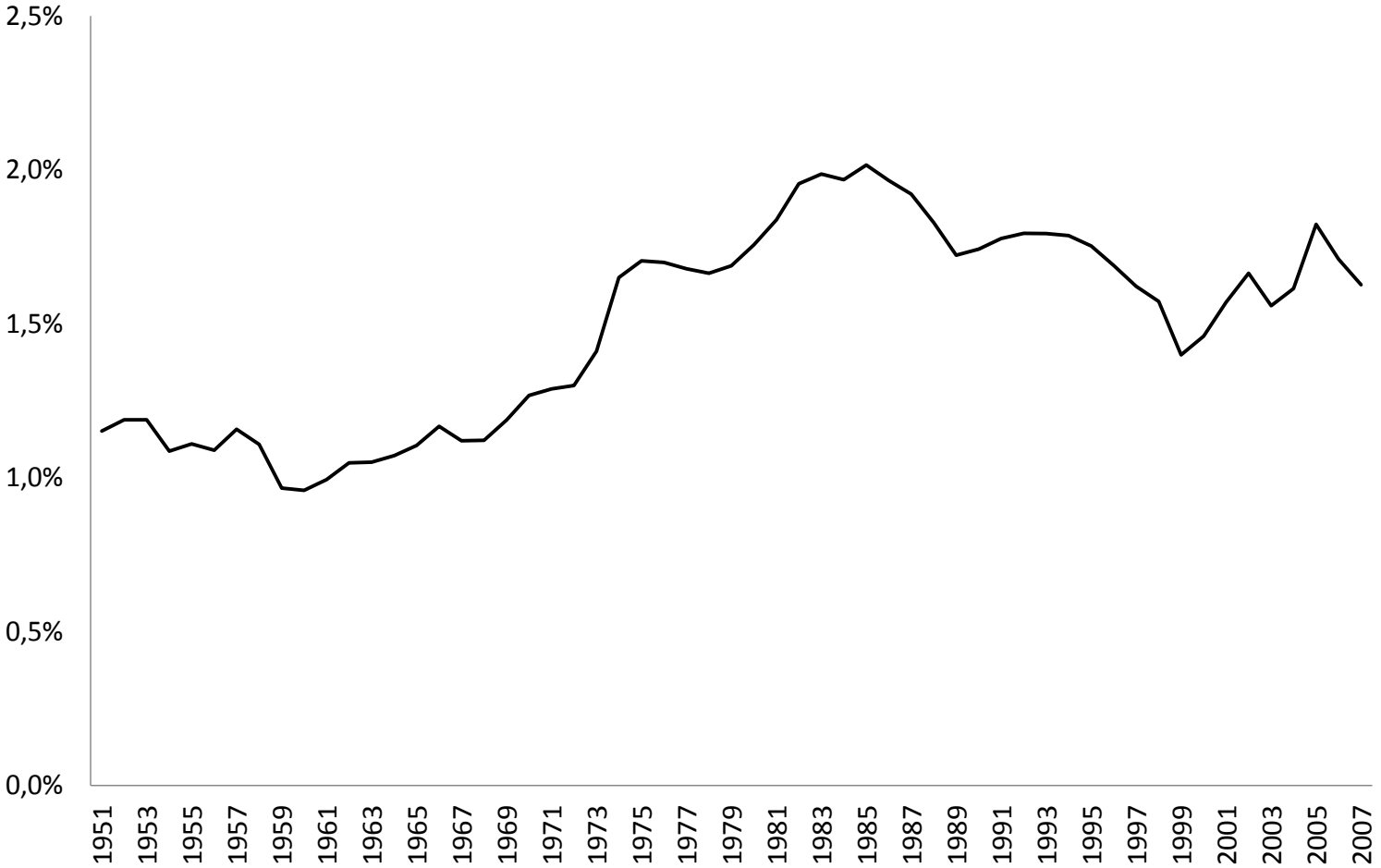
Note: "Plain" unit cost does not account for bank capital income, instead using plain financial VA. The European series is calculated using the sum of country series – that is, the ratio of the sum of countries' corrected financial VA to the sum of countries' financial output. The US series is from Philippon (2012) 'level estimation'.

Figure 2.3.4.1: Unit cost robustness check



Note: the initial estimation refers to previous series, the corrected estimation uses UK financial VA instead of banking income.

Figure 2.3.4.2 : European unit cost alternative measure

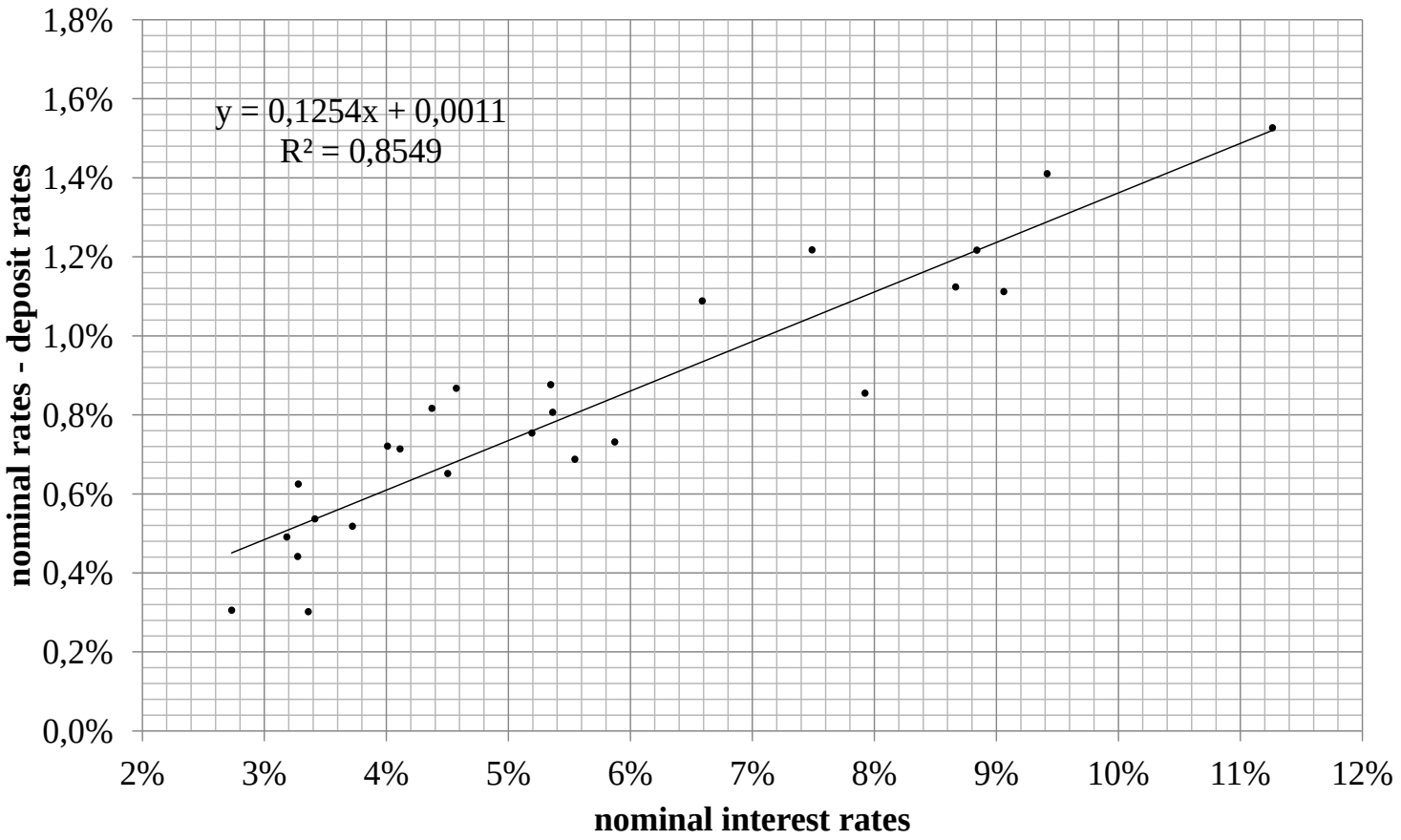


Note : the alternative unit cost removes ‘insurance VA’ from the financial consumption.

Figure 2.3.4.3: European unit cost, alternative measure bis

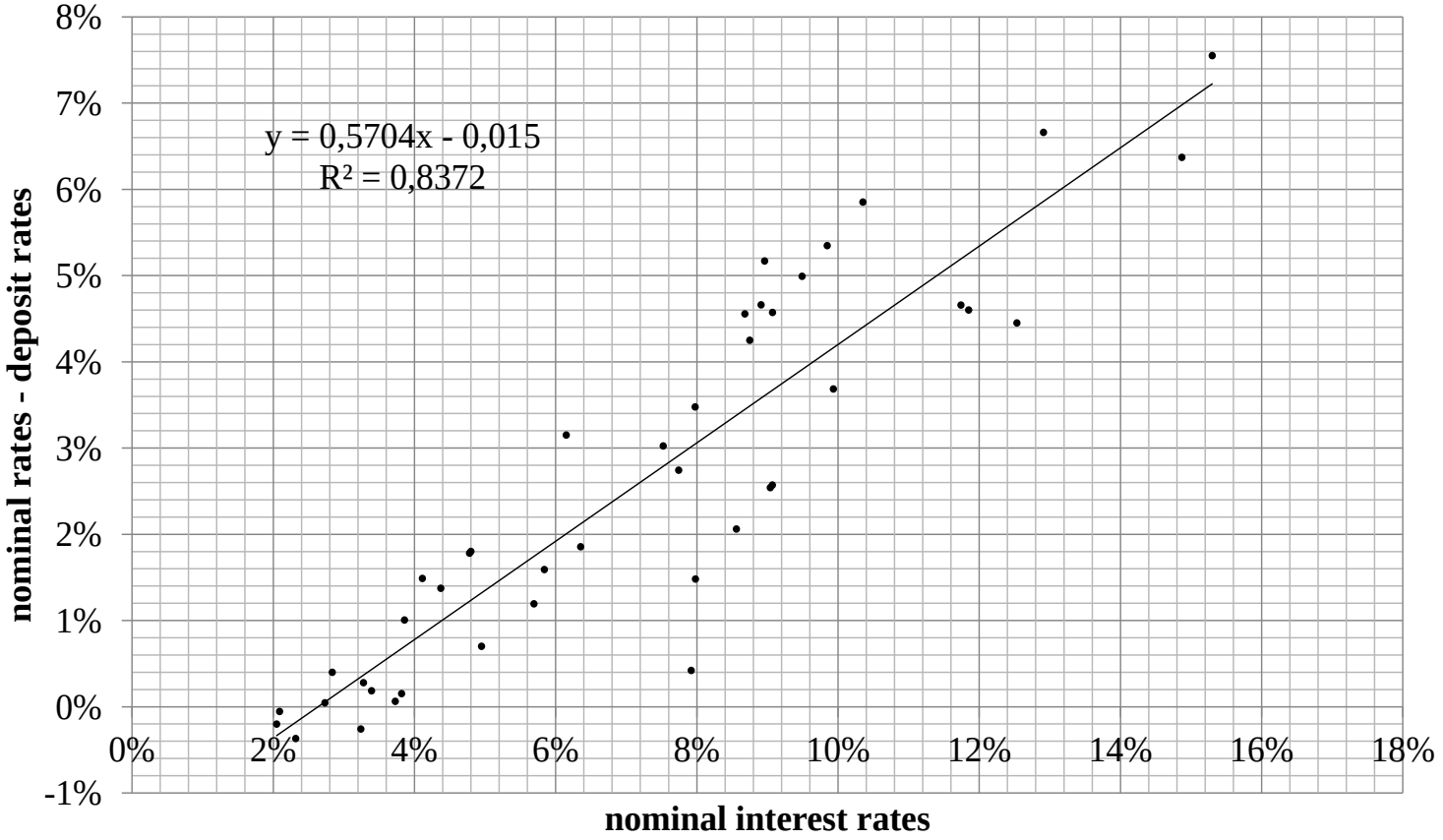
Note: the alternative unit cost removes market capitalization from the financial output.

Figure 2.4.1.1a:
Relationship between nominal interest rates and deposit rates in Germany (1978-2002)



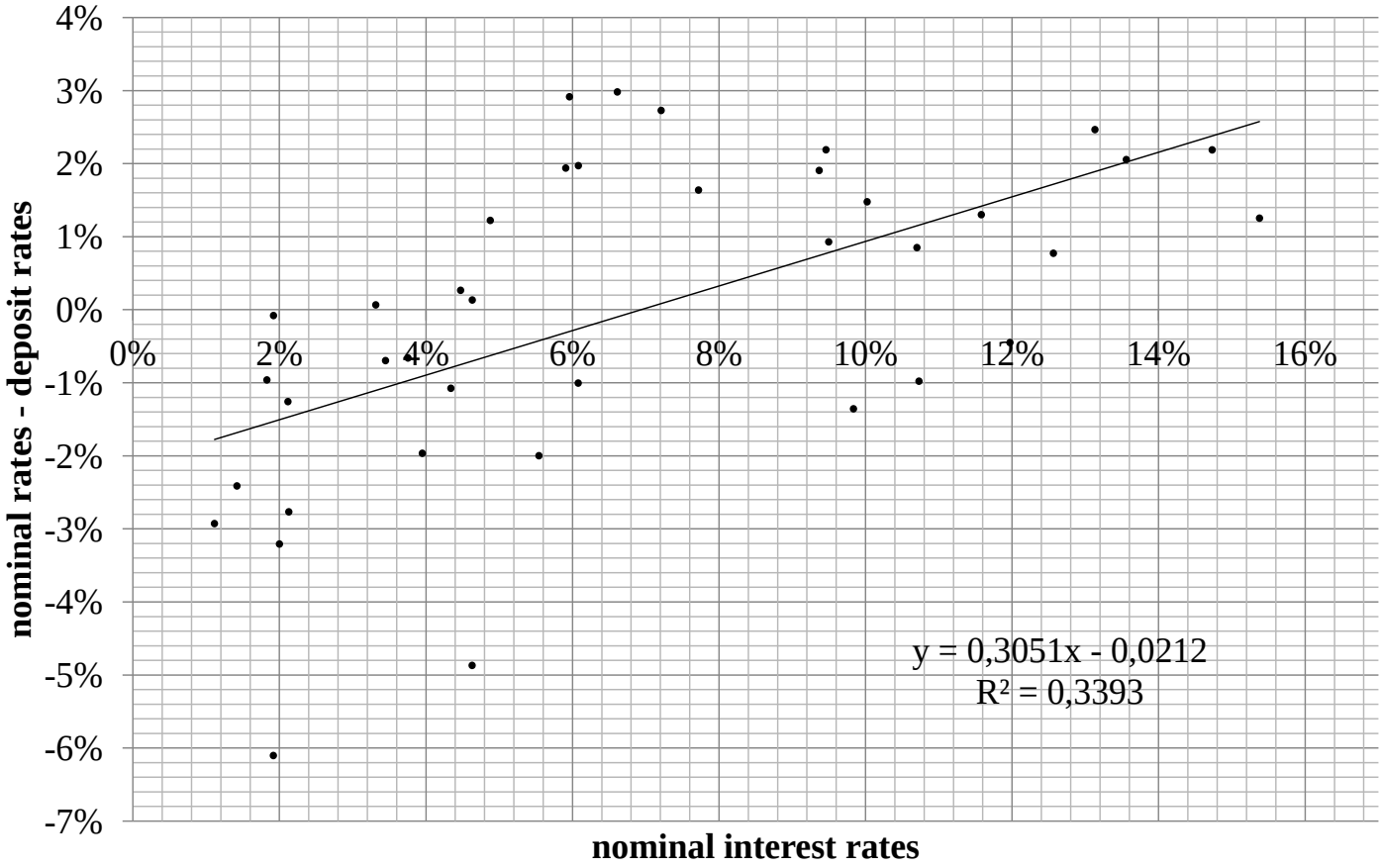
Note: nominal interest rates are short-term interest rates, that is, call-money loans rates.

Figure 2.4.1.1b:
Relationship between nominal interest rates and deposit rates in France (1966-2008)



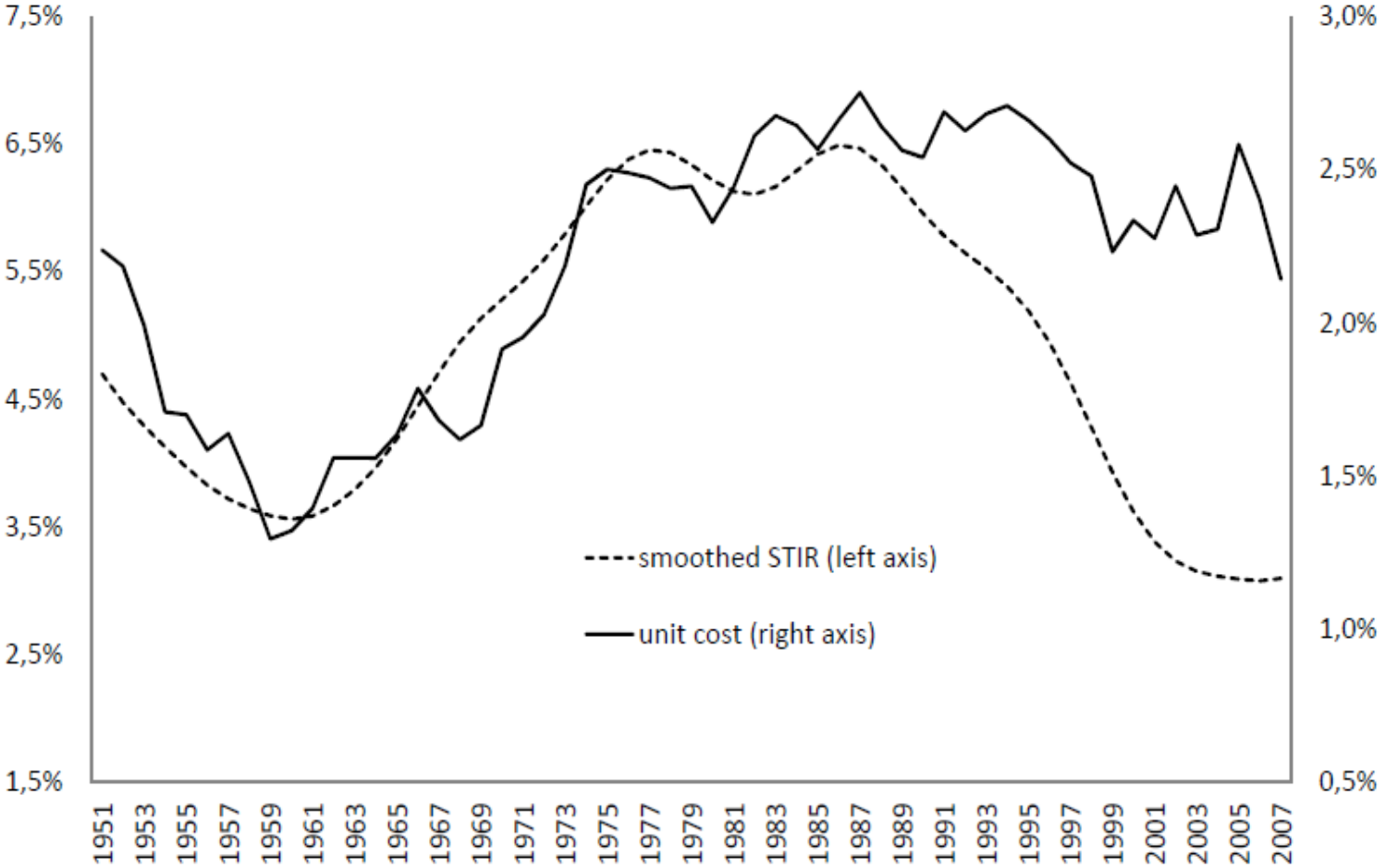
Note: nominal interest rates are short term interest rates, that is, call-money loans rates.

Figure 2.4.1.1c:
Relationship between nominal interest rates and deposit rates in the UK (1960-1998)



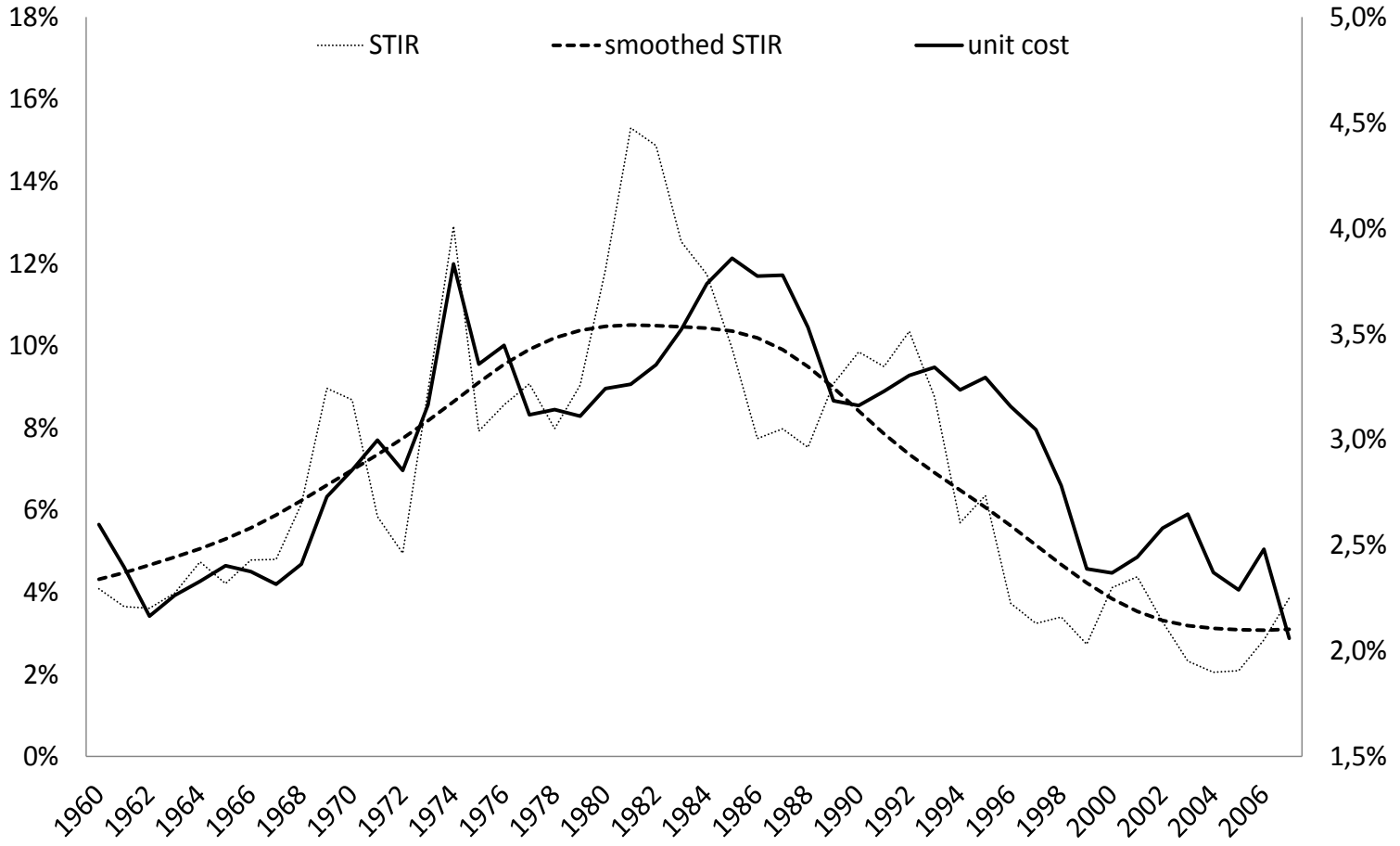
Note: nominal interest rates are short term interest rates, that is, call-money loans rates.

Figure 2.4.1.2a: unit cost and short-term interest rate in Germany



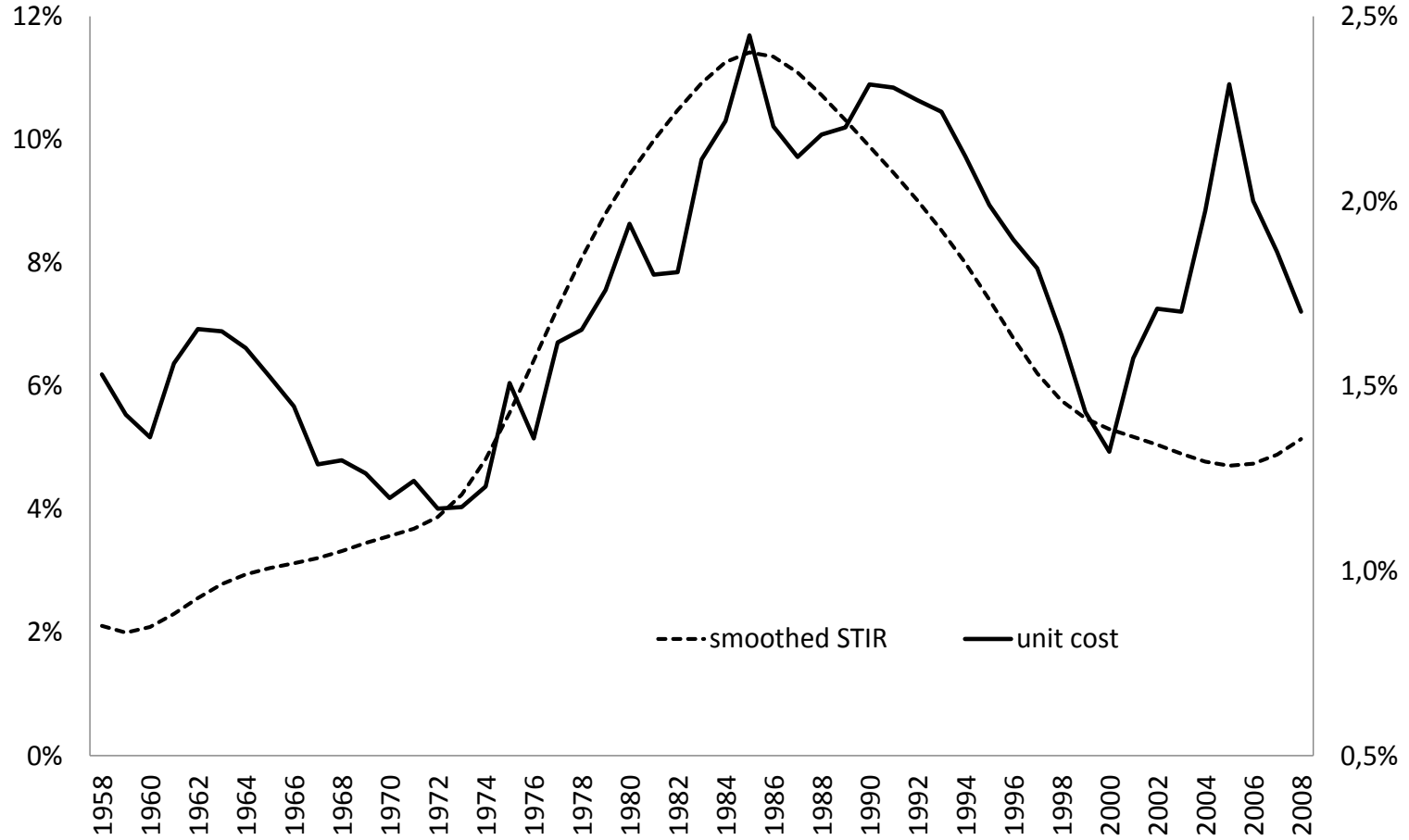
Smoothed-STIR is the lowess-smoothing of short-term interest rates of band width 0.3.

Figure 2.4.1.2b: unit cost and short-term interest rates in France



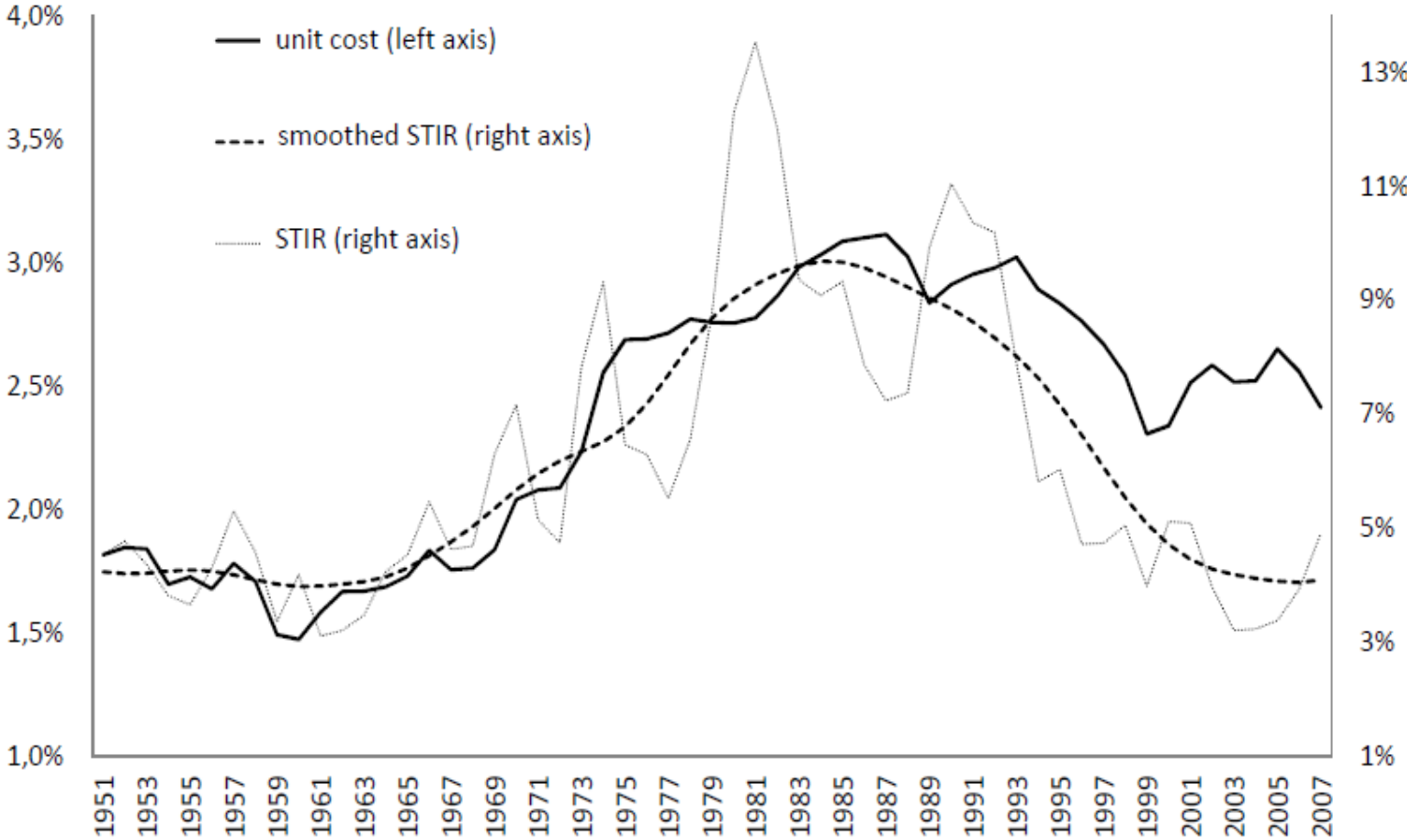
Smoothed STIR is the lowess-smoothing of short-term interest rates of band width 0.3; STIR is raw short term interest rates.

Figure 2.4.2.1.c: Unit cost and short-term interest rates in the UK



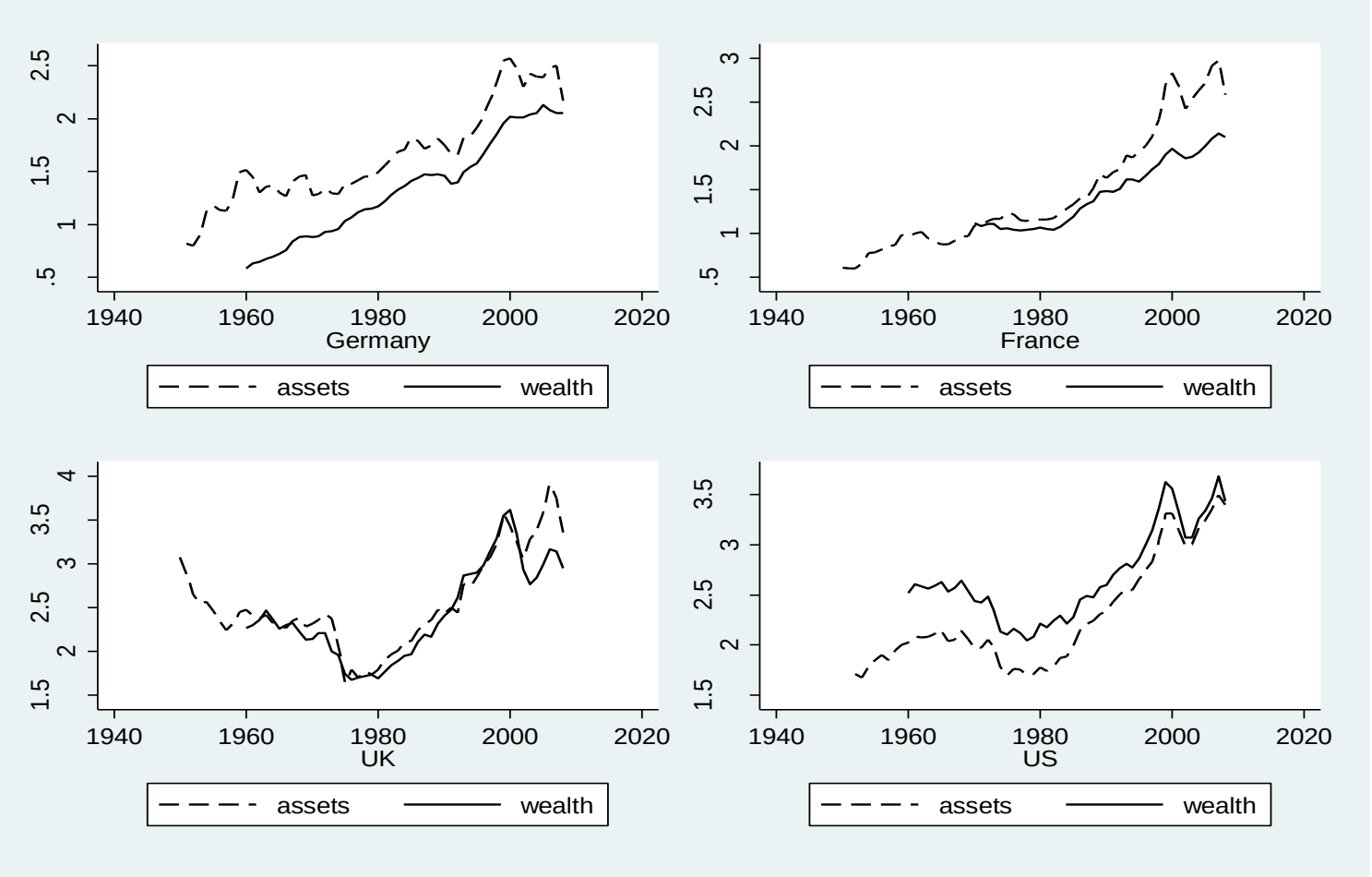
Smoothed STIR is the lowess-smoothing of short-term interest rates of band width 0.3.

Figure 2.4.1.2d: Plain unit cost and short-term interest rates in Europe



Note: STIR is the short-term interest rates transformed by a lowess smoothing of band width 0.3. Interest rates have been estimated using countries' GDP share as weighted method.

Figure 2.4.2.1: Comparison of the GDP share of financial wealth and the GDP share of financial assets



Note: 'assets' is the ratio of credit, market capitalization and public debt to GDP; 'wealth' is the private financial wealth to GDP (Piketty & Zucman 2013).

Table A: Intensity of intermediation test, explaining the unit cost by financial output components

	Unit cost					
	(1)	(2)	(3)	(4)	(5)	(6)
output share of credit	-0.0596	-0.0773	-0.0718	0.0220	-0.0209	0.0199
	(0.0764)	(0.0953)	(0.0453)	(0.0398)	(0.0547)	(0.0798)
output share of broad money	-0.0770	-0.113	0.00133	0.0564	-0.00359	0.0771
	(0.0884)	(0.118)	(0.0614)	(0.0643)	(0.0894)	(0.0890)
output share of market capitalization	-0.105	-0.127	-0.0748	0.0218	-0.0174	-0.00305
	(0.0817)	(0.0996)	(0.0529)	(0.0541)	(0.0614)	(0.0764)
Constant	0.0993	0.123	0.0781	-0.0109	0.0359	-0.00249
	(0.0789)	(0.100)	(0.0503)	(0.0500)	(0.0680)	(0.0807)
Time fixed effects	no	no	no	yes	yes	yes
Observations	306	197	109	306	197	109
R-squared within	0.286	0.260	0.731	0.634	0.620	0.838

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Each regression adds countries dummy. Standard errors include country clusters. Countries used in the regressions are Germany, France, the UK, the US, Italy and Spain; Italy and Spain data is available from 1970 to 2007.

Chapter 2

Financial Wealth, Risk Taking and the Securities Industry: Explaining Financial Efficiency in the Long Run, Theory and Evidence

Introduction

Finance in Europe and the US has taken on increasing weight over the past 40 years (Bazot (2014), GSV (2014), Greenwood and Scharfstein (2013), Philippon (2014), Philippon and Reshef (2013)). This has led to conflicting views about the economic cost of such large financial industries. On the one hand, the increasing weight of finance might be due to rents and economic inefficiencies due to inefficient trading activities (Philippon, 2014; Greenwood & Scharfstein, 2013). On the other hand, finance may have grown naturally due to the increasing ratio of wealth to GDP and trust vis-a-vis financial intermediaries (GSV, 2013; 2014). Therefore, growing cost of financial intermediation would have stemmed from the increasing volume of financial wealth managed by financial intermediaries.

Although financial wealth helps to explain the increasing weight of finance, questions remain as to the evolution of financial intermediation costs. Based on analyses by Philippon (2014) and Bazot (2014) of the unit cost of finance in the US and Europe, we know that financial intermediation costs increased from 1970 to 2007. Because deposit rates do not move as quickly as market rates, Bazot (2014) shows that high unit costs in the 1970s and 1980s can be explained by the increasing spread of deposit rates. Controlling for this effect, Bazot (2014) found that unit cost in Europe increases continuously after the early 1990s alongside the development of new financial market activities. As shown by Greenwood and Scharfstein (2013) for the US, the joint development of the securities industry and credit intermediation is a central characteristic in the growing weight of finance after the 1990s. Securities industry income has increased considerably with the boom in credit derivatives, while the rise of credit intermediation has been made possible through securitization. Because financial intermediaries profit has depended on credit expansion through securities management, increase in capital income (capital gains or income on securities), securitization, and the number of steps in credit intermediation are important aspects of financial development over the past 20 years. This chapter looks at the effect of those parameters on financial efficiency.

This chapter tells a straightforward story: as household wealth increases, the demand for wealth management rises proportionally (Sunderam, 2012). This encourages financial intermediaries to find new strategies for investing this wealth while remaining profitable. Intermediaries thus create new assets from which additional income can be realized through security management and arbitrage. Financial intermediaries do not account for the underlying project quality since a growing part of their income now comes from security management and the exploitation of their limited liability options (Acharya, 2009). This is why they enhance their profitability through risk taking at the expense of household financial wealth. Finally, the weight of the financial industry and the unit cost of financial in-

termediation increase while the volume of low-quality securities—such as subprime mortgages—rises dramatically.

In order to account for the simultaneous development of credit and the securities industry, I first present a theoretical model of financial intermediation. In the model, financial intermediaries invest financial wealth of risk-adverse but blind-to-disaster households into firms' projects. Derivatives and tradeable financial assets allow banks to play on the market in a zero-sum game. Thanks to banks' limited liability—which can also be seen as a free bail-out option financed by a lump-sum tax on financial wealth—intermediaries may be inclined to finance risky projects (Acharya, 2009) even though the projects have negative expected value. Like GSV 2013, but unlike GSV 2014, the model distinguishes between safe and risky projects, without assuming that risk-taking is the only way to obtain a positive return on wealth. Therefore, the model shows that the variance in arbitrage gains is welfare-reducing, encourages risk-taking and raises the costs of financial intermediation. Another key aspect of the model is that risk-taking and financial inefficiency increase with household financial wealth so long as gains from arbitrage is high enough. This may explain why the size of the financial industry keeps on growing in the late 20th century after financial deregulation.

The model helps to account for important empirical facts. First it coincides with the decreasing return of financial wealth over the past 20 years. Second, it accounts for the increasing share of intermediated financial assets and the joint development of credit and intermediaries capital income. Third, as long as financial wealth grows more quickly than GDP (see Piketty Zucman, 2014 for evidence), the model explains the increasing weight of finance. Fourth, it helps us to understand the development of risk-taking through low-quality credit such as sub-prime mortgages.

According to these theoretical results, the joint development of the securities industry and credit intermediation should reduce financial efficiency. In order to test this prediction, I use the new data set presented in the first chapter of this report to

measure financial efficiency through the unit cost of financial intermediation in six developed countries (France, Germany, Italy, Spain, the UK and the US) from 1970 to 2007. I then look at the effect of bank share of capital income, securitization development, and the credit intermediation index on the unit cost of finance. Based on different econometric estimations, the analysis robustly matches the theoretical prediction.

This study also complements the literature about shadow banking and universal banking efficiency. In terms of shadow banking, this chapter ties in with recent theories about securitization raison d'etre (see Adrian & Ashcraft, 2012 for a literature review). In particular, GSV 2013 shows that risk diversification provide a rational for securitization. In their model, the reduction of interest paid to investors helps banks insure the payment of risk-free claims once all loans have been securitized. Therefore, bank profitability increases when financial wealth is high. My model adds two points to this explanation. First, securitization helps bank profitability due to arbitrage gains opportunities; and second, unlike GSV (2013 and 2014), banks are encouraged to finance risky projects even when those projects are not socially beneficial—which seems to be a key aspect of the sub-prime crisis. Lastly, the model provides new insight into universal banking efficiency. Because arbitrages can encourage banks to finance welfare- reducing projects, the separation of universal banks would help avoid this negative effect.

Section 1 presents a model of financial intermediation capturing some features of the co-development of credit intermediation and security management on welfare and the unit cost of finance. Section 2 proposes an empirical analysis of the role of bank capital income and the credit intermediation index on the unit cost of financial intermediation. Section 3 gives some recommendations for regulation. Section 4 concludes.

2.1 The model

The aim of the model is to assess risk-taking, financial intermediation cost and welfare according to financial wealth and intermediaries gains from securities management.

2.1.1 The model framework

The economy is composed of households, financial intermediaries—called banks for the sake of simplicity—and enterprises. Households have total financial wealth w that needs to be invested. Each household asks a financial intermediary to invest the funds. Households are risk-averse and therefore prefer to have their funds invested in safe projects so long as the spread of return between safe and risky projects remains inferior to their loss of utility from returns variance $v(\sigma)$, where σ is the standard deviation of returns from risky projects investment and $v'(\sigma) > 0$, $v''(\sigma) > 0$, and $v(0) = 0$. Households know about project returns although in a limited way since, as in GSV (2013), they never anticipate the worse state of nature (see Coval et al., 2009a; 2009b).

Enterprises projects are of two kinds: safe and risky. By investing in safe projects, banks obtain r with certainty. The number of safe projects is equal to $L < w$. By investing in risky projects, intermediaries obtain $\sum_i p_i r_i$, where i is the observed state of nature, so that $i = g, l, b$ where g is good, l is low and b is bad and $r_g > r_l > r_b$ and $\sum_i p_i = 1$. In addition $p_g r_g + p_l r_l > 0$ whereas $r_l < 0$, $r_b < 0$ [1], $\sum_i p_i r_i = \lambda < 0$—that is, the expected welfare gain from risky investment is always negative. Projects face idiosyncratic risk and can be exchanged on the market in a zero-sum game. In other words, securitization in the model helps bank develop trading business. The number of risky projects is higher than w. Finally, if

[1] This means that households only obtain $1 - r_l$ or $1 - r_d$ per unit invested in risky project if the state of nature is l or d.

wealth is not invested by the bank, households puts their wealth into a passive fund which yields μ with $0 > \mu > \lambda$, meaning that passiveness entails fewer losses than risky investment.[2] Perfect competition prevails on passive funds market, so passive funds make no profit. Because households ignore tail risks, risky investment is preferred to “passiveness" so long as expected—although biased—gains from risky investment ($\Omega_{i\epsilon g,l}(\sigma)$) are higher than $\mu + v(\sigma)$.

Are these hypotheses justified? The example of the subprime crisis is enlightening. We know that mortgages from safe household lending brought low but positive income, while subprime mortgages tended to result in negative income for investors due to high default rate. This is confirmed by a study by Demyanyk and Van Hemert (2009), which found that the rate of delinquent loans increased dramatically from 2001 to 2006 in the US.

Banks are risk neutral and have market power $1/\alpha$ [3] where $\alpha \in [0;1]$ is the intensity of competition. Each bank collects a given share of financial wealth and invest it in firms' project. To collect financial wealth, banks issue claims whose remuneration depends on the underlying project being financed. Banks can also trade the related asset to try to beat the market. This occurs through securitization if projects are financed by bank loans, or through market activities if projects are financed by equities.[4] If a bank beats the market, it gains extra profit η_j randomly distributed among banks. Because trading activity is a zero-sum game, $\eta \sim N(0;\sigma)$ with σ, the arbitrage gain standard deviation. Lastly, because $\lambda < 0$, it is never profitable for banks to invest household funds in risky projects if they do not also try to beat the market.

[2] $\mu < 0$ can be due to inflation or exogenous shock. However, this hypothesis is used for the sake of simplicity and does not impact the main results of the model.

[3] As mentioned in GSV 2014, this market power can be due to household trust in financial intermediaries in a framework of monopolistic competition. The level of competition has been left exogenous in the model for the sake of simplicity. However, it is worth noting that α could have been endogenised in a Salop-like model of monopolistic competition without consequences for the results

[4] It is worth noting that financial intermediaries can also use derivatives like swaps or futures to that end.

2.1.2 Solving the model

In order to account for bank financing choices between safe and risky projects, let us look at their profitability arbitrage. Based on bank market power, unit profit after safe investment is:

$$\Pi^{safe} = r(1-\alpha) \tag{2.1}$$

If banks invest all the funds in a risky project, they promise remuneration equal to gains from arbitrage activities weighted by market power in case of success. Bank j expected unit profit after risky investment is thus:

$$E\left(\Pi_j^{risky}\right) = \sum_{i \epsilon g,l,b} \left(max[p_i(\eta_j + r_i); 0]\right)(1-\alpha) \tag{2.2}$$

Because trading is a zero-sum game, a limited proportion k of banks are profitable whatever the state of nature i:

$$k_i(\sigma) = \int_{-r_i}^{R} f(\eta) d\eta$$

With $f(.)$ the density of probability of η and R the maximum gain of trading activity. Since η follows a normal law and $\sum_i p_i r_i = \lambda < 0$ then $\frac{\partial \sum_i k_i(\sigma)}{\partial \sigma} > 0$. Therefore, the expected value $(g(.))$ of η for $\eta > -r_i$ is given by:

$$g_i(\sigma) = \int_{-r_i}^{R} f(\eta)\eta d\eta$$

With $\frac{\partial \sum_i g_i(\sigma)}{\partial \sigma} > 0$ per definition. Thus, the average expected unit profit of all j banks is given by:

$$E\left(\Pi^{risky}\right) = \Lambda(\sigma)(1-\alpha) \tag{2.3}$$

with

$$\Lambda(\sigma) \equiv \sum_{i \epsilon g,l,b} p_i(g_i(\sigma) + k_i(\sigma) r_i)$$

We know from $\lambda < 0$ that safe investment yields more profit for a bank so long as arbitrage gains are not taken into account. We also see from (3) that $E(\Pi^{risky})$ increases as market power and arbitrage gain variance grows. Since households ignore tail risks, p_g and p_l are multiplied by $h = \frac{1}{1-p_b}$ so that $\sum_{i=l,g} hp_i = 1$ and p_g/p_l remains constant. The expected household gain from risky investment is thus given by:

$$\Omega_{i\epsilon g,l}(\sigma) = h \sum_{i\epsilon g,l} p_i(r_i - g_i(\sigma))(1-\alpha)$$

Since $p_g r_g + p_l r_l > 0$, $\Omega_{i\epsilon g,l}(0) > 0$ then $\Omega'_{i\epsilon g,l}(\sigma) < 0$. Because $v(0) = 0$, $v'(\sigma) > 0$ and $v''(\sigma) > 0$:

Lemma 1: *There is a unique* $\bar{\sigma} \in [0; +\infty[$ *such that* $\Omega_{i\epsilon g,l}(\sigma) = \mu + v(\sigma)$*, so that households strictly prefer self-storage to risky investment when* $\sigma > \bar{\sigma}$.

What are the consequences for the unit cost of finance, risk-taking and welfare? Three cases may occur, depending on the amount of financial wealth.

(i) $w < L$: because of household risk aversion, wealth is entirely invested in a safe project. The unit cost of finance is equal to $z = (1-\alpha)r$. If banks profit is fully redistributed to households, welfare is equal to: $W = U(L(1+r))$.

(ii) $w > L$ but profits from risky investments are not large enough: all safe projects are financed but the remaining wealth cannot be invested without generating losses. In fact, so long as good projects are used as collateral, it is not profitable for banks to invest in risky projects. The limited liability option cannot be invoked. If the bank invest in risky projects it loses λ per unit of risky investment as long as $(w-L)\lambda < (1-\alpha)rL$. This holds so long as $w < \bar{w} \equiv \left(1 + \frac{(1-\alpha)r}{\lambda}\right) L$. When $w > \bar{w}$ the bank can exercise its limited liability option. However, it does not invest in risky projects if the previous losses are not compensated. This holds as long as

$(w - \bar{w})(\Lambda(\sigma)(1-\alpha)) < Lr(1-\alpha)$, which corresponds to:

$$w < \hat{w} \equiv L\left(1 + \frac{r}{\Lambda(\sigma)} + \frac{(1-\alpha)r}{\lambda}\right) \tag{2.4}$$

We see from (4) that $\hat{w}$ decreases in σ and α so that arbitrage gains and banks competition accelerate the occurrence of $w > \hat{w}$. If (4) holds, the unit cost of finance is still $z = (1-\alpha)r$ and welfare is now equal to $W = U(L(1+r) + (w-L)(1+\mu))$.

(iii) $w > L$ and $w > \hat{w}$: all safe projects are financed while the remaining wealth is invested in risky projects if, and only if, $\sigma < \bar{\sigma}$. If $\sigma > \bar{\sigma}$ results are similar to case (ii), otherwise the unit cost of finance—that is, bank profit per unit of wealth—is given by:

$$z = \pi/w = (1/w)(Lr(1-\alpha) + (w-\hat{w})\Lambda(\sigma)(1-\alpha))$$

$$z = \theta(1-\alpha)r + \left(1 - \theta\left(1 + \frac{r}{\Lambda(\sigma)} + \frac{(1-\alpha)r}{\lambda}\right)\right)\Lambda(\sigma)(1-\alpha) \tag{2.5}$$

With $\theta = L/w$. It results from (5) that z increases in w when $w > \hat{w}$. We also see from (5) that z increases in σ.

Welfare is now equal to:

$$W = U\left((1+\alpha r)L + (1+\lambda-(1-\alpha)(1+v(\sigma))\Lambda(\sigma))\,(w-L)\right) + (1-\alpha)rL + (1-\alpha)\Lambda(\sigma)(w-\hat{w}) \tag{2.6}$$

Since $\lambda < 0$, W decreases compared to case (i) and (ii) while banking profit increases. If bank profits are fully redistributed to households, global welfare per unit of wealth is equal to:

$$W/w = U(1 + r\theta + \lambda(1+v(\sigma))(1-\theta))$$

W/w is decreasing in $1-\theta$ so that, if L is stable, it decreases as wealth increases. If

(4) holds, arbitrage activities and risk-taking increase bank profits at the expense of total welfare. This phenomenon is exacerbated by the amount of financial wealth under management. Therefore $w = L$ is the most welfare-increasing situation. The key results of the model are displayed in the following proposition:

Proposition 1: *For $\sigma < \bar{\sigma}$, the model shows that: (i) arbitrage gains variance and banks' market power increase the occurrence of $w > \hat{w}$. At this point, risk-taking increases and welfare decreases. (ii) If the number of safe projects is constant, the unit cost of financial intermediation decreases with financial wealth when $w \in [L; \hat{w}]$ while it increases with financial wealth as $w > \hat{w}$.*

2.1.3 Empirical predictions of the model

Given that in developed countries financial wealth has increased more than GDP since the 1980s (Piketty & Zucman, 2014) and that financial deregulation has helped financial intermediaries to realize important gains from arbitrage and market-based activities, the empirical predictions of the model are the following: (i) Household income from financial wealth management should have decreased while (ii) the transfer of income from households to the financial sector, (iii) the share of risky investment and (iv) bank capital income should have increased, especially for bank-based financial system; (v) depending on households' financial wealth, the credit intermediation index should have decreased—or stagnated depending on the amount of other financial services—($w \in [L; \hat{w}]$) then increased ($w > \hat{w}$), especially after financial deregulation due to raising incentive to invest on trading activities. (vi) Financial efficiency (measured through the cost of finance and the effect of finance on GDP growth) should be negatively correlated to arbitrage income and financial intermediation intensity.

Do the data confirm these predictions? To look at prediction (i) and (ii) I review data in Piketty and Zucman (2014) and Greenwood and Scharfstein (2014). In or-

der to measure unit income from financial wealth management, I use the ratio of household financial income to household financial wealth. In the case of prediction (ii) I use financial industry income from security management to measure the fees paid through the ratio of securities industry output to financial wealth. Unfortunately, the US is the only country for which such information exists. Controlling for inflation, Figure 3.1.2.1 shows that household unit income from wealth management in the US has decreased, while the cost of households' financial wealth management has increased. An important fact is that the costs of financial wealth management tend to increase after 1996, along with the emergence of new market-based activities, securitization and active financial management (Greenwood & Scharfstein, 2013). Figure 3.1.2.2 presents gains from financial wealth in the US and France[5]. The return from financial investment has decreased over the past 30 years in all countries and tends even to be close to zero by 2007 in the US once GDP-growth and financial management costs are taken into account.

Because risk is hard to measure, prediction (iii) is difficult to capture in the data. However, other studies have provided useful information as to the amount of delinquency rate, especially in the US before the subprime mortgage crisis. Demyanyk and Van Hemert (2009) document that the quality of loans deteriorated for six consecutive years between 2001 and 2006. This confirms risk-taking from idiosyncratic characteristics of loans, since increasing housing prices delayed household insolvencies and their related catastrophes.

Prediction (iv) comes from the development of securitization and securities trading. With financial regulation tight, financial wealth small and GDP growth high, there is no reason for banks to invest household wealth in risky projects (equation (4) does not hold). On the other hand, deregulation helped increase arbitrage opportunities and thereby arbitrage gains variance. Bank incentives to raise their profits then encouraged the development of loans securitzation and securities trad-

[5]Data is not available in other countries for this calculation to be proposed.

ing. This ties in with increasingly intense intermediation and the development of securities income. Bazot (2014) provides data on banking income excluded from banking VA—which mostly comes from capital income—and shows that it dramatically increased from the mid-1990s to 2007, at least in Germany and the UK. [6] To measure the intensity of intermediation, I use the Credit Intermediation Index (CII) proposed by Greenwood and Scharfstein (2013). The logic of the CII is straightforward: it measures the number of steps a monetary unit takes as it passes from investors (households or enterprises) to end-users. It is defined as the total liabilities of all sectors (including the financial sector) to total end-users liabilities.[7] Figure 3.1.2.3 displays the series for France, Germany, Italy, Spain, the UK and the US. The CII decreases from 1980 to 2000, then increases thereafter in French civil law countries, whereas it is quite stable till the late 1990s and increases thereafter in all other countries (Germany, the UK and the US). The CII data thus matches the model expectation. It is worth noting that the CII decreases rather than stagnates in countries where the state was highly involved in banking business—especially France and Italy. A process of dis-intermediation occurred during the 1980s during which banking privatization and the end of credit control decreased mandatory transactions and helped the decompartmentalization of the banking system. Bank interconnections vanished and so reduced the number of step to end-users of credit (see Bertrand et al., 2007 on the consequences of the French banking liberalization of 1985).

The effect of arbitrage and intermediation intensity on financial efficiency is more ambiguous as it depends on other parameters. For example, the reduction of nominal rates during the 1990s concealed the increase of financial intermediation costs thereafter (Bazot, 2014). Controlling for this effect, Bazot (2014) shows

[6] The case of the US is special as it mostly depends on fees rather than direct arbitrage gains. This also helps to explain why financial sector weight is better measured through value added in the US than in Europe.

[7] Details of the calculation are provided in the data appendix.

that the part of the unit cost of finance unexplained by nominal rates of interest increases from 1990 to 2007 in Germany, the UK, and Europe. While this coincides with the financial deregulation period, other covariates might explain this trend. This is why econometric devices are needed to look at predictions (vi).

2.2 Empirical analysis

The model has shown that the joint development of the securities industry and credit intermediation reduces financial intermediation efficiency. Two aspects of financial efficiency have been studied in the literature hitherto: the effect of financial development on growth and the effect of the intensity of intermediation on the unit cost of finance. We know from recent studies that the correlation between financial development—which is strongly correlated to financial wealth (Bazot, 2014)—and economic development follows an inverted U-shape (see in particular Ductor & Grechyna, 2012 and Samargandi et al., 2013), probably due to the decreasing marginal productivity of capital. The low growth observed in developed countries over the past 10 years—despite financial innovation—coincides with this fact. On the other hand, little empirical evidence has been produced so far about intermediation intensity and financial costs. Thanks to a new data set on the unit cost of financial intermediation produced in Philippon (2014) and Bazot (2014), it is now possible to do more. I propose to look at the effect of three explicative variables: the CII, the share of bank capital income and the volume of securitized loans. The aim of the analysis is thus to look at the potential correlation between the unit cost of financial intermediation and variables indicating the joint development of the securities industry and credit intermediation.

As shown by Greenwood and Scharfstein (2013) the CII accounts for the joint development of credit and the securities industry. Because “lazy" financial wealth in developed countries mostly sleeps in bank accounts rather than “under the mat-

tress", the evolution of the CII mostly depends on credit and securities markets interactions. In this respect, the CII is supposed to influence the unit cost in two ways. First, as asserted by the model, it coincides with the development of arbitrage activities. Second, for a given amount of wealth under management, a higher number of steps to end-users implies that each intermediary takes a share of investment yields. However, this can also reduce the unit cost of finance if it comes with higher efficiency.

Securitization can affect the unit cost in three ways. First, as the model suggests, securitization helps the development of arbitrage gains. Second, GSV 2013 showed that interest rates paid to risk-adverse households must diminish when financial wealth is too high, thereby increasing bank profitability. This is in fact the only way for the claims supply to equalize its demand when loans are fully securitized. Third, securitization is supposed to increase the number of step to end-users.

An increase in the share of bank capital income is positively correlated to unit cost in the model due to arbitrage gains. Because bank share of capital income depends on market-based activities, this ratio accounts for the development of the securities industry compared with traditional banking business.

2.2.1 Data and descriptive statistics

2.2.1.1 The unit cost of financial intermediation

As shown in chapter 2, the unit cost of financial intermediation is the cost of producing and maintaining one monetary unit of financial service during one year. The unit cost is measured through the ratio of financial industry income to the weighted sum of financial asset intermediated. Another possible measure is proposed in GSV 2014 through the ratio of household financial income to financial wealth. Nevertheless, this measure only accounts for household wealth management and ignores other financial services related to liquidity management or enterprises and govern-

ment financial wealth management. This may bias the unit cost upwards when enterprises hold a large share of total financial wealth, as in Germany. Therefore, the first measure is preferred, though robustness checks are proposed with the second measure.

Countries can be divided into two categories (see Figures 3.2.1.1 A and B): non-French civil law countries (Germany, the UK and the US) display lower average unit cost but an increasing trend, while French civil law countries display high average unit cost but a decreasing trend. In fact, non-French civil law countries' unit costs are lower by 0.012 monetary unit (sd 0.0008). On the other hand, non-French civil law countries' unit cost increases by 0.0018 monetary unit per decade, while French civil law country unit costs remains stable. While non-French civil law country unit costs remain stable around 0.024 from 1980 to 2007, French civil law country unit costs decrease by 0.015 from 0.039 to 0.024 over the same period. By 2007 non-French civil law country unit costs have almost caught up with those of French civil law countries.

Finally, let's look at the countries' common features. First, the unit cost increases during the 1970s but decreases during the 1990s along with nominal rates. Second, except for Italy, the unit cost reaches a maximum between the mid-1980s and the early 1990s—that is, when interest rates spread increased (Bazot, 2014). The case of Italy is particular due to very high inflation rate during the 1970s.

2.2.1.2 Share of bank capital income and securitization

In order to account for the development of securities industry, I look at the ratio of securitized loans to GDP, using the SIFMA database. However, since banks do not always securitize their loans for arbitrage purposes, the share of bank capital income is used to complement the analysis. On the other hand, because securitization can generate income through fees rather than capital income—especially with the development of fund managers—the share of bank capital income may

overlook arbitrage activities. It is thus important to use both variables at the same time.

Figure 3.2.1.2 shows the evolution of securitization from 1970 to 2013. We see that securitization boomed in the US, the UK and Spain over the past 20 years, which is related to the boom in mortgage credit in those countries. By contrast, securitization appears much less used in France and Germany. In other words, countries that experienced a housing boom are subject to significant securitization.

Figure 3.2.1.3 shows the change in the ratio of banking income overlooked in financial VA to financial income from 1970 to 2007. As explained in Bazot (2014) this ratio mostly accounts for the share of bank capital income. The data show that French civil law countries have higher but stable levels of bank capital income throughout the period. This is due to the preeminent role of the state and universal banks in those financial systems.[8] On the other hand, the share of bank capital income in non-French civil law countries is close to zero till the early 1990s, then increases sharply thereafter, except in the US where it remains low. By 2007, the share of bank capital income is close to 40 per cent in all countries except the US.[9] The interesting fact here is not the share of bank capital income per se—which differs according to countries' specificities—but its evolution.

2.2.2 Empirical strategy

Because CII data is not available for before 1980, I proceed in two steps. First I measure the correlation between unit cost and securitization and bank share of capital income; and second, I look for the correlation between unit cost and the credit intermediation index. Because countries have idiosyncratic characteristics, I

[8] By contrast, the separation of banking activities among commercial banks, sparkassen and credit cooperatives limited German bank capital income till financial liberalization in 1992 (see Fisher & Pfeil, 2004).

[9] The US case is particular because of the historic role of mortgages and the astonishing weight of fund managers in financial wealth management. This is related to the early development of the originate-to-distribute model of finance and the importance of fees in lieu of capital income. This is also why securitization started sooner and has remained stronger in the US than in Europe.

control for countries' fixed effects.

Other covariates are used in the regression to control for omission variable bias. Those variables are: the smoothed nominal rate of interest, the distance from the US real interest rate, a dummy variable accounting for inflation rate superior to 10 per cent, a one-year lagged index of financial reform, proposed by Abiad et al. (2008), the GDP growth rate and the ratio of state deficit to GDP. Nominal rates help to account for the impact of deposit rate stickiness on bank income (see chapter 2), especially during periods of high inflation. The distance from the US real interest rate captures the financial market integration effect on credit development, bank access to financial resources, and competition. The inflation dummy variable controls for the negative effect of high inflation on financial development (Boyd, Levine & Smith, 2001). Because deregulation at a given moment can generate rent opportunities, I use a financial reform dummy equal to 1 when financial reform occurs in the previous year. GDP growth captures the financial opportunities from economic growth. Finally, public deficits are taken into account to control for crowding-out effects.

Table 1 and 2 displays descriptive statistics and the correlation matrix. Panel A does not account for the credit intermediation index while panel B does not account for securitization and bank share of capital income. We see from Table 2 that the CII and securitization are negatively correlated to the unit cost of finance. On the other hand, bank share of capital income appears positively correlated to unit cost. Interestingly, nominal rate of interest is highly and positively correlated to unit cost, thereby confirming chapter 1 results. The tested models are the following:

$$z_{x,t} = a_1 SEC_{x,t} + a_2 INCOME_{x,t} + \sum_q b_q CONTROL_{q,x,t} + \epsilon_{x,t} \tag{2.7}$$

$$z_{x,t} = a_3 CII_{x,t} + \sum_q b_q CONTROL_{q,x,t} + e_{x,t} \tag{2.8}$$

With z the unit cost, SEC the ratio of securitization to GDP, $INCOME$ share of bank capital income, CII the credit intermediation index, ϵ and e the error terms, q the control variable index, x the country index and t the year index. I use two different estimators: first, OLS regressions including fixed effects and clusters per country; and second, I use Driscoll and Kraay standard errors to account for cross-sectional dependence and autocorrelation (Hoechle, 2007).[10]

2.2.3 Results

Table 3 presents the econometric results from equation 6. We see that nominal rates of interest, securitization and bank share of capital income are all highly significant whether or not time fixed effects and control variables are used in the regressions. In addition, estimated parameters appear stable whatever the set of control variables used. Controlling for cross-sectional dependence, we see that $INCOME$ significance is jeopardized, suggesting panel dependence bias in the OLS regressions. However, $INCOME$ remains significant at 10 per cent so long as time-fixed effects are used in the model.

Looking at Table 3 regression [4,8] we see that the unit cost of finance increases by 0.1 (resp. 0.3) cent as $INCOME$ (resp. GDP share of securitization) increases by 10 per cent. For example, in the German case, since $INCOME$ increases 40 per cent from 1990 to 2007, this could be responsible of a 0.4 cent unit cost augmentation. Similarly, when GDP share of securitization in the UK increases by 25 per cent from 1980 to 2007, there is a 0.75 cent unit cost increase.

Table 4 presents econometric results from equation (7). We see that nominal rates of interest and CII are highly and positively significant whether or not time-fixed effects and control variables are used in the regressions. Using Driscoll and

[10]Panel corrected standard error regressions have also been used to account for panel-specific auto-correlation of order 1; however, because results are very similar they are not displayed here; they are available upon request to the author.

Kraay standard errors does not affect the significance of CII. CII appears highly explicative of the unit cost of finance, as suggested by the model.

Looking at Table 4 regression [4,8] we see that the unit cost of finance increases by 1.2 cent if the number of steps to end-users of financial services increases by one unit. Therefore, in the German case, when CII increases by 0.2, there is a 0.24 cent unit cost increase. The R^2 of Table 4 regressions appears particularly high, meaning that the model explains the unit cost very well. To illustrate the correlation captured by the regression, I propose to look at the relationship between CII and the unit cost or the residual of the unit cost after accounting for nominal rates of interest in a time series regression. Figure 3.2.3.1 shows how good is the correlation even though series goes in opposite directions after 2006. The deviation at the end of the period is however due to the boom of subprime mortgages accumulated in intermediaries balance sheet.

2.2.4 Robustness check

So far, I have used the ratio of financial income to end-users' outstanding financial assets in order to measure the unit cost of finance. As argued in GSV 2014, the ratio of financial income to household financial wealth can be used as an alternative measure. The average value of this alternative unit cost appears higher—0.035 against 0.028 for the precedent measure—as well as its standard deviation—0.15 against 0.009. The correlation between both unit cost measures is high (0.76), confirming that the volume of intermediated assets is close to household financial wealth, as suggested in Bazot (2014).

I now run a regression with the alternative unit cost in order to check for robustness. Tables 5 and 6 provide estimation of (6) and (7) using this new measure. Results appear similar except for $INCOME$, which becomes not significantly different to zero. The positive correlation of securitization and CII with the unit cost

is confirmed.

2.3 Regulation recommendations

One important aspect of the model is that trading activities can help banks to make high profits even though they finance risky projects with negative net present value. Banks are able to do so because households never anticipate the worst state of nature. Clearly, it is hard to regulate household rationality; what then can the regulator do? Since the subprime crisis, numerous propositions have been made to make finance safer and more efficient; here, I discuss three of them: the Tobin tax, capital requirements, and universal banking separation. Since the effect of those parameters on the whole financial and economic system cannot be taken into account, I look at their impact on the issue treated in this paper so far.

(i) In the spirit of Keynes [11], the Tobin tax is a tax on financial transaction that aims to reduce financial instability related to speculation. In the model presented in section 1, speculation increases bank arbitrage gains, so that banks' limited liability naturally increases profitability. The Tobin tax is thus supposed to improve the system in two ways. First it reduces bank profits from speculation and prevents equation (4) from holding. Second, it reduces the variance of bank gains from securities trading. Along with the first effect, this can prevent (4) from holding too. If (4) still holds, the tax reduces the unit cost of finance but has no effect on global welfare.

(ii) Based on international banking regulations (in the Basel Accord), capital requirements are supposed to go up or down in function of the risk banks holds in their balance sheet. However, the way the regulation was formed may have generated some pitfalls. First, because capital requirements depend on a bank's own assessment of assets risks, conflict of interest inside the bank may have led

[11] see chapter XII of the General Theory on Employment Interest and Money.

to underestimate the risks. Second, the development of securitization has helped banks to reduce regulatory capital requirements (Acharya et al., 2013), thereby increasing their gains from risk-taking. However, if arbitrage gains diminish due to capital requirements, then (4) may no longer hold, and thus welfare increases. Second, if (4) still holds, then capital requirements reduce trading profitability by reducing the amount of funds engaged in risky projects. Capital requirements thus prevent global welfare from reducing as much as in the fully deregulated case. It is however worth noting that non-banking intermediaries like hedge funds are not subject to strict capital requirements, especially in tax havens.

(iii) The bank separation proposition aims at preventing banks from taking advantage of their too-systemic-to-fail status in risk-taking and speculation. This is supposed to affect the results in two ways. First, let's assume that instead of having limited liability, banks are too systemic to fail. Bank incentive to take risks comes from moral hazard. This implies that one additional period must be included in the model, wherein a bank gets a sure reward if it survives. Now assume that the certainty of being saved holds for retail banks only. Retail banks are no longer encouraged to take risks so long as gains from risk-taking—independent of arbitrage, which is no longer possible—are inferior to rewards. In the case of the model, separation would necessarily increase welfare and reduce the unit cost of financial intermediation due to the negative net present value of risky projects.

Conclusion

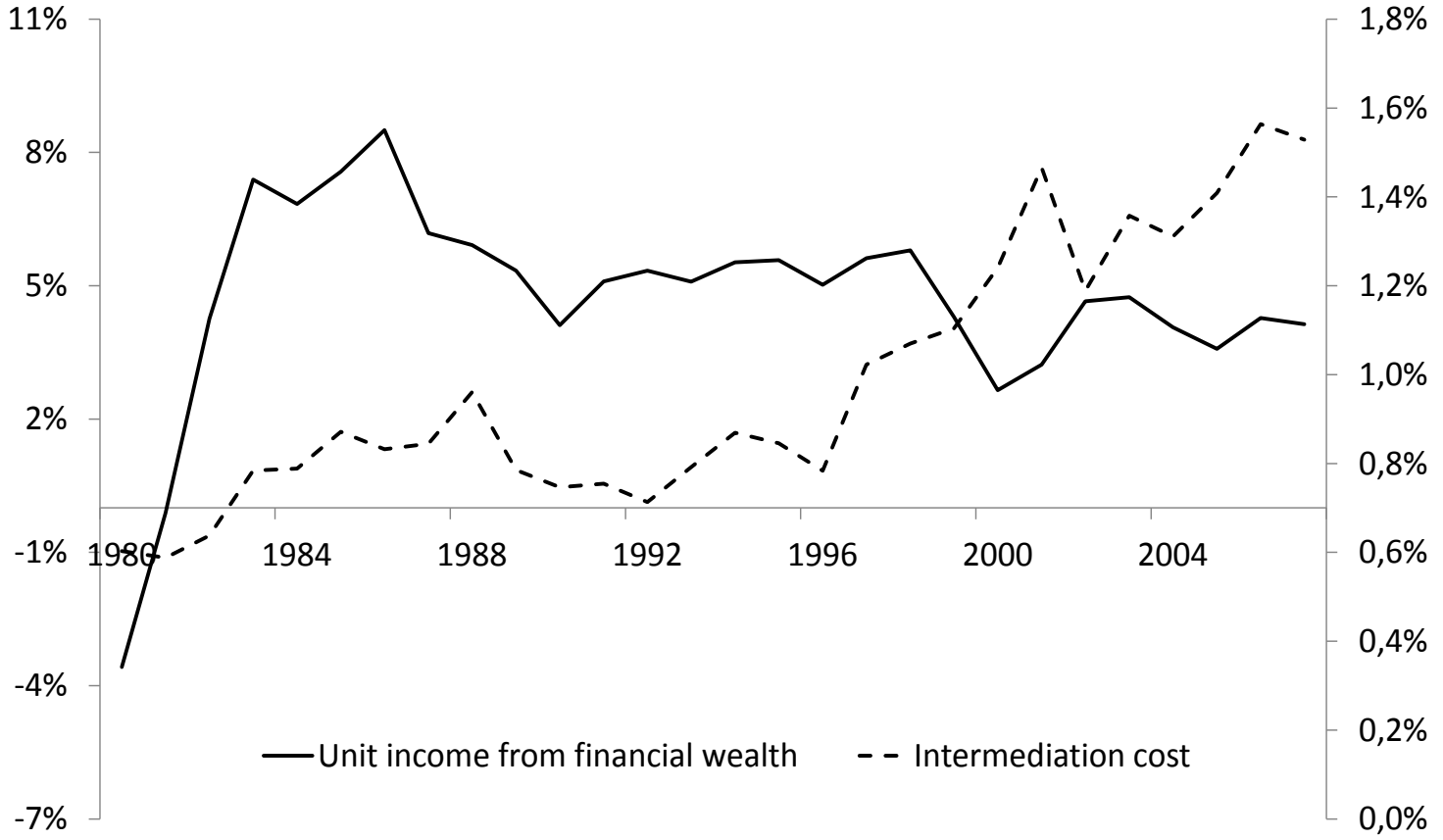
In this chapter I have presented an account of a new aspect of recent development of financial intermediation. Using recent statistical information and theoretical work on the evolution of financial industry output, financial costs, risk-taking and efficiency, I have explained these facts in a model in which risk-neutral banks capture a growing share of financial wealth. Because of household limited liability,

the ability to carry out arbitrage activities in a zero-sum game encourages banks to fund risky projects with negative expected value. This results in decreasing return from financial wealth, increased risk-taking and increased cost of financial intermediation. The main difference from other recent theoretical analysis of modern finance (see in particular GSV, 2013; 2014) comes from the incentive for banks to finance inefficient projects—with full background knowledge—in order to raise profits. In this respect, the aim of the model is not to explain all aspects of the financial intermediation industry but to complement existing theories to account for the increasing volume of outstanding low-quality assets along with the increasing weight of the financial industry and soaring rents.

To assess the model's coherence against empirical facts, I looked at the effect of the joint development of the securities industry and credit intermediation on the unit cost of financial intermediation. The empirical analysis shows in particular that bank share of capital income, the degree of securitization and the number of steps to final end-users of credit—that is, the credit intermediation index measuring intermediation intensity—are positively and robustly correlated to the unit cost of finance. This coincides with the view that too high levels of intermediated wealth can raise financial intermediary income at the expense of social welfare.

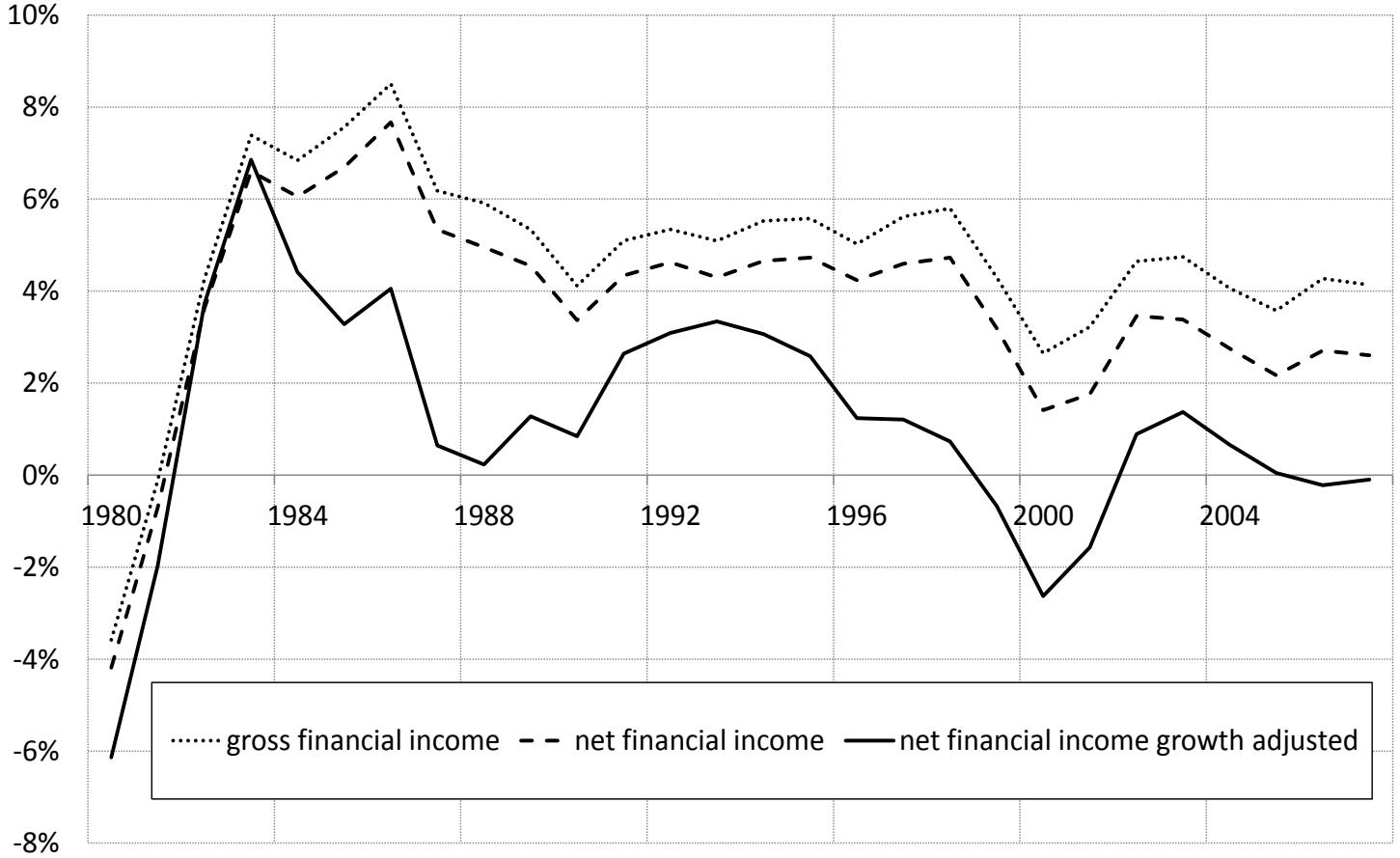
Finally, financial regulation can solve the kind of inefficiency that the theoretical and empirical analyses illustrate. The Tobin tax, capital requirements, and banking separation can prevent financial intermediaries from taking risks by reducing arbitrage gains. However, as long as financial intermediary incentives to take risk remains, the Tobin tax and capital requirements only limit welfare losses, while banking separation rules out the issue.

Figure 3.1.2.1: Gains and costs from financial wealth intermediation



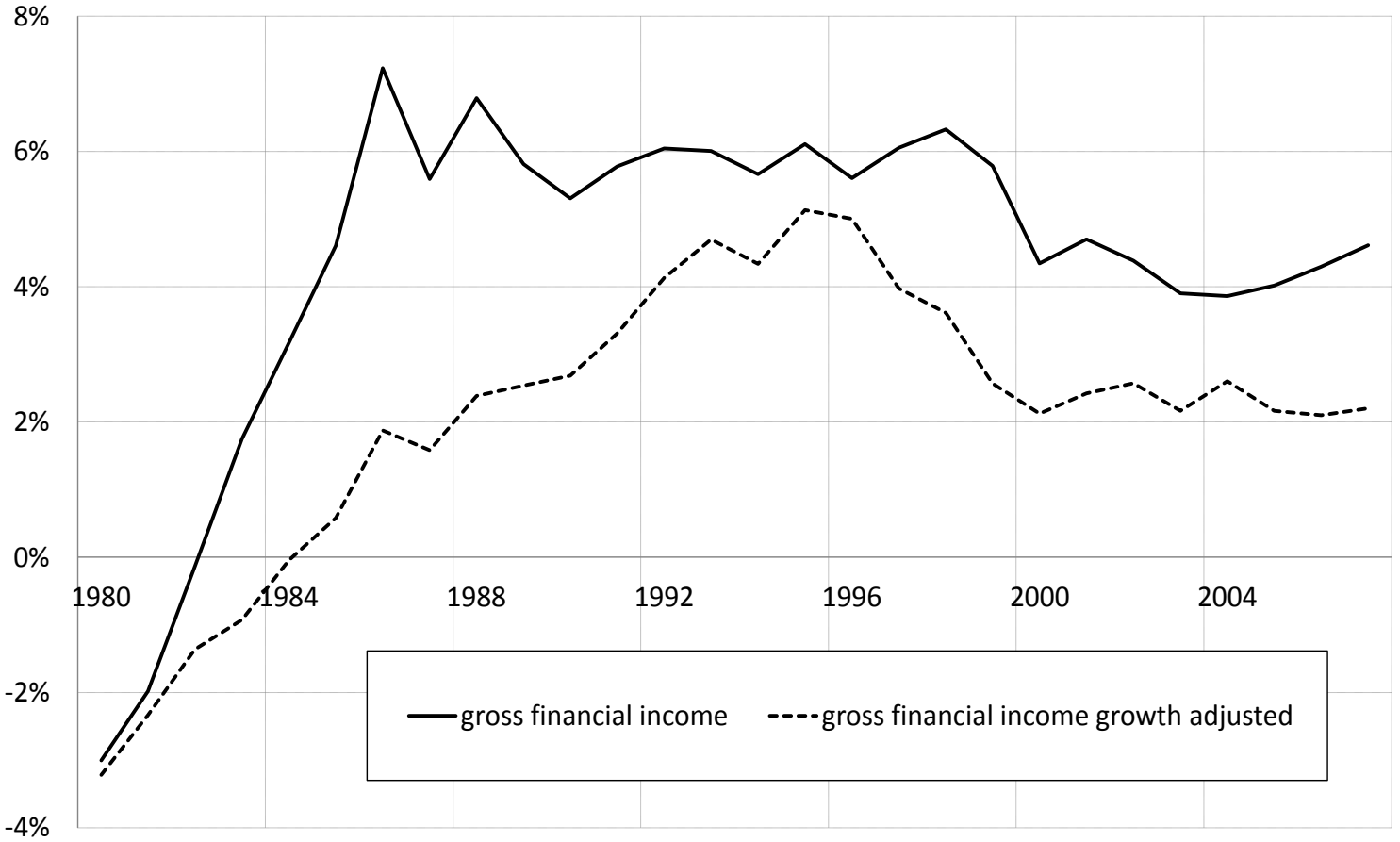
Note: Unit income from financial wealth is the ratio of households' financial income to households' financial assets. Intermediation cost is the ratio of income from securities industry to households financial asset.
Sources: Piketty and Zucman (2014) and BEA

Figure 3.1.2.2.A: Households' financial income rate in the US



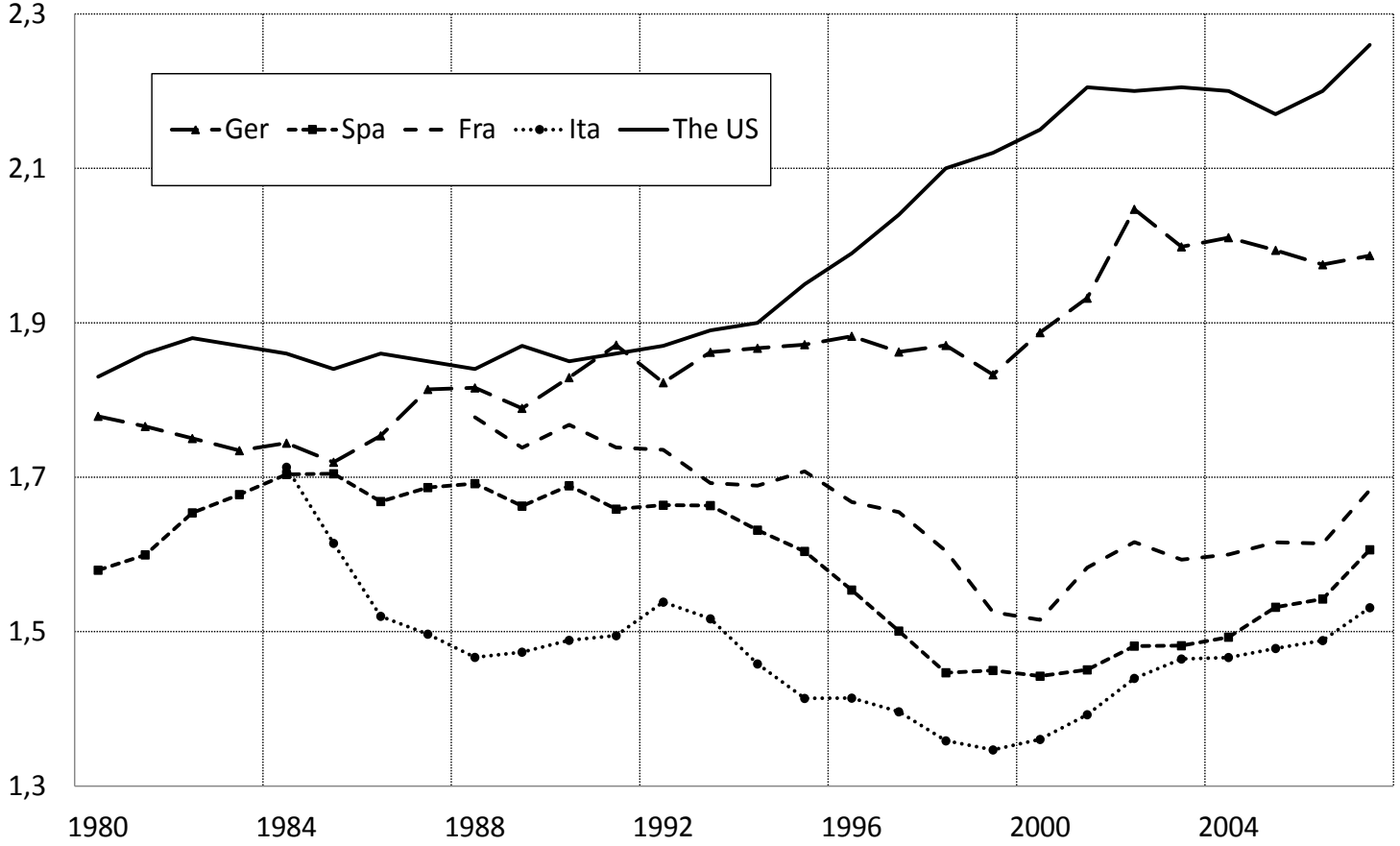
Note: Gross financial income is the ratio of households' financial income to households' financial wealth; net financial income is gross financial income minus financial intermediation costs; net financial income growth adjusted is net financial income minus 5 years moving average GDP growth.
Sources: Piketty and Zucman (2014) and BEA

Figure 3.1.2.2.B: Households' financial income rate in France



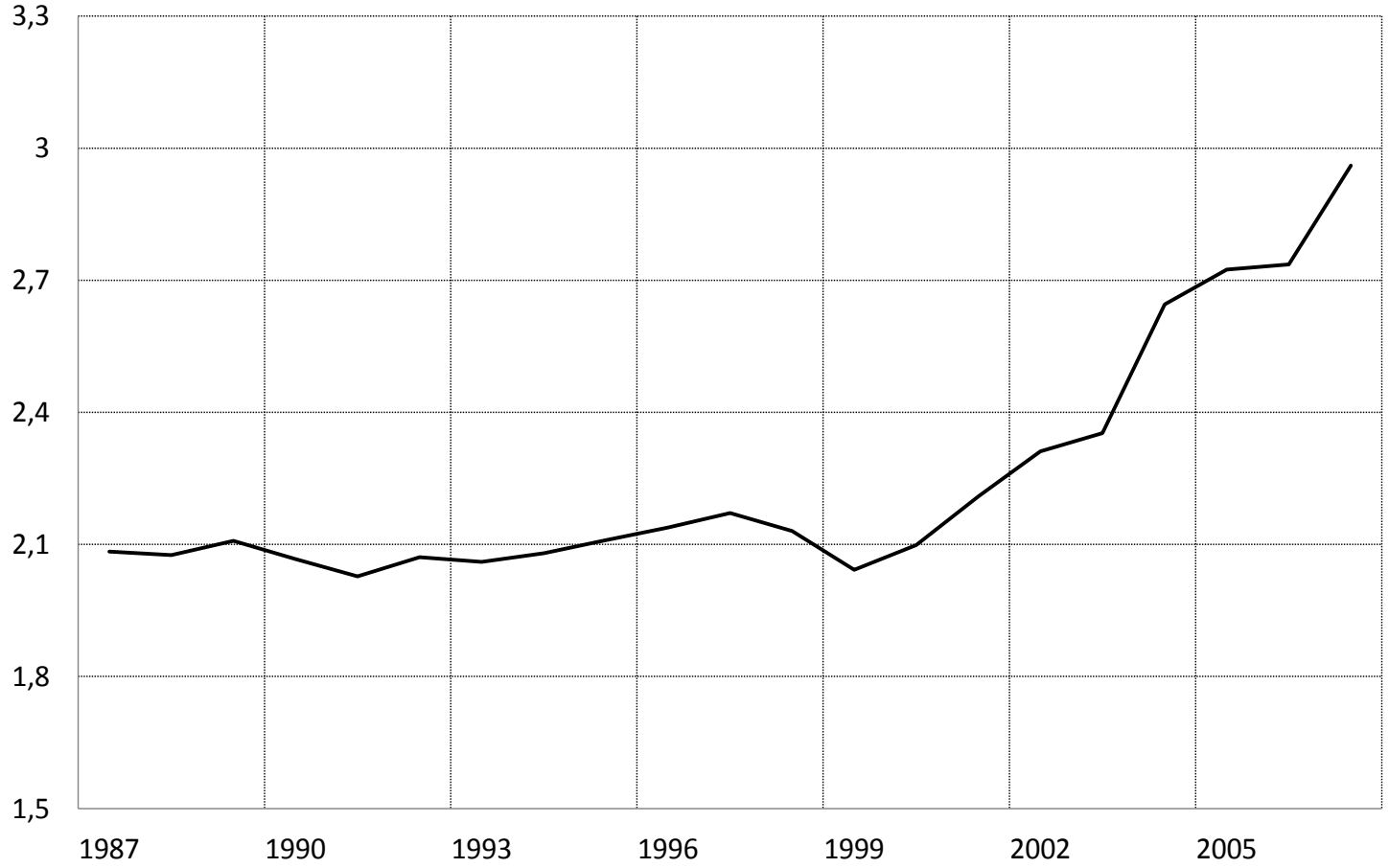
Note: Gross financial income is the ratio of households' financial income to households' financial wealth; gross financial income growth adjusted is gross financial income minus 5 years moving average GDP growth.
Sources: Piketty and Zucman (2014)

Figure 3.1.2.3a: Credit intermediation index



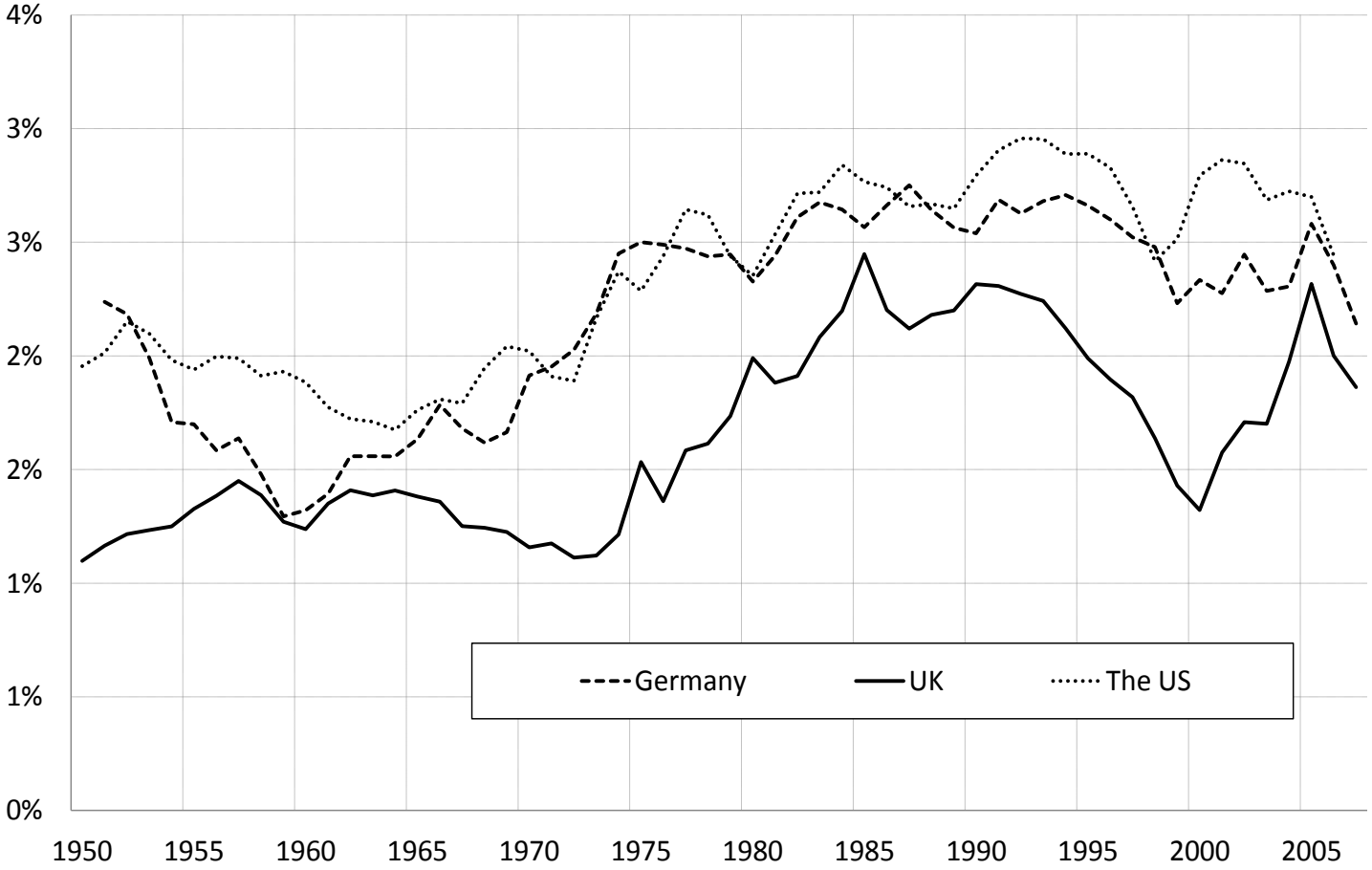
Note: Credit intermediation index is the number of steps of one monetary unit to final end-users. It is calculated through the ratio of total financial liabilities, including financial industry, to end-users financial liabilities.
Sources: Euronex, Flow of Funds, OECD and author's calculation

Figure 3.1.2.3b: Credit intermediation index in the UK



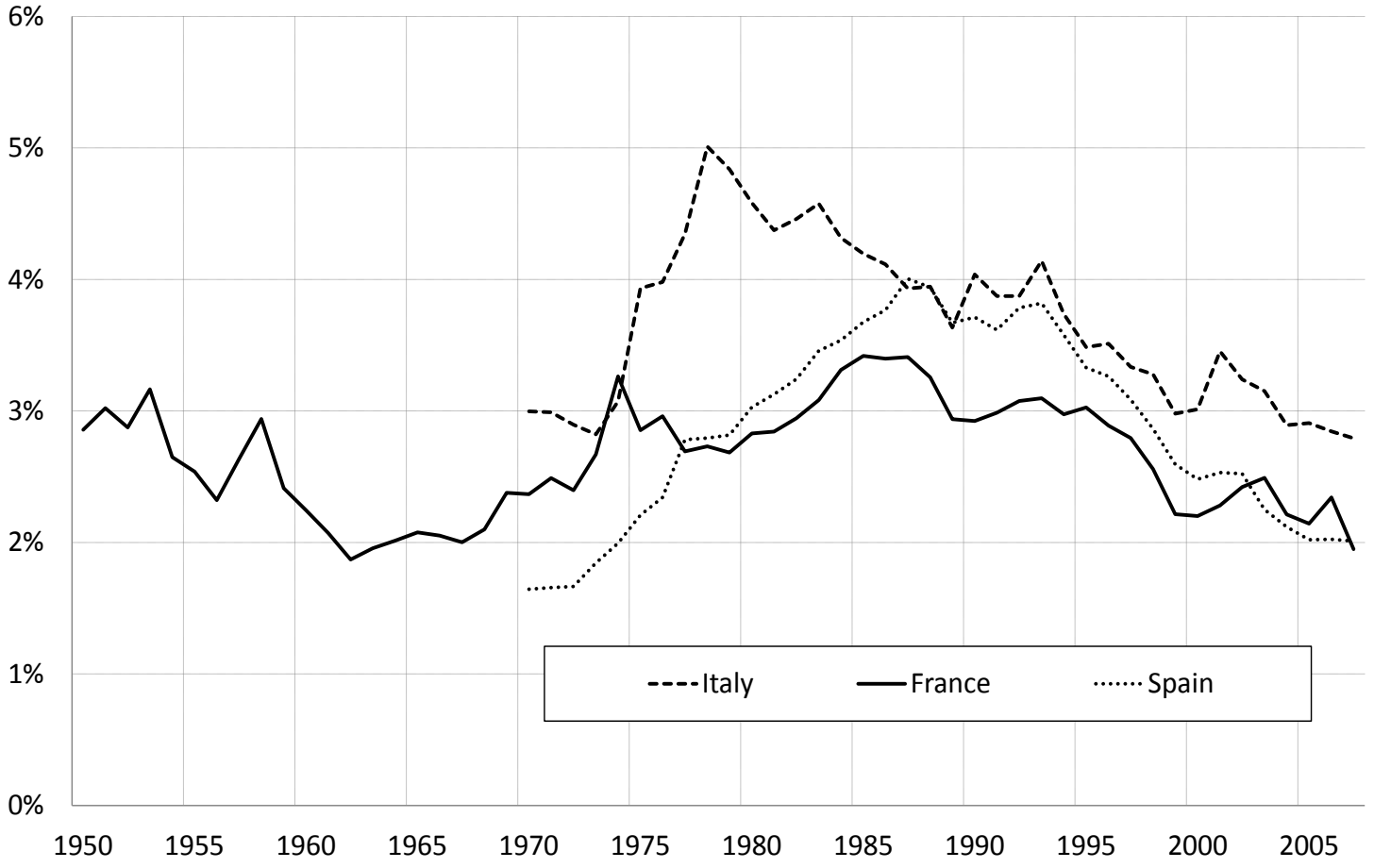
Note: Credit intermediation index is the number of steps of one monetary unit to final end-users. It is calculated through the ratio of total financial liabilities, including financial industry, to end-users financial liabilities.
Sources: Euronex and OECD

Figure 3.2.1.1.A : The unit cost of financial intermediation in non-French civil law countries



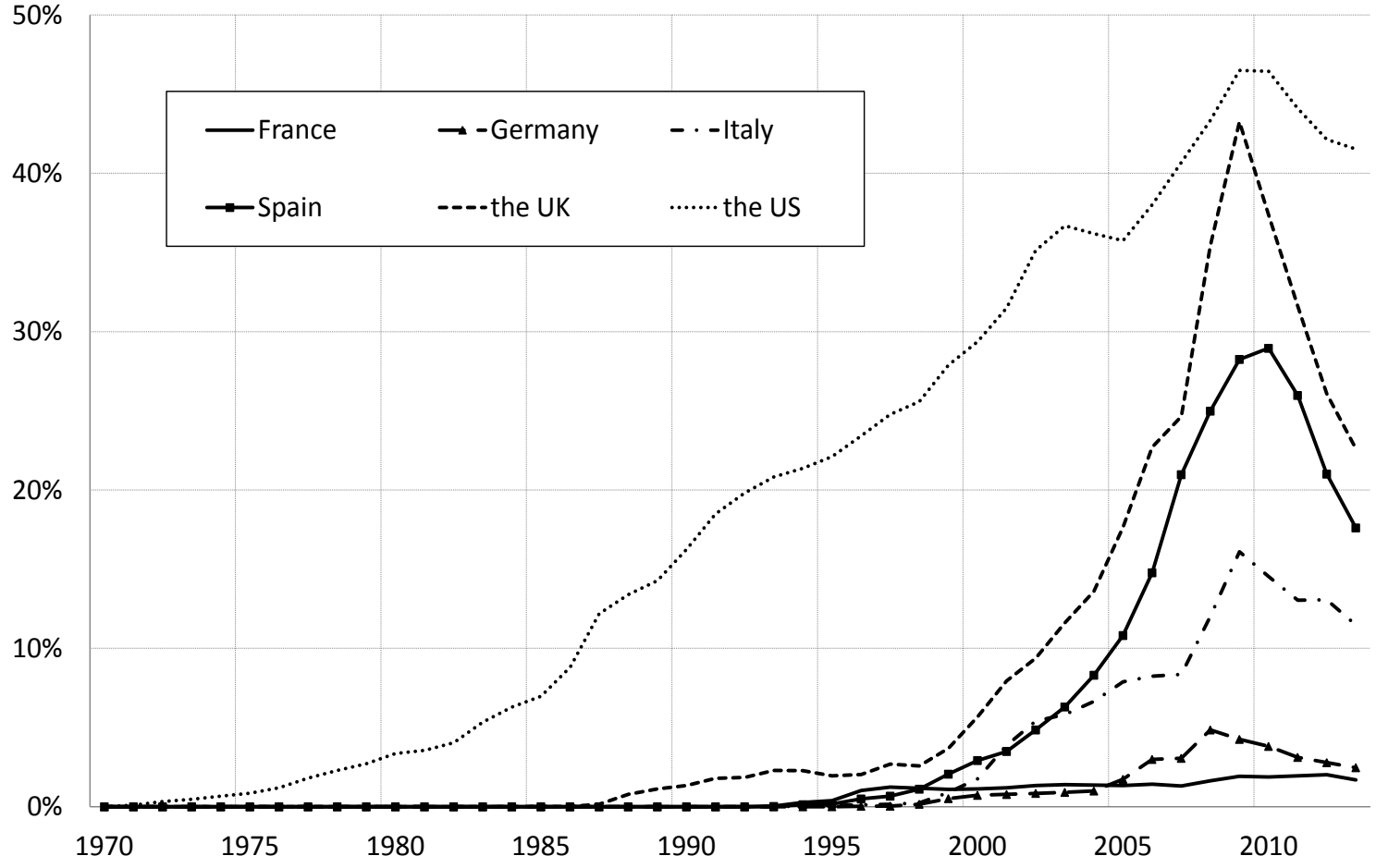
Note: the unit cost of finance is the ratio of financial industry income to the weighted sum of financial asset.
Sources: Bazot (2014) based on Philippon (2013) for the US and Bazot (2014) for Germany and the UK

Figure 3.2.1.1.B : The unit cost of financial intermediation in French civil law countries



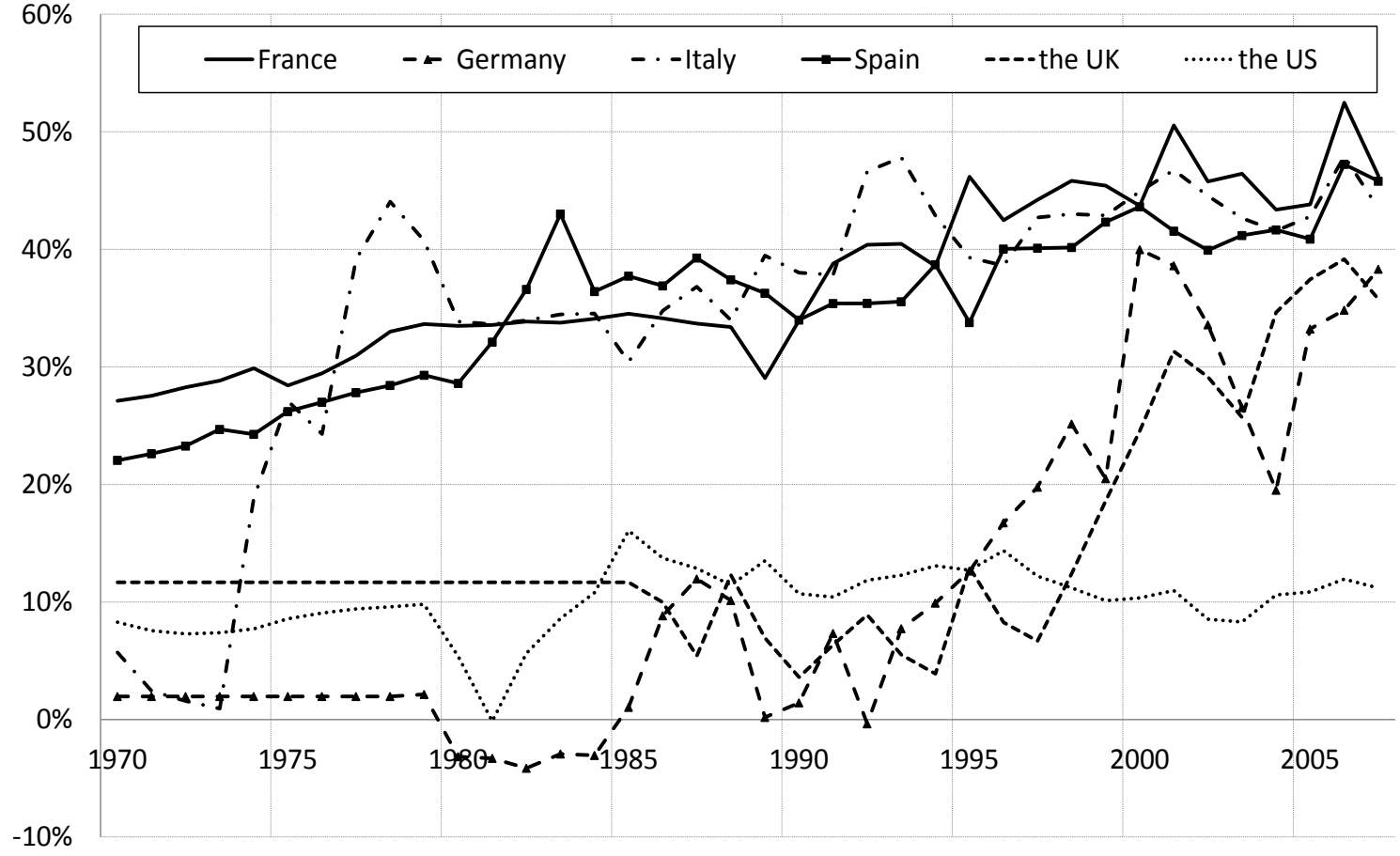
Note: the unit cost of finance is the ratio of financial industry income to the weighted sum of financial asset.
Sources: Bazot (2014)

Figure 3.2.1.2: GDP share of securitization



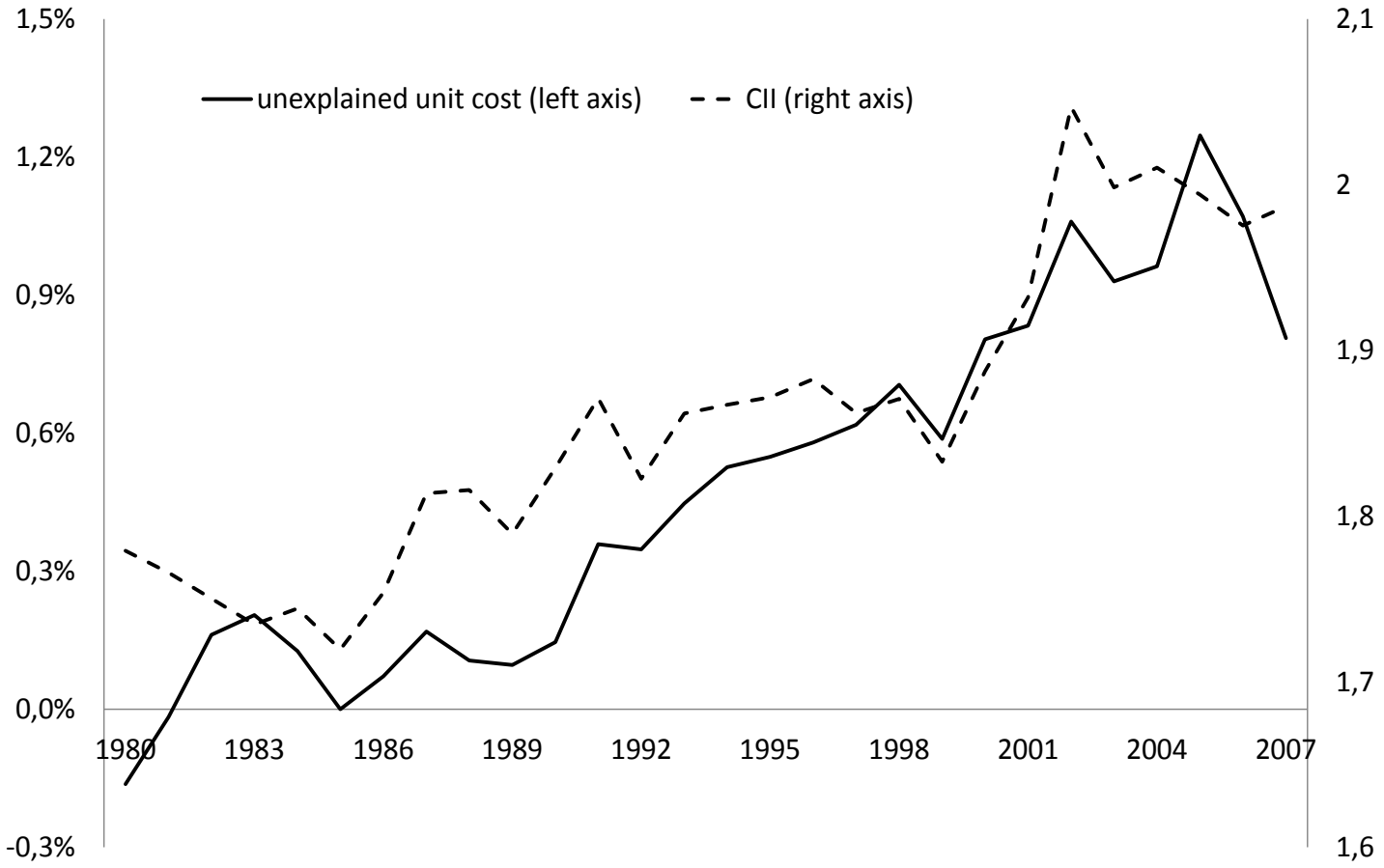
Sources: SIFMA

Figure 3.2.1.3: share of banks' capital income



Note: The share of banks' capital income is measured through the ratio of banking income excluded from VA to all financial income
Sources: Bazot (2014)

Figure 3.2.3.1.A: Unexplained unit cost and credit intermediation index in Germany



Note: The unexplained unit cost is the residual of regression explaining the unit cost by nominal rates of interest.

Figure 3.2.3.1.B: unit cost and credit intermediation index in France

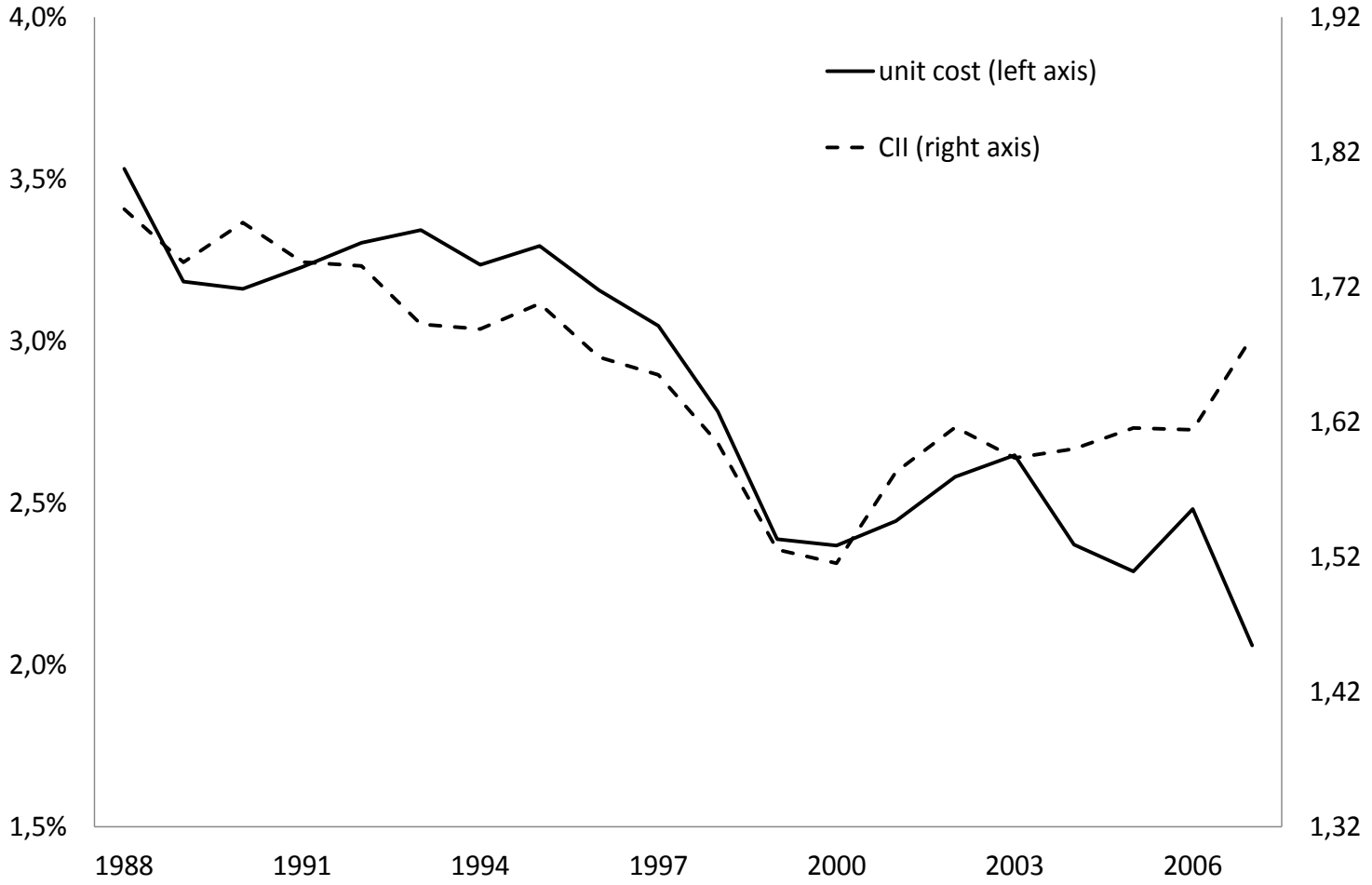


Figure 3.2.3.1.C: unit cost and credit intermediation index in Italy

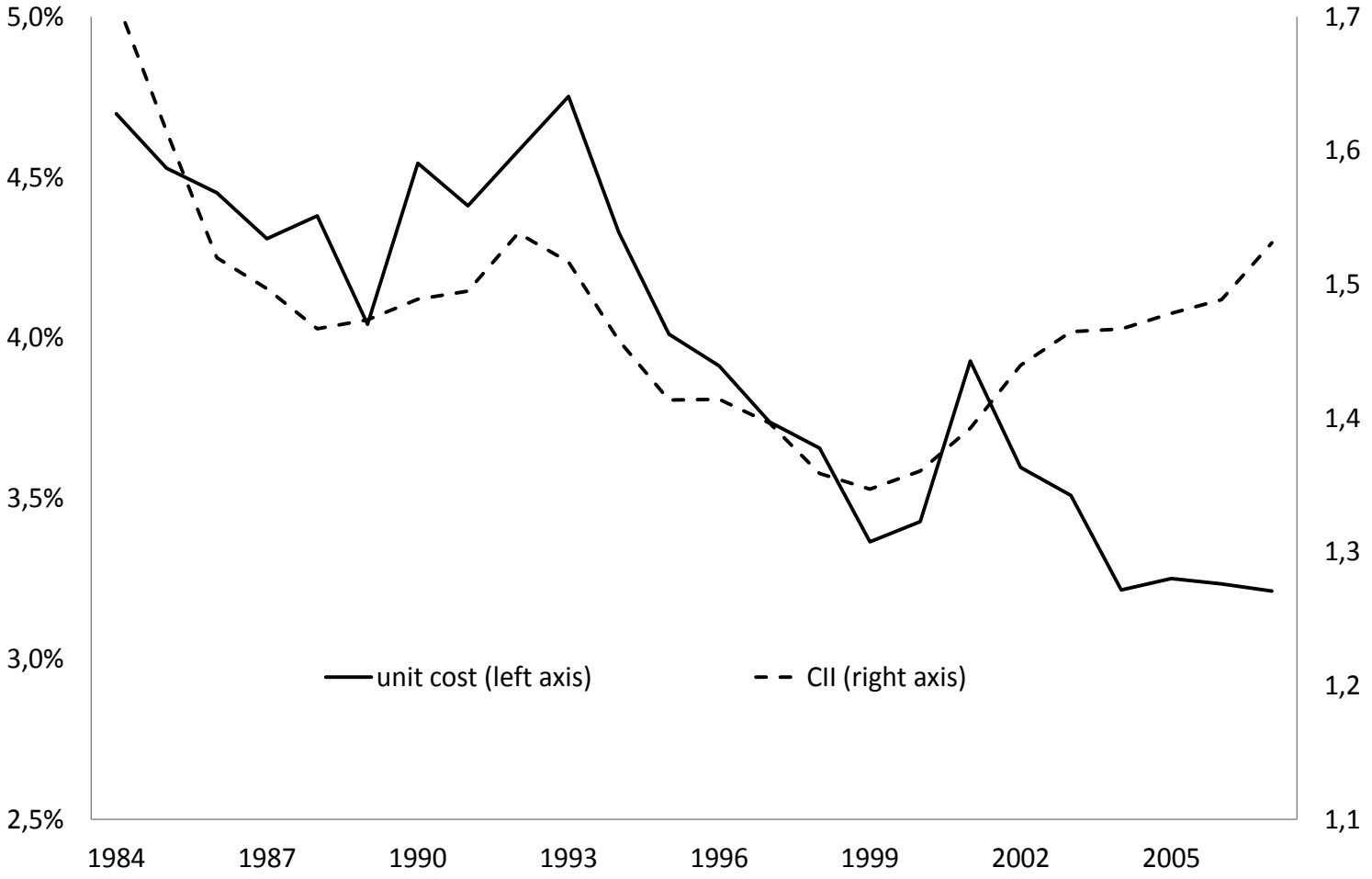


Figure 3.2.3.1.D: unit cost and credit intermediation index in Spain

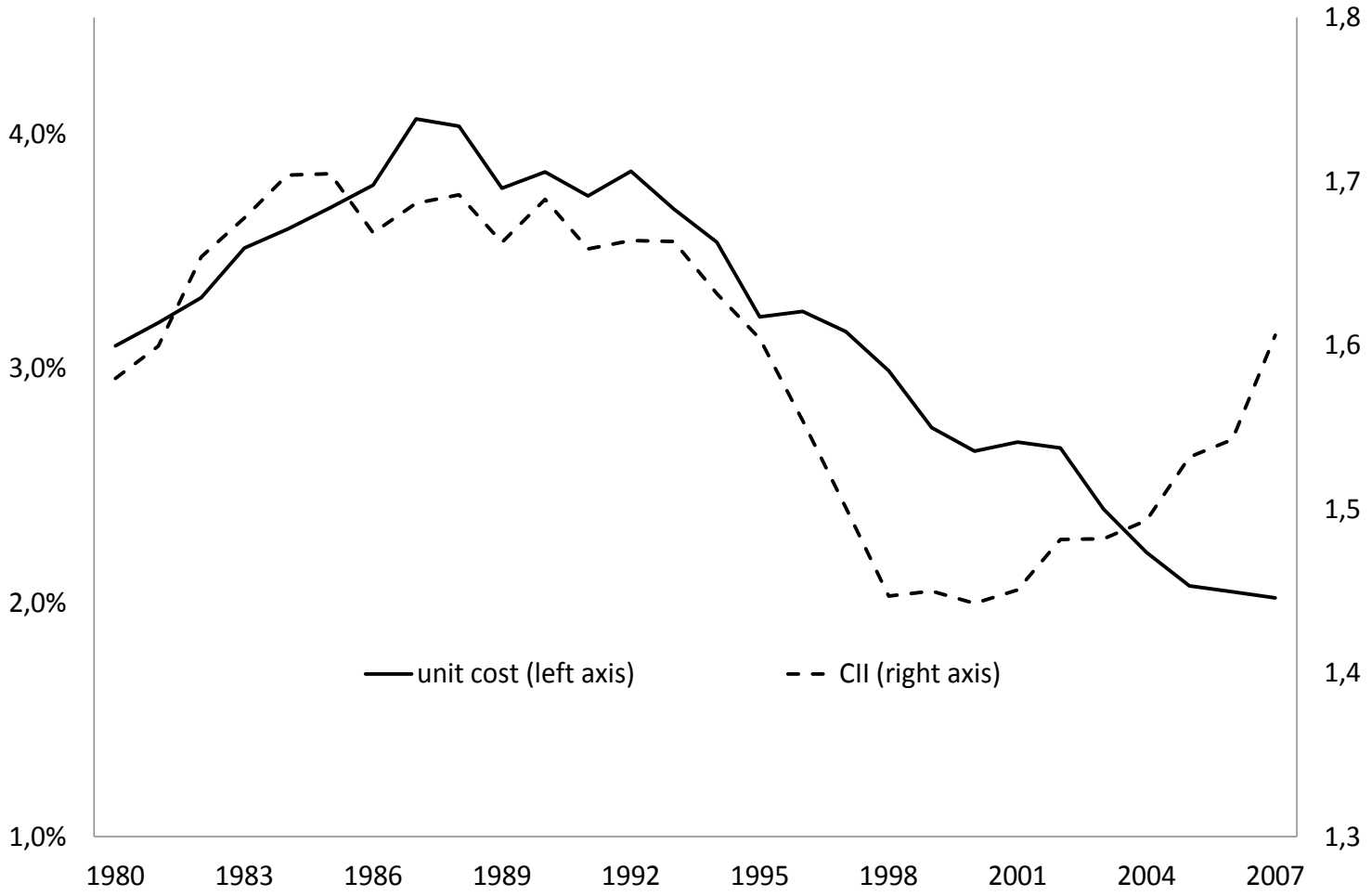
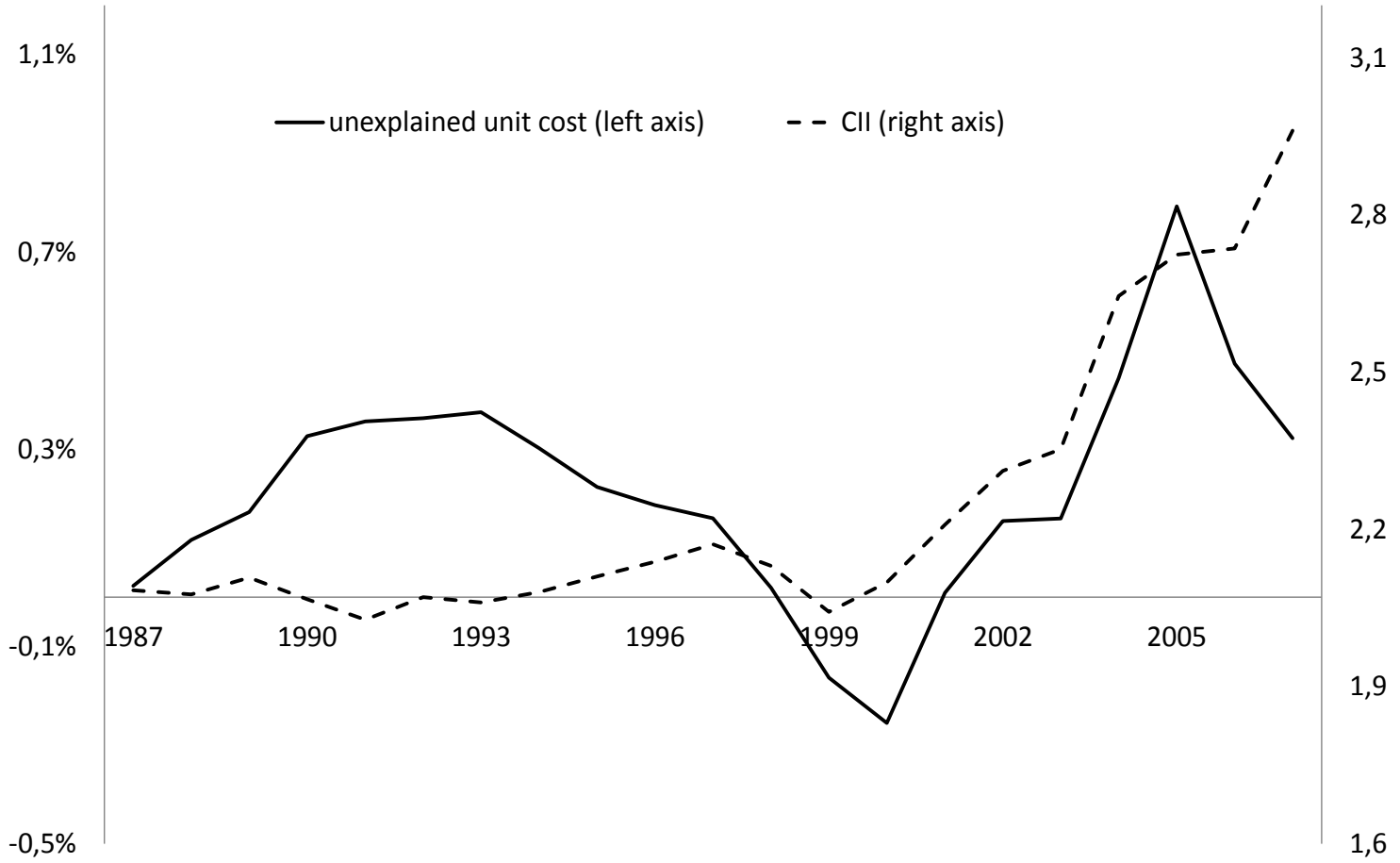
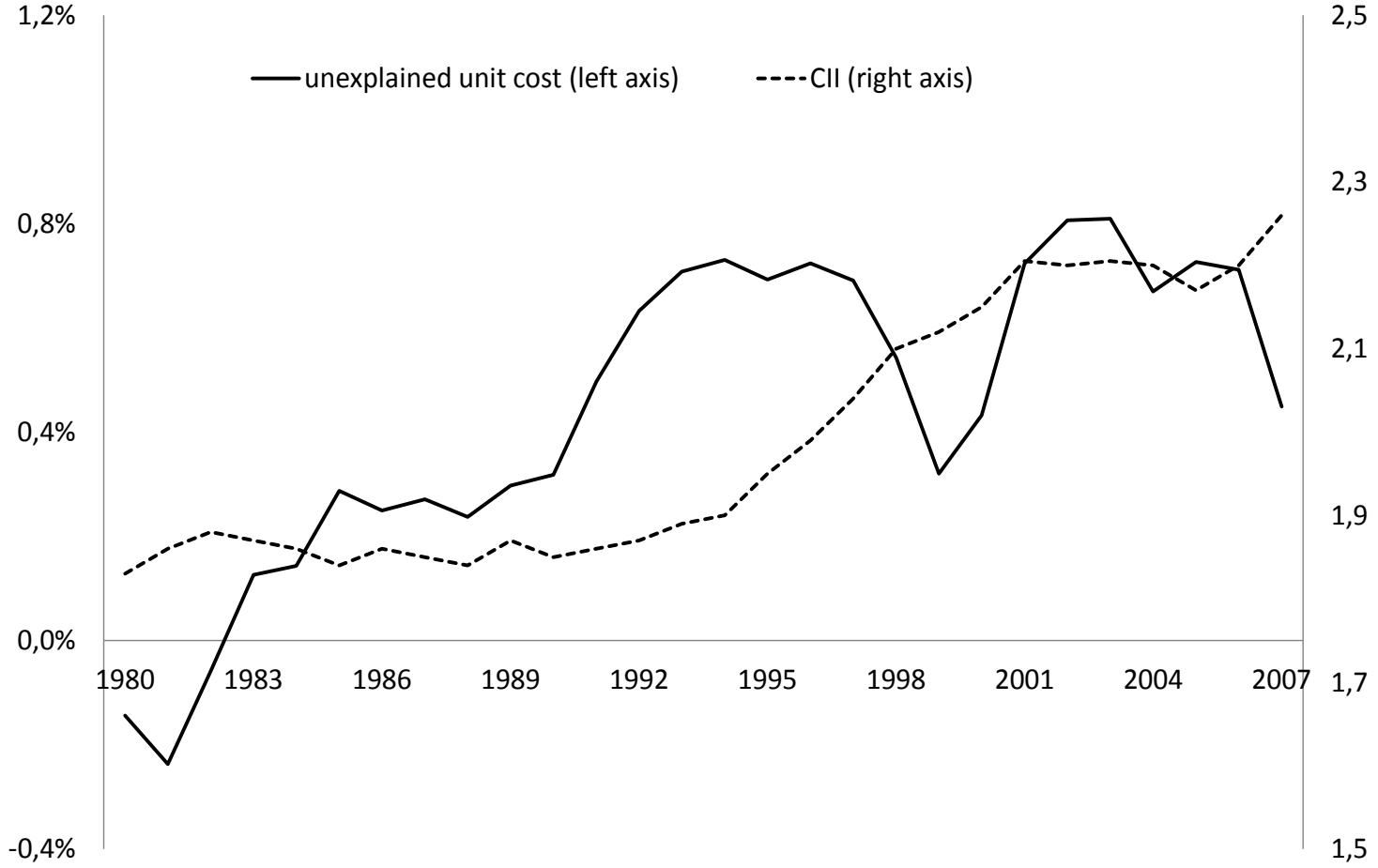


Figure 3.2.3.1.E: Unexplained unit cost and credit intermediation index in the UK



Note: The unexplained unit cost is the residual of regression explaining the unit cost by nominal rates of interest.

Figure 3.2.3.1.F: Unexplained unit cost and credit intermediation index in the US



Note: The unexplained unit cost is the residual of regression explaining the unit cost by nominal rates of interest.

Table 1: descriptive statistics

	N	Mean	Std. Dev.	Min	Max
unit cost	228	0,0284828	0,0088538	0,011684	0,0583661
nominal rate	224	0,0761485	0,0356827	0,0293323	0,1635218
banks' capital income	228	0,2391224	0,1534503	-0,0414407	0,5247773
securitization	234	0,043057	0,089743	0	0,4333102
CII	149	1,798391	0,2897281	1,34687	2,9607
high inflation	228	0,4517544	0,4987619	0	1
GDP growth	228	0,0166898	0,0182242	-0,0480537	0,0668612
rates integration	224	-0,0018506	0,0331427	-0,1540592	0,0840328
financial reform	228	0,3070175	0,8196614	-2	6
deficit	228	0,7906655	2,920098	-8,290001	11,3084

Note: Unit cost is measured through the ratio of financial income to real financial assets outstanding; nominal rate is the smoothed nominal rate of interest using lowess smoothing of bandwidth 0.3; banks' capital income is the ratio of banking income excluded from VA to financial income; securitization is the ratio of securitized assets to GDP; CII is the credit intermediation index measured through the ratio of all sectors liabilities (including financial sector) to end-users liabilities; high inflation is a dummy equal to 1 if inflation is higher than 10% and zero otherwise; rates integration is the difference between country real interest rate and the US real interest rate; financial reform is the one year lagged variation of deregulation index (Abiad et al. (2007)); deficit is the ratio of state deficit to GDP

Table 2: Correlation matrix

PANEL A; N=224	unit cost	nominal rates	banks' share capital income	securitization	high inflation dummy	GDP growth	rates integration	Lag financial reform	deficit
unit cost	1.0000								
nominal rates	0.6058	1.0000							
banks' share capital income	0.4594	0.0937	1.0000						
securitization	-0.1545	-0.3869	-0.1331	1.0000					
high inflation dummy	0.1717	0.5762	-0.1829	-0.3758	1.0000				
GDP growth	-0.0045	0.0493	0.0825	-0.1231	-0.0007	1.0000			
rates integration	0.2499	0.0689	0.2174	0.0634	-0.3260	-0.0790	1.0000		
Lag financial reform	0.1957	0.2105	0.0690	-0.1074	-0.0020	-0.0667	0.1157	1.0000	
deficit	0.4351	0.3733	0.0627	-0.0872	0.0553	-0.3160	0.2226	0.1292	1.0000

PANEL B; N=149	unit cost	nominal rates	CII	high inflation dummy	GDP growth	rates integration	Lag financial reform	deficit
unit cost	1.0000							
Nominal rates	0.6004	1.0000						
CII	-0.5944	-0.1954	1.0000					
high inflation dummy	0.4070	0.6962	-0.1776	1.0000				
GDP growth	0.0081	0.0777	-0.0933	-0.1209	1.0000			
rates integration	0.2822	0.3210	0.0770	0.2231	-0.1098	1.0000		
Lag financial reform	0.2646	0.2301	-0.1265	-0.0160	0.0970	0.1699	1.0000	
deficit	0.3838	0.4107	-0.0134	0.2135	-0.3338	0.2278	0.0743	1.0000

Note: CII is the credit intermediation index

Table 3: unit cost explanation, Panel A

	Robust clustered standard errors				Discroll-Kraay standard errors			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
nominal rates	0.139***	0.133***	0.128***	0.120**	0.139***	0.133***	0.128***	0.120***
	(0.0129)	(0.0226)	(0.0172)	(0.0368)	(0.0119)	(0.00933)	(0.0188)	(0.0194)
banks' capital income	0.00862**	0.00450*	0.00880***	0.00970***	0.00862**	0.00450	0.00880	0.00970*
	(0.00259)	(0.00203)	(0.00200)	(0.00170)	(0.00311)	(0.00303)	(0.00443)	(0.00424)
securitization	0.0248**	0.0217**	0.0290***	0.0303***	0.0248***	0.0217***	0.0290***	0.0303***
	(0.00757)	(0.00780)	(0.00611)	(0.00626)	(0.00401)	(0.00334)	(0.00229)	(0.00247)
high inflation		-0.00121*		-0.000578		-0.00121*		-0.000578
		(0.000478)		(0.00240)		(0.000477)		(0.000579)
growth		0.00830		0.0248		0.00830		0.0248
		(0.0254)		(0.0308)		(0.0194)		(0.0273)
integration		0.0200		0.0102		0.0200**		0.0102
		(0.0159)		(0.0105)		(0.00748)		(0.00862)
financial reform		0.000382		0.000301		0.000382		0.000301
		(0.000199)		(0.000213)		(0.000271)		(0.000274)
deficit		0.000184		8.87e-05		0.000184*		8.87e-05
		(0.000122)		(0.000135)		(8.81e-05)		(0.000130)
Constant	0.0151***	0.0168***	0.0154***	0.0163***	0.0151***	0.0168***	0.0155***	0.0163***
	(0.000903)	(0.00175)	(0.000906)	(0.00116)	(0.00152)	(0.00141)	(0.00144)	(0.00175)
Time fixed effects	no	no	yes	yes	no	no	yes	Yes
Observations	224	224	224	224	224	224	224	224
R-squared	0.631	0.692	0.756	0.766	-	-	-	-

Note: *** p<0.01, ** p<0.05, * p<0.1; see table 1 for variables description. All regressions include panel fixed effects.

Table 4: unit cost explanation, Panel B

	Robust clustered standard errors				Discroll-Kraay standard errors			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
nominal rates	0.0987***	0.0913***	0.0590***	0.0477**	0.0987***	0.0913***	0.0590*	0.0477
	(0.00860)	(0.00654)	(0.0122)	(0.0142)	(0.0169)	(0.0122)	(0.0289)	(0.0286)
CII	0.00697**	0.00508**	0.0121***	0.0120***	0.00697***	0.00508**	0.0121***	0.0120***
	(0.00176)	(0.00154)	(0.00187)	(0.00135)	(0.00149)	(0.00156)	(0.00160)	(0.00158)
high inflation		-0.00146*		0.00115*		-0.00146		0.00115*
		(0.000620)		(0.000568)		(0.000871)		(0.000483)
growth		0.00955		0.00614		0.00955		0.00614
		(0.0232)		(0.0159)		(0.0144)		(0.00919)
integration		0.0474**		0.00501		0.0474***		0.00501
		(0.0151)		(0.0102)		(0.00986)		(0.0112)
financial reform		0.000316		0.000233		0.000316		0.000233
		(0.000341)		(0.000182)		(0.000334)		(0.000226)
deficit		0.000165**		-4.54e-07		0.000165		-4.54e-07
		(4.97e-05)		(7.23e-05)		(8.80e-05)		(9.51e-05)
Constant	0.00939**	0.0127***	0.00163	0.00394	0.00939**	0.0127***	0.00163	0.00394
	(0.00288)	(0.00257)	(0.00435)	(0.00367)	(0.00252)	(0.00307)	(0.00428)	(0.00399)
Time fixed effects	no	no	yes	yes	no	no	yes	Yes
Observations	149	149	149	149	149	149	149	149
R-squared	0.647	0.736	0.879	0.885	-	-	-	-
Number of panel	6	6	6	6	6	6	6	6

Note: *** p<0.01, ** p<0.05, * p<0.1; see table 1 for variables description. All regressions include panel fixed effects.

Table 5: explanation of the alternative unit cost, Panel A

	Robust clustered standard errors				Discroll-Kraay standard errors			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
nominal rates	0.224***	0.225**	0.341**	0.404*	0.224***	0.225**	0.341***	0.404***
	(0.0426)	(0.0591)	(0.125)	(0.163)	(0.0508)	(0.0562)	(0.0709)	(0.0841)
banks' capital income	-0.0234	-0.0204	-0.0201	-0.0177	-0.0234	-0.0204	-0.0201	-0.0177
	(0.0212)	(0.0183)	(0.0205)	(0.0160)	(0.0159)	(0.0163)	(0.0174)	(0.0150)
securitization	0.0508**	0.0506**	0.0606**	0.0624**	0.0508***	0.0506***	0.0606***	0.0624***
	(0.0155)	(0.0164)	(0.0160)	(0.0190)	(0.00601)	(0.00591)	(0.0105)	(0.0100)
high inflation		-0.000391		-0.00981		-0.000391		-0.00981**
		(0.00145)		(0.00724)		(0.00174)		(0.00350)
growth		0.0447		0.0224		0.0447		0.0224
		(0.0261)		(0.0582)		(0.0436)		(0.0521)
integration		-0.0476		-0.0267		-0.0476*		-0.0267
		(0.0677)		(0.0576)		(0.0194)		(0.0215)
financial reform		-0.000389		0.000286		-0.000389		0.000286
		(0.000594)		(0.000643)		(0.000904)		(0.000815)
deficit		0.000267*		0.000107		0.000267		0.000107
		(0.000132)		(0.000296)		(0.000238)		(0.000304)
Constant	0.0215***	0.0200***	0.00896	0.00455	0.0215**	0.0200**	0.0184**	0.00455
	(0.00396)	(0.00365)	(0.00902)	(0.0115)	(0.00694)	(0.00758)	(0.00548)	(0.00882)
Time fixed effects	no	no	yes	yes	no	no	yes	Yes
Observations	217	217	217	217	217	217	217	217
R-squared	0.413	0.435	0.550	0.601	-	-	-	-

Note: *** p<0.01, ** p<0.05, * p<0.1; see table 1 for variables description. All regressions include panel fixed effects. The unit cost is now measures through the ratio of financial income to households' financial wealth.

Table 6: explanation of the alternative unit cost, Panel B

	Robust clustered standard errors				Discroll-Kraay standard errors			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
nominal rates	0.133***	0.124***	0.0768**	0.0561**	0.133***	0.124***	0.0768***	0.0561**
	(0.0140)	(0.0105)	(0.0221)	(0.0211)	(0.00920)	(0.00711)	(0.0185)	(0.0153)
CII	0.0135***	0.0123***	0.0179***	0.0181***	0.0135***	0.0123***	0.0179***	0.0181***
	(0.00234)	(0.00243)	(0.00133)	(0.00139)	(0.00153)	(0.00162)	(0.00256)	(0.00243)
high inflation		-0.000376		0.00184*		-0.000376		0.00184**
		(0.000864)		(0.000875)		(0.000654)		(0.000558)
growth		0.0252		0.0144		0.0252		0.0144
		(0.0212)		(0.0246)		(0.0206)		(0.0230)
integration		0.0239		-0.00425		0.0239*		-0.00425
		(0.0171)		(0.0178)		(0.0103)		(0.0134)
financial reform		-8.40e-05		0.000130		-8.40e-05		0.000130
		(0.000348)		(0.000186)		(0.000334)		(0.000248)
deficit		0.000172*		7.17e-05		0.000172*		7.17e-05
		(7.84e-05)		(0.000115)		(8.38e-05)		(0.000106)
Constant	-0.00232	-0.000120	-0.00713*	-0.00424	-0.00232	-0.000120	-0.00713**	-0.00735*
	(0.00455)	(0.00435)	(0.00314)	(0.00380)	(0.00254)	(0.00315)	(0.00275)	(0.00289)
Time fixed effects	no	no	yes	yes	no	no	yes	Yes
Observations	148	148	148	148	148	148	148	148
R-squared	0.799	0.816	0.880	0.886	-	-	-	-
Number of panel	6	6	6	6	6	6	6	6

Note: *** p<0.01, ** p<0.05, * p<0.1; see table 1 for variables description. All regressions include panel fixed effects. All regressions include panel fixed effects. The unit cost is now measures through the ratio of financial income to households' financial wealth.

General conclusion

This report has proposed to look at the effect of the growth of finance on financial efficiency. It thus relies on the analysis of the unit cost of financial intermediation in two steps.

Chapter 1 proposed to assess financial intermediation efficiency in Germany, France, the UK, and Europe more broadly, over the past 60 years. The study relied on Philippon's (2014) methodology, which calculates the unit cost of financial intermediation through the ratio of 'financial consumption'—measured by financial income—to 'financial output'—approximated by the sum of outstanding assets intermediated. The contribution of chapter 2 is threefold. First, because financial industry VA ignores banks' capital income (capital gains, dividends and interest on securities) it is an imperfect measure of the consumption of financial intermediation. So long as capital income generates wages and profits to financial intermediaries, it is akin to an implicit consumption of financial services. Using banking income instead of banking VA to measure the consumption of banking services, I showed that the GDP share of finance has increased continuously in Germany, France, the UK and Europe as a whole. Second, I showed that the European unit cost of financial intermediation has increased over the past 40 years and matches the US unit cost calculated by Philippon (2014). Third, because the unit cost increases during periods of monetary troubles, I focused on nominal rates of interest to explain the evolution of unit cost. Therefore, a rise in nominal rates of interest increases the spread of bank interest, so that 1970s and 1980s high unit costs are

statistically explained by increases in short-term interest rates.

Chapter 2 then proposed to evaluates the causes of financial intermediation costs evolution after the 1990s. I proposed a model in which banks can choose to invest households wealth into safe or risky investment. The model shows that, even though risky investments bring negative net present value, households inability to believe in the worse state of nature can lead financial intermediaries to take risk if gains from arbitrage and market power are high enough. Even though households are risk adverse, financial wealth increase results in augmenting unit cost of financial intermediation and decreasing welfare. Second, based on those theoretical results, I looked at the empirical effect of new market based activities on financial intermediation cost. The empirical analysis shows in particular that the credit intermediation index is positively correlated to the unit cost of finance, suggesting, as shown in the theoretical model, that the joint development of securities industry and credit intermediation is positively correlated to financial intermediation cost.

BIBLIOGRAPHY

Abiad, A., Detragiache, E., et Tressel, T. (2008). A new database of financial reforms. Working chapter 08/266, IMF.

Acharya, V. (2009). A theory of systemic risk and design of prudential bank regulation. *Journal of Financial Stability*, 5(3).

Acharya, V., Schnabl, P., et Suarez, G. (2013). Securitization without risk transfer. *Journal of Financial Economics*, 107(3).

Adrian, T. et Ashcraft, A. (2012). Shadow banking regulation. Staff Report N.559, FRB of New York.

Allen, F. et Gale, D. (2001). *Comparing financial systems*. MIT Press.

Bazot, G. (2014). Financial consumption and the cost of finance: Measuring financial efficiency in europe (1950-2007). PSE-WP.

Berger, A. N. et Humphrey, D. (1992). Measurement and efficiency issues in commercial banking. In Griliches, Z., editor, *Measurement issues in the service sectors*. NBER, University Press of Chicago.

Bertrand, M., Schoar, A., et Thesmar, D. (2007). Banking deregulation and industry structure: Evidence from the french banking act of 1985. *Journal of Finance*, 62(2).

Blanchard, O. (1997). The medium run. *Brookings Papers on Economic Activity*, 1.

Blundell-Wignall, A., Wehinger, G., et Slovik, P. (2009). The elephant in the room: the need to deal with what banks do. *OECD Journal: Financial Market Trend*, 2009(2).

Boyd, J. H., Levine, R., et Smith, B. D. (2001). The impact of inflation on financial sector performance. *Journal of Monetary Economics*, 47(2).

Carletti, E. et Vives, X. (2009). Regulation and competition policy in banking. In Vives, X., editor, *Competition Policy in the EU: Fifty Years On from the Treaty of Rome*. Oxford University Press.

Coval, J., Jurek, J., et Stafford, E. (2009a). Economic catastrophe bonds. *American Economic Review*, 99(3).

Coval, J., Jurek, J., et Stafford, E. (2009b). The economics of structured finance. *Journal of Economic Perspectives*, 23(1).

Demirgüç-Kunt, A., Laeven, L., et Levine, R. (2004). Regulations, market structure, institutions, and the cost of financial intermediation. *Journal of Money, Credit and Banking*, 36(3).

Demyanyk, Y. et Van Hemert, O. (2009). Understanding the subprime mortgage crisis. *the Review of Financial Studies*, 27(8).

Diamond, D. et Rajan, R. (2009). The credit crisis: conjectures about causes and remedies. *American Economic Review: Papers & Proceeding*, 99(2).

Ductor, L. et Grechyna, D. (2012). Excess financial development and economic growth. WP.

Fama, E. et French, K. (2010). Luck versus skill in the cross section of mutual fund a estimates. *Journal of Finance*, 65(5).

Feiertag, O. (2006). *Wilfrid Baumgartner : un grand commis des finances à la croisée des pouvoirs*. CHEFF, Paris.

Fisher, K. et Pfeil, C. (2004). Regulation and competition in german banking: an assessment. In Krahnen, J. P. et Schmidt, R. H., editors, *the German financial system*. Oxford University Press, Frankfurt.

Flannery, M. J. (1982). Retail bank deposit as quasi-fixed factors of production. *American Economic Review*, 72(3).

Fournier, J. M. et Marionnet, D. (2009). La mesure de l'activité des banques en france. *Bulletin de la Banque de France*, 178.

French, K. (2008). Presidential address: the cost of active investing. *Journal of Finance*, 63(4).

Gennaioli, N., Shleifer, A., et Vishny, R. (2013). A model of shadow banking. *Journal of Finance*, 68(4).

Gennaioli, N., Shleifer, A., et Vishny, R. (2014). Finance and the preservation of wealth. *Quarterly Journal of Economics*. forthcoming.

Greenwood, R. et Scharfstein, D. (2013). The growth of finance. *Journal of Economic Perspectives*, 27(2).

Haldane, A., Brennan, S., et Madouros, V. (2010). What is the contribution of the financial sector: Miracle or mirage? In et al., A. T., editor, *The future of finance: the LSE report*. LSE.

Hautcoeur, P. C. (1996). Le système financier français depuis 1945. *Risque*, 25.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *Stata Journal*, 7(3).

Keys, B., Mukherjee, T., Seru, A., et Vig, V. (2012). Did securitization lead to lax screening? evidence from money market mutual funds. *Quarterly Journal of Economics*, 125(1).

Lacoue-Labarthe, D. (2001). *Les banques en France. Privatisation, restructuration, consolidation*. Economica.

Levine, R. (2011). Finance, regulation and inclusive growth. Brown University WP.

Logan, A. (2000). The early 1990s small banks crisis: leading indicators. *Bank of England, Financial Stability Review*, 9.

Loriaux, M. M. (1991). *France after hegemony*. Cornell University Press, Ithaca.

Manove, M., Padilla, A. J., et Pagano, M. (2001). Collateral versus project screening: a model of lazy bank. *RAND Journal of Economics*, 32(4).

Marnata, F. (1973). *La bourse et le financement des investissements*. A. Colin, Paris.

Mehra, R., Piguillem, F., et Prescott, E. C. (2011). Costly financial intermediation in neoclassical growth theory. *Quantitative Economics*, 2(1).

Michie, R. (1999). *The London stock exchange*. Oxford University Press, Oxford.

Monnet, E. (2012a). The diversity in national monetary and credit policies in western europe under bretton woods. Mimeo.

Monnet, E. (2012b). *Politique monétaire et politique du crédit en France pendant les Trente Glorieuses, 1945-1973*. PhD thesis, EHESS. unpublished.

Paal, B., Smith, B., et Wang, K. (2013). Monopoly versus competition in banking: some implications for growth and welfare. *Annals of Economics and Finance*, 14(3).

Philippon, T. (2015). Has the US financial industry become less efficient? *American Economic Review*. forthcoming.

Philippon, T. et Reshef, A. (2012). Wages and human capital in the us financial industry: 1906-2066. *Quarterly Journal of Economics*, 127(4).

Philippon, T. et Reshef, A. (2013). An international look at the growth of modern finance. *Journal of Economic Perspectives*, 27(2).

Piketty, T. et Zucman, G. (2013). Capital is back: wealth income ratios in rich countries 1870-2010. *Quarterly Journal of Economics*. forthcoming.

Quennouëlle-Corre, L. (2000). *La direction du Trésor : 1947-1967 : l'État-banquier et la croissance*. CHEFF, Paris.

Quennouëlle-Corre, L. (2005). The state, banks and financing of investments in france from world war ii to the 1970s. *Financial History Review*, 12(1).

Rajan, U., Seru, A., et Vikrant, V. (2010). The failure of models that predict failure: distance, incentives and defaults. Research chapter 08-19, Chicago GSB.

Roberts, R. (2005). London as an international financial centre, 1980-2000: global powerhouse or wimbledon ec2. In Cassis, Y. et Bussière, E., editors, *London and Paris as International Financial Centres in the Twentieth Century*.

Samargandi, N. abd Fidrmuc, J. et Ghosh, S. (2013). Is the relationship between financial development and economic growth monotonic for middle income countries? WP.

Smith, B. (2003). Taking intermediation seriously. *Journal of Money, Credit and Banking*, 35(6).

Stauffer, P. (2004). A tale of two worlds: how bankers and national accountants

view banking. In *28th general conference of the International Association for Research in Income and Wealth*. IARIW. Working chapter.

Stiroh, K. (2004). Diversification in banking: is noninterest income the answer? *Journal of Money, Credit and Banking*, 36(5).

Sunderam, A. (2012). Money creation and the shadow banking system. WP.

Vitols, S. (2005). Changes in germany's bank-based financial system: implication for corporate governance. In Jackson, G. Aand Moerkes, A., editor, *Corporate governance: an international review*.

Data Appendix

This appendix presents data sources and calculation used in the estimation of the unit cost of financial intermediation. It also adds information about other series used in the study.

Value added and 'corrected' value added

Value added data is most often available either through statistical yearbooks or EU KLEMS website (http://www.euklems.net). EU KLEMS series last from 1970 to 2007. Data before 1970 is from statistical yearbooks. If important differences occur between both sources, yearbooks official data is always preferred[1]. EU KLEMS database splits financial value added into 'banking', 'insurance' and 'other financial intermediaries' series. This statistical precision is rarely available in statistical yearbooks.

So as to correct VA series using banks income I first rely on EU KLEMS to split financial VA into banking and non-banking components of financial VA. Then, I use OECD database about banking income to replace banking VA by banking income. Because OECD data does not go further than 1979 I do the hypothesis that the ratio of corrected VA to financial VA grows at the same annual rate as the nearest 10 years of available data. This hypothesis helps extend the data till 1950. The series is finally controlled to account for trade balance of financial industry. The US corrected VA added use BEA's data (http://www.bea.gov/industry/gdpbyind_data.htm) to split financial VA into banking and non-banking components. I use OECD database about banking income to replace banking VA by banking income. I thereafter follow the same methodology as for European countries to extrapolate the series from 1950 to the first available date.

Although VA data is available before 1970 for Germany, France and the UK, it is difficult to extend VA series for Italy, Spain and the Netherlands. In fact, data is not available before 1970 for Spain while Italian and the Netherland series are either poor or incongruous. For the sake of robustness and simplicity financial VA is not extended till 1950 in those countries.

Banking income data is not homogenous across countries. While Germany and France series account for national banks income – including foreign banks subsidiaries inside but excluding national banks subsidiaries outside – Italy, Spain and the Netherlands accounts for country-made income whatever the nationality of institutions. The UK series is made up of the seven largest UK banks incomes including their subsidiaries outside the UK.

Germany

Value added data is available in *Statistische jahrbuch* all over the covered period. Banking income data is available from 1979 to 2007 from OECD database. To extend the data till 1950 I do the hypothesis that the ratio of corrected VA to financial VA grow at the same rate as the annual growth rate of this ratio from 1979 to 1989. Because trade balance tends to be close to 0 all over the covered period, series are let unchanged before that date. Foreign banking income is assumed similar to trade balance.

[1] This is particularly the case for the UK.

France

Value added is from INSEE website and the *annuaire statistique de la France*. Banking income data is available from 1988 to 2007 from OECD database. To extend the data till 1950 I do the hypothesis that the ratio of corrected VA to financial VA grow at the same rate as the annual growth rate of this ratio from 1988 to 1998. The series is finally controlled to account for trade balance using trade balance series of financial industry available in French balance of payments yearbook. Because trade balance tends to be close to 0 after 1995, series are let unchanged all over the covered period.

The UK

Statistical yearbooks and the ONS website (reference is: FC: FC: Prod acc: Uses: B.1g: Gross value added) provide financial VA from 1987 to 2007. EU Klems series is used from 1970 to 1987. I finally use compensations share of financial industry available on the ONS website (reference is: *FC: FC: Gen inc: Uses: D.11: Comp of employ Wages & salaries*) to extend the data till 1963. This refers to national accountant techniques used to assess financial VA before the 1970s. Before 1963 I use Feinstein (1965) data.

Banking income data is available from 1980 to 2007 from OECD database. To extend the data till 1950 I do the hypothesis that the ratio of corrected VA to financial VA grow before 1980 at the same rate as the annual growth rate of this ratio from 1980 to 1990. The series is finally corrected to account for trade balance using trade balance series of financial industry available in balance of payments yearbook (pink book). Since data is not available before 1960 I do the hypothesis that financial industry trade balance is equal to the mean of 1960-1970 values, that is, 10% of financial VA. Foreign banking income is assumed similar to trade balance. Banking income series is thus corrected using trade balance values.

Italy, Spain and the Netherlands

Value added is available in EU KLEMS from 1970 to 2007. Banking incomes data is available from 1979 to 2007 in the case of Spain and the Netherlands and from 1984 to 2007 for Italy. To extend the data till 1970 I proceed the same way as for Germany. Trade balance of financial industry is assumed close to zero in Italy and Spain. The Netherlands probably has non-zero trade balance; however, this country is only used for European estimation of the unit cost.

Financial output

The financial output is estimated using four different series, namely: private credit, broad money, market capitalization and public debt. Private credit data is available on the BIS website (http://www.bis.org/statistics/credtopriv.htm) from 1970 to 2007 except for the UK where it is available from 1960 to 2007. Before 1970 I therefore used Schularick and Taylor (2012) data set about banking credit, which proves to be very close to credit series. Public debt data is from Reinhart and Rogoff website (http://www.reinhartandrogoff.com/data/).

Broad Money for Germany is M2 before 1970 then M3 from 1970 to 2007. M3 data for Germany is available on the Bundesbank website, M2 is from Schularick and Taylor (2012). Broad money for France is M2 from 1950 to 1970 and M3 after 2007. Data is from the *annuaire statistique*. For the UK broad money is M3 from 1950 to 1962 and M4 after 1962. Sources is Capie and Webber (1985) and Bank of England/ONS. Data is also available

from Thomas et al. (2010). For Italy, Spain and the Netherlands I took up M3 data from Schularick and Taylor (2012).

Market capitalization is available from 1988 to 2007 from World Bank database. Before 1987 I use different sources and make additional assumptions. In the case of France, data is available from Bozio (2002). For the UK I rely on Michie's (1999) evaluation of the London Stock exchange capitalisation for 1950. Insofar as Michie's data accounts for both equity and bonds, I use Goldsmith (1985) to separate market capitalisation from outstanding bonds[2]. I finally use the growth rate of stock market index available in Global Financial Database and Schularik and Taylor (2012) to extrapolate market capitalization values between 1950 and 1987. The data produced fits well with Michie's series produced for all ten years. For Germany, Italy, Spain and the Netherlands I use the stock market index correlation with market capitalization from 1988 to 2008 to extrapolate market capitalization. I hence multiply the stock market index with the related correlation coefficient.

So as to give evidence of the accuracy of this calculation Figure Ap 1 compares the assessed market capitalization series with Rajan and Zingales (2003) series for Germany, the UK, Italy and the Netherlands.[3] Series is close for Germany and Italy. Rajan and Zingales series tends to be more volatile in the case of the UK and the Netherlands. However, trends are similar in both cases.

Other series

Five other series are used in the study: wages, interest rates, inflation, deregulation index and credit intermediation index. European countries compensation series are available in EU-KLEMS from 1970 to 2007. Wages series for the UK is also available on the ONS web site till 1955. Nominal interest rate is from Schularick and Taylor (2012). Deposit interest rate is from World Bank database. Inflation series is available in Reinhart and Rogoff website. The deregulation index is from Abiad et al. (2008).

Credit intermediation index is calculated using financial intermediaries' financial liabilities, excluding equities and other participations, and final end-users financial liabilities. Data is available in Eurostat database website from 1995 to 2007 (see http://epp.eurostat.ec.europa.eu/portal/page/portal/sector_accounts/data/database). Eurostat provides data from 1987 to 2007 for the UK and from 1980 to 2007 for Spain. To extend the series for "bank-based" countries (Germany, Italy and France) I used OECD banking income report which provides detailed balance sheet information on banks. End-users financial liabilities are determined by the sum of credit, market capitalisation and public debt.[4] I finally used the coefficient of a regression explaining series from Eurostat by series from OECD data to extrapolate the series before 1995.[5] I thus come up with series from 1980 in Germany, from 1984 in Italy and from 1988 in France.

[2] This method is also used by La Porta et al. (2008) to extrapolate market capitalization.
[3] It is worth noting that Rajan and Zingales do not provide data for Spain before 1980. Comparison for France is not useful as Bozio (2002) proposes a complete market capitalization database.
[4] It is worth noting that summing those elements provides very similar series than those produced by Eurostat over the period 1995-2007.
[5] R^2 from the regression is very high in all three cases.

References

Abiad, A, Detragiache, E and Tressel, T (2008): “A New Database of Financial Reforms,” IMF Working Paper 08/266

Bozio, A. (2002): ``La capitalisation boursière en France au XXe siècle, " mémoire de DEA, unpublished

Capie, F. and A. Webber (1985): "A monetary history of the United Kingdom, 1870-1982," Volume 1, Routledge

Feinstein, C. H. (1972): "National income, expenditure and output of the United Kingdom 1855-1965," Cambridge

Fournier, J. M. and D. Marionnet (2009): ``La mesure de l'activité des banques en France," *Bulletin de la Banque de France*, vol. 178

Michie, R. (1999): "The London stock exchange," Oxford University Press, Oxford

Rajan, R. And L. Zingales (2003): “The great reversals: the politics of financial development in the twentieth century,” *Journal of Financial Economics*, vol. 69(1)

Schularick, M. and A. Taylor (2012): "Credit booms Gone bust: monetary policy, leverage cycles and financial crises, 1870-2008," *American Economic Review*, vol. 102(2)

Thomas, R., S. Hills and N. Dimsdale (2010): “The UK recession in context — what do three centuries of data tell us?,” *Bank of England Quarterly Bulletin*

Market capitalization series

Figure Ap 1a:
Market capitalization to GDP in Germany, comparison with Rajan and Zingales (2003)

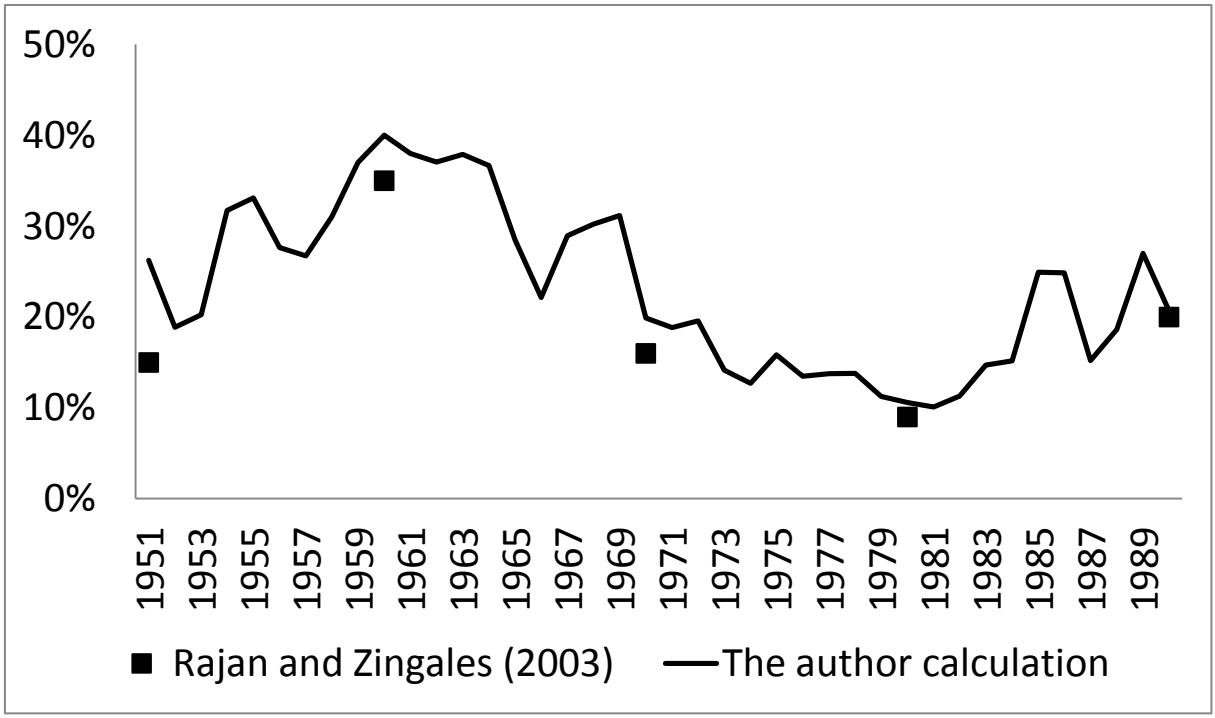


Figure Ap 1b:
Market capitalization to GDP in the UK, comparison with Rajan and Zingales (2003)

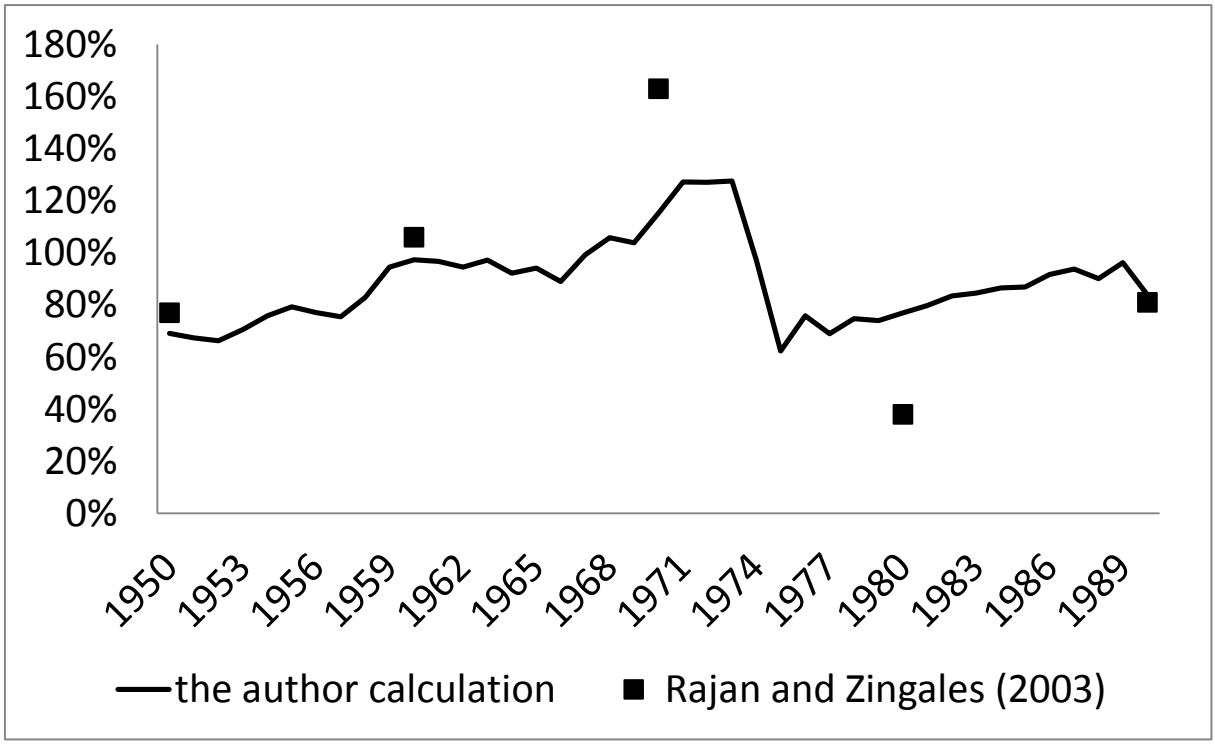


Figure Ap 1c:
Market capitalization to GDP in Italy, comparison with Rajan and Zingales (2003)

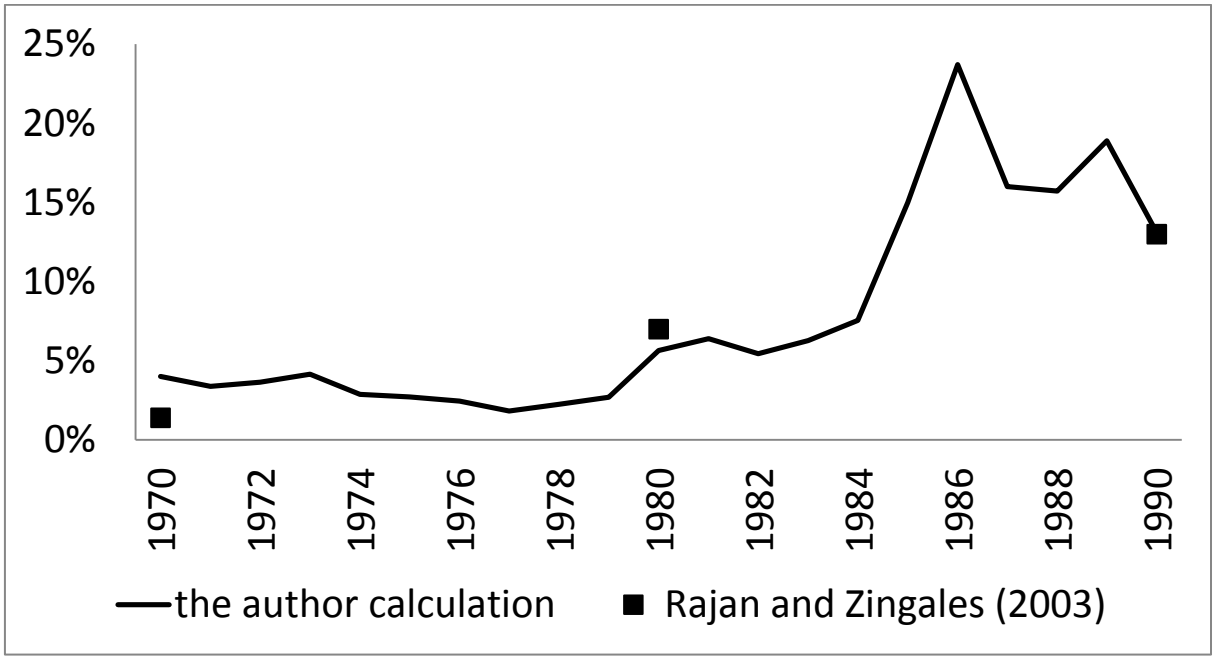
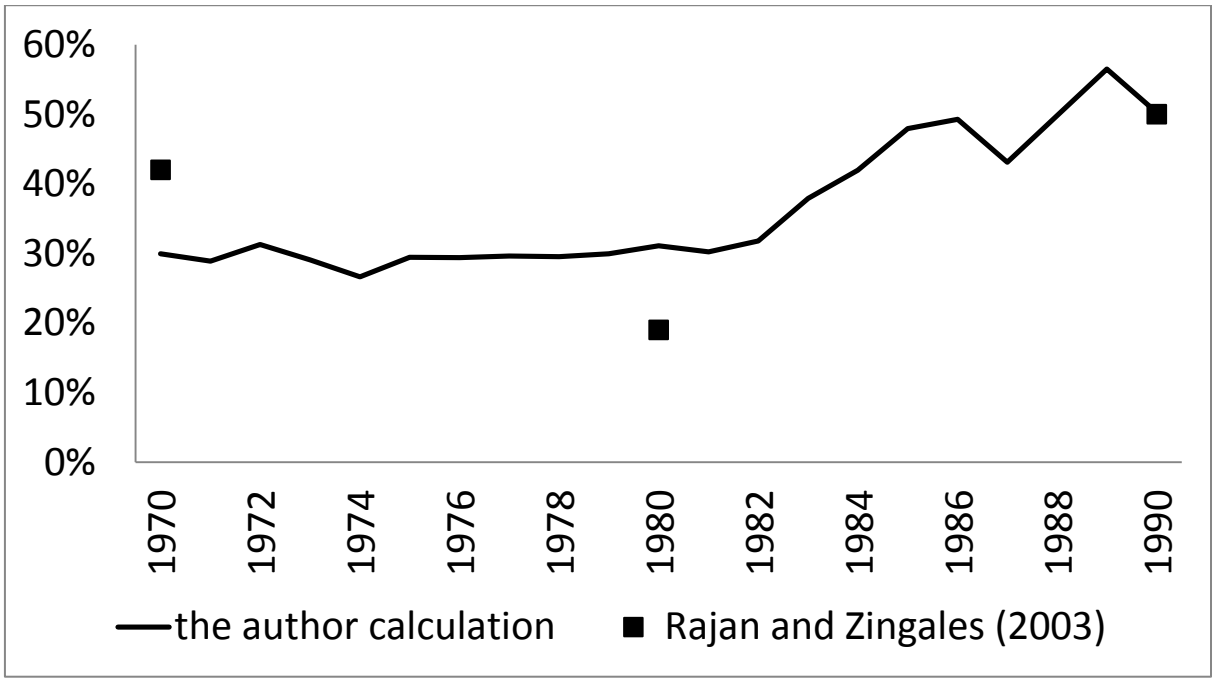


Figure Ap 1d: Market capitalization to GDP in the Netherlands, comparison with Rajan and Zingales (2003)



L'Institut des politiques publiques (IPP) est développé dans le cadre d'un partenariat scientifique entre PSE-Ecole d'économie de Paris (PSE) et le Centre de Recherche en Economie et Statistique (CREST). L'IPP vise à promouvoir l'analyse et l'évaluation quantitatives des politiques publiques en s'appuyant sur les méthodes les plus récentes de la recherche en économie.

PSE-Ecole d'économie de Paris regroupe plus de 120 chercheurs, 200 doctorants et 300 étudiants, et constitue un pôle français en science économique de renommée mondiale. PSE a pour objectif premier de fédérer, animer et assurer le rayonnement de ses chercheurs, tout en proposant des formations généralistes et spécialisées à la pointe de la discipline, du M1 au doctorat. La fondation vise également à tisser des liens pérennes entre les différents univers « consommateurs » de savoirs économiques : les acteurs académiques, institutionnels et privés. www.parisschoolofeconomics.eu

PARIS SCHOOL OF ECONOMICS
ÉCOLE D'ÉCONOMIE DE PARIS

Le CREST est le centre de recherche du GENES (Groupe des Ecoles Nationales d'Economie et Statistiques) qui est devenu le 1er janvier 2011 un établissement public à caractère scientifique, culturel et professionnel (EPSCP), sous la tutelle technique de l'INSEE (ministère de l'Economie, des Finances et de l'Industrie). Le GENES regroupe quatre établissements : le CREST, le CEPE, l'ENSAE et l'ENSAI. Il a vocation à conduire des travaux de recherche, des missions d'étude ou d'expertise et des actions de diffusion. Il est en outre habilité à développer des dispositifs d'accès aux données, notamment de la statistique publique. www.crest.fr

CREST
Centre de Recherche en Économie et Statistique