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Wages and Human Capital in Finance: International Evidence, 1970-2005*

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Abstract

We study the allocation and compensation of human capital in the finance industry in a set of developed economies in 1970-2005. Finance relative skill intensity and skilled wages generally increase but not in all countries, and to varying degrees. Skilled wages in finance account for 36% of increases in overall skill premia, although finance only accounts for 5.4% of skilled private sector employment, on average. Financial deregulation, financial globalization and bank concentration are the most important factors driving wages in finance. Differential investment in information and communication technology does not have causal explanatory power. High finance wages attract skilled international immigration to finance, raising concerns for "brain drain".

JEL codes: G2, J2, J3

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1 Introduction

High wages in finance have received significant attention following the 2007–2008 financial crisis, both in the United States and in Europe. The crisis sparked a growing interest in understanding what explains high wages in finance, due to the perceived centrality of finance as the cause, catalyst or propagator of the Great Recession. There are four main reasons for this. First, the persistence of high wages in finance even after the crisis begs the question whether social returns are dwarfed by private returns to workers in finance. If high wages in finance reflect short-term and private incentives, then these may not be aligned with long-term goals and social returns. Second, socially inefficient high wages in finance may draw talent from other more productive sectors of the economy. Third, financial development has an important role in explaining economic development in broad cross sections of countries (e.g., Rousseau and Sylla (2003) and Levine (2005)). Therefore, it is important to understand the internal organization of finance, as well as the indirect effects of financial development.[1] Fourth, high wages in finance contribute significantly to overall inequality. We estimate that skilled wages in finance explain on average 36% of increases in overall skill premia across countries in our sample. This is striking given that finance's share of skilled workers in private sector employment is only 5.4%, on average.

While rising finance wages have been documented in several countries, the causes are still not well-understood.[2] We show that changes in educational composition explain little of the evolution of finance wages. Philippon and Reshef (2012) argue that the most important factor affecting wages in finance in the United States is financial deregulation. We bring new data and introduce better identification strategy to bear on this claim.

We investigate five potential explanations for the rise in wages in finance—always relative to the rest of the non-farm private sector—in a set of 22 industrialized and transition economies in 1970–2005: Deregulation, technology, financial globalization, expansion of domestic credit and banking concentration. We confirm that the most important driver of finance relative wages is deregulation, and the economic effect is large. Figure 1 illustrates this relationship, where increases in finance relative wages follow deregulation. We also find that higher bank concentration within finance is related to higher finance wages. Finally, we show that high wages in finance attract skilled workers

[1] However, it is important to distinguish between human capital and wages within finance, and its overall size. Juxtaposing findings in Philippon and Reshef (2012) with those in Philippon and Reshef (2013) we see that the growth of finance and its internal organization are not the same phenomena, and follow different—although probably not independent—paths.

[2] For patterns of changes in relative wages see Philippon and Reshef (2012) for the United States, Célérier and Vallée (2015) for France, Lindley and McIntosh (2014) for the United Kingdom, to which Wurgler (2009) adds Germany, Bohm, Metzger, and Stromberg (2015) for Sweden, and Philippon and Reshef (2013) for several other developed economies.

across international borders, highlighting allocation effects and potential brain drain.

A few papers have studied individual level micro data on finance wages; however, none of them studies directly the underlying determinants of the rise in finance wages, which lie at the industry level. Our work aims to fill this gap. By using panel data for several countries over time, and by employing IV regressions, we try to identify the causal relationship between financial regulation and wages in finance.[3] Our paper has two shortcomings compared to Philippon and Reshef (2012). First, our sample is shorter. Second, the consistency across countries of the financial regulation variables may neglect country-specific features of legislation; we elaborate on the last point below.

Wages in finance may increase through three channels: (1) an increase in skill, unobserved quality or "talent" of workers in the sector (composition); (2) an increase in the returns to skill or talent in finance, holding constant the composition; and (3) industry rents, defined as compensation that is over and above a competitive wage. Using data on French engineers in 1983–2011, Célérier and Vallée (2015) estimate that the entire increase in finance wages in their sample is explained by sector-specific increases in returns to talent in this sector. In contrast, Bohm, Metzger, and Stromberg (2015) find that the increase in relative wages in finance in Sweden in 1991–2010 cannot be explained by changing returns to talent. Moreover, they show that average talent—measured by cognitive test scores and high-school grades—has not increased in finance relative to other sectors. Their findings imply that the entire increase in finance wages must be attributed to rents. Lindley and McIntosh (2014) study a sample of 378 workers in finance in the United Kingdom and—similar to Bohm, Metzger, and Stromberg (2015)—do not detect an increase in talent (measured as numeracy). While job characteristics and technological change go some way in explaining the rise in finance wages within their sample, a large residual is left unexplained.

Financial regulation affects wages in finance through limits on the scope and scale of financial activity within the financial sector, in particular activity that is more prone to asymmetric information and risk taking. This is particularly true for highly skilled individuals, because rules and restrictions on the range and nature of their activities reduce the need for incentive pay (Philippon and Reshef (2012)).[4] Goodhart, Hartmann, Llewellyn, Rojas-Suarez, and Weisbrod (1998) illustrate that the pervasiveness of asymmetric information in finance leads to a different effect of deregulation there versus other industries, where we expect—and usually find—wage reductions,

[3] Tanndal and Waldenstrom (2015) use synthetic control group methodology and find that financial deregulation affects overall top income shares; they do not study finance wages directly and do not discuss causality. See also Godechot (2015) on the relationship of inequality with other finance-related correlates.

[4] Guadalupe (2007) provides evidence that competition in the product space increases demand for skill. Wozniak (2007) studies the effect of banking deregulation in the United States on the structure of compensation *within* banking; she finds that within-establishment inequality droped, while between-establishment inequality increased. This reflects the effect of deregulation on industry organization.

not increases.[5]

We find that higher wages in finance are associated with financial deregulation and bank concentration, consistent with the model of Korinek and Kreamer (2014). In their model these forces increase compensation in the financial sector (at the expense of the rest of the economy) and are associated with higher risk taking. Axelson and Bond (2015) study a model in which the threat of moral hazard is associated with high wages and rents in finance. Closely related, Bolton, Santos, and Scheinkman (2011) and Biais and Landier (2015) study models in which more opaque activities are related to higher informational rent extraction.[6]

Acharya, Pagano, and Volpin (2013) study a model in which an increase in firm-to-firm mobility make employers provide excessive short term compensation, while the employees take excessive long term risk. Bijlsma, Zwart, and Boone (2012), Thanassoulis (2012) and Benabou and Tirole (forthcoming) study models in which competition between banks leads to competition for banker talent, which manifests in high banker compensation and incentive pay (bonuses) and unnecessarily high (long run) risk for banks. In a similar vein, Glode and Lowery (forthcoming) argue that competition for traders—as opposed to bankers, who increase surpluses—is associated with higher rents and reduced social efficiency. Empirically, Efing, Hau, Kampkotter, and Steinbrecher (2014) find that incentive pay (bonuses) are positively correlated with trading volume and volatility, and that this has diminished somewhat after 2008. Cheng, Hong, and Scheinkman (2015) find that residual compensation of chief executive officers (CEOs) and risk-taking are positively correlated across finance firms in 1992–2008.[7]

We stress that none of these papers relate pay or risk outcomes *empirically* to regulation. Our results are in line with the importance of these mechanisms, although we are not able to separately identify these channels. We do find, however, a strong association between non-bank credit and wages in finance, which is consistent with the importance of "over the counter" markets. We also find a strong correlation between greater banking industry concentration in increasing finance wages. Less competition in banking is likely to contribute to abnormal profits and rents, and this can drive up finance wages if profits and rents are shared with workers, as in Akerlof and Yellen

[5] Peoples (1998) discusses the effects of product market deregulation on wages in the American trucking, railroad, airline and telecommunications industries, where unionization played a major role. Regulation—and deregulation—of entry and prices in these industries followed a pattern similar to that suggested in the classic Stigler (1971) paper.

[6] Bolton, Santos, and Scheinkman (2011) stress the social inefficiency caused by informational rents in opaque "over the counter" markets versus transparent organized markets. While Axelson and Bond (2015) highlight differences in the threat of moral hazard across industries, Biais and Landier (2015) characterize conditions (within an overlapping generations model) under which opacity and rent extraction increase over time.

[7] This is consistent with evidence in Philippon and Reshef (2012), who show that scale effects explain little of the wage differential of CEOs in finance versus CEOs in other sectors after 1990, leaving other mechanisms, such as risk taking.

(1990).[8]

Information and communication technology (ICT) may drive increases in relative wages for skilled labor in finance as suggested by Autor, Katz, and Krueger (1998) and Autor, Levy, and Murnane (2003).[9] Within finance, Autor, Levy, and Murnane (2002) document how computerization affects demand for labor and job complexity in two large banks.[10] Morrison and Wilhelm (2004) and Morrison and Wilhelm (2008) argue that investment in ICT affected the optimal organization of investment banks in the United States. We document that finance increased its relative intensity of ICT and we estimate that ICT is relatively more complementary to skill in finance than in other sectors. While we find that the increase in relative ICT intensity in finance is positively *correlated* with relative skilled wages in finance, this relationship is not causal. While ICT may increase the productivity of skilled workers in finance, the results suggest that this force is not *differentially* stronger relative to other sectors.[11] In contrast, the relationship of finance relative wages with financial deregulation is robust and causal. These results contribute to the understanding of demand for skill and income inequality.

One concern about high wages in finance is that they attract skilled workers from other parts of the economy, where they may be more productive socially. If competition for talent is fierce, the same forces may manifest themselves across international borders. Here, it is plausible that attracting skilled workers from other countries has detrimental effects on the country of origin via brain drain. In order to address this issue, we ask whether high wages in finance attract skilled workers across international borders. We use bilateral immigration data in a sample of 15 industrialized countries, where immigrants in each destination are differentiated by level of education and

[8] Azar, Raina, and Schmalz (2016) show that cross-ownership of banks in the U.S. is related to higher fees, some of which can be passed on to workers.

[9] The overall rise in relative demand for more educated workers in developed countries, as well as the increase in their relative wages, is well documented; see for example Machin and Van Reenen (1998). Berman, Bound, and Machin (1998) attribute this to skill-biased technological change. See Acemoglu (2002b) for a review of the early literature on skill biased technological change. Acemoglu and Autor (2011) highlight these and other forces that may affect relative demand, in particular globalization and offshoring; they also provide an up-to-date report on empirical findings and theoretical considerations. Acemoglu (2002a) argues that the increase in supply of more educated workers biases innovation towards equipment that is more complementary to their skills. For other explanations for the increase in demand for skilled workers see Card (1992), Card and Lemieux (2001), and Acemoglu, Aghion, and Violante (2001).

[10] Autor, Levy, and Murnane (2002) focus on digital imaging technology. A more recent technology in banking is internet-based services, that can replace low and medium-skilled employees, and leverage the skills of highly skilled employees who design these services.

[11] For example, does ICT make skilled workers in investment banking more productive than skilled workers at Google? The results suggest, no. Morrison and Wilhelm (2004) and Morrison and Wilhelm (2008) argue that investment in ICT affected the optimal organization of investment banks in the United States: Codification of activities reduced the incentives for accumulation of tacit human capital through mentorship, which led to change from partnerships to joint stock companies. This change would also lead to higher wage compensation versus illiquid partnership stakes that are "cashed in" only upon retirement. Although this argument is germane only to American investment banks—while we study 22 countries—our results are not inconsistent with it.

industry. We fit regression models that resemble gravity equations from the international trade and finance literatures (e.g., Ortega and Peri (2014)) and find that high wages in finance do attract skilled workers across borders. This raises concerns that high wages in finance may lead to brain drain. This effect is not present for unskilled workers, which is likely due to higher barriers for low skilled workers to immigrate relative to the pecuniary benefit of doing so.

These findings contribute to the literature on the allocation of talent. Both Baumol (1990) and Murphy, Shleifer, and Vishny (1991) stress the importance of allocating the most talented individuals in society to socially productive activities. Policies and institutions that can readily influence this allocation can be much more important for welfare than the overall supply of talent.[12] Goldin and Katz (2008) document increasing shares of Harvard University undergraduates who choose a career in finance since 1970, as well as an increasing wage premium that they are paid relative to their piers.[13] Wurgler (2009) and Cahuc and Challe (2012) argue that the existence of financial bubbles can attract skilled workers to finance, and Oyer (2008) shows that during financial booms more Stanford MBAs are attracted to finance.[14] Kneer (2013) argues that financial deregulation is detrimental to other skill intensive sectors, while Cecchetti and Kharroubi (2013) argue that credit growth hurts disproportionately R&D-intensive manufacturing industries. Although direct evidence is not provided, these authors interpret their findings as indicating a brain drain from the real economy into finance. Here we provide direct evidence that internationally, high wages in finance attract highly educated individuals.

In the next section we document a set of facts about wages and skill intensity in finance. In section 3 we entertain explanations for the rise in relative wages in finance. In Section 4 we show how high wages in finance attract skilled workers across borders (skilled immigration). In Section 5 we offer concluding remarks.

2 Data and facts

Our sample is a set of 22 industrialized and transition economies in 1970–2005. We rely on the EU KLEMS dataset, March 2008 release.[15] Finance is comprised of three subsectors: Financial intermediation, except insurance and pension funding (by banks, savings institutions, and companies

[12] See also the equilibrium model of Acemoglu (1995), where both the allocation of talent and relative rewards are endogenously determined.

[13] Shu (2013) finds no increase in the proportion of graduates from M.I.T. working in finance in 2006-2012, but this sample is already at the end of a long process of increasing shares of graduates from elite American universities working in finance, for example in Harvard University (Goldin and Katz (2008)).

[14] Using survey data for the United States, United Kingdom, Germany and France, and controlling for observables, Wurgler (2009) finds similar trends to our wage series for these countries.

[15] See appendix for list of countries and years covered for each country. See O'Mahony and Timmer (2009) for more detailed documentation.

that provide credit services); insurance and pension funding, except compulsory social security; and other activities related to financial intermediation (securities, commodities, venture capital, private equity, hedge funds, trusts, and other investment activities, including investment banks). For notational simplicity we will refer to this sector as "Finance".

Disaggregating finance into its sub-sectors does not yield informative time series for two reasons. First, there are relatively few observations in the EU KLEMS dataset on separate sub-sectors within finance, and they typically start relatively late in the sample. Second, and more importantly, the separation into subcomponents of finance is not very informative in countries that have universal banking/insurance systems, which are the majority in our sample. The industrial classification of sub-sectors within finance in the EU KLEMS dataset (as well as in the OECD STAN database) does not clearly represent functional differences. While this separation is informative in the U.S., it is relatively uninformative elsewhere.[16]

We analyze the evolution of time series in finance *relative* to the non-farm, non-finance, private sector, which we denote as NFFP. All labor concepts pertain to employees. We chose not to use the slightly different concept of "persons engaged", which includes proprietors and non-salaried workers in addition to employees, for the following reason. Total compensation of persons engaged is calculated in the EU KLEMS by total compensation of employees multiplied by the ratio of hours worked by persons engaged to hours worked by employees. This implies the same average wage for salaried and non-salaried workers, which is woefully inadequate when comparing finance to other sectors of the economy.

Here we summarize our descriptive findings. First, we observe significant heterogeneity across countries in the trends and levels of relative wages in finance. Second, we find that most of the variation in finance relative wages is accounted for by skilled workers' wages in finance; changes in relative skill intensity explain little of the overall evolution of relative wages in finance. Third, we show that finance skilled relative wages explain on average 36% of increases in overall skill premia across countries in our sample, thus contributing significantly to wage inequality. This is striking given the size of the sector in total private sector employment, which is on average only 5.4%. These findings motivate us to examine both overall finance relative wages and finance skilled relative wages in the regression analysis below.

[16] This point is also illustrated in Bazot (2014), where national accounts in Europe do not capture capital income of commercial banks.

2.1 Finance relative wages

The finance relative wage is defined as

$$\omega_t = \frac{w_{\text{fin},t}}{w_{\text{nffp},t}} \ , \tag{1}$$

where $w_{s,t}$ is the average wage across all workers in each sector $s \in \{\text{fin,nffp}\}$, calculated as total compensation of employees divided by the total hours worked by employees. Figure 2 depicts the finance relative wage in our sample, where we group countries based on whether ω is increasing, decreasing or exhibits a mixed trend. We split the countries where ω is increasing into two separate panels in order to ease the exposition. Overall, there is significant heterogeneity in the trends of ω across countries: 11 countries see increases, while the remainder are split between decreases and mixed trends.[17]

What is the importance of changes in the skill composition of finance for the relative wage of finance? In order to answer this question we decompose changes in ω into within and between skill group changes using the formula

$$\Delta\omega = \sum_i \Delta\omega^i \overline{n}^i_{\text{fin}} + \sum_i \Delta n^i_{\text{fin}} \overline{\omega}^i \ , \tag{2}$$

where $i \in \{\text{skilled,unskilled}\}$ denotes skill groups. Here $\Delta\omega^i$ is the change over some period of the relative wage of skill group i in finance, w^i_{fin}, compared to w_{nffp} (the average wage in the NFFP sector), $\overline{n}^i_{\text{fin}}$ is the average employment share of skill group i in finance, Δn^i_{fin} is the change in the employment share of skill group i within finance, and $\overline{\omega}^i$ is the average relative wage of skill group i in finance compared to the average wage in the NFFP sector.[18] The first sum captures the contribution of wage changes within groups, while the second sum captures the contribution of changes of skill composition (the "between" component). We compute this decomposition for each country in the sample. The definition of high skilled workers in the EU KLEMS is consistent across countries and time, and implies a university-equivalent bachelors degree.

Table 1 Panel A reports $\Delta\omega$, the within share ($\sum_i \Delta\omega^i \overline{n}^i_{\text{fin}}/\Delta\omega$) and the between share ($\sum_i \Delta n^i_{\text{fin}} \overline{\omega}^i/\Delta\omega$) for all countries, sorted by $\Delta\omega$. The within share is on average much larger than the between share, 1.67 versus -0.67, respectively. Even after dropping the United Kingdom and Austria, whose tiny $\Delta\omega$ in this period inflates their within share, the within share is on average 0.78 versus 0.22 for the

[17] Notable here is the United Kingdom, where ω fluctuates substantially. We also computed ω using data from the OECD STAN database and the series are very similar to what we find here using EU KLEMS, in particular for the UK. It is the real average wage in finance w_{fin} that explains most of the mixed pattern, not the average real wage in the rest of the economy w_{nffp}. As we show below, the UK relative wage of skilled workers in finance behaves less erratically, i.e, it increased substantially during the sample period, in a similar fashion to other countries.

[18] Averages are over beginning and end of period of change.

between share. This implies that within group wage changes matter much more than changes in skill composition for explaining the finance relative wage.

To illustrate this point in a different way we examine the finance excess wage, which we define as the difference between the actual relative wage, ω, and a benchmark relative wage, $\widehat{\omega}$:

$$\omega_t^{\text{excess}} = \omega_t - \widehat{\omega}_t \ .$$

The benchmark wage $\widehat{\omega}$ is defined as the finance relative wage that would prevail if skilled and unskilled workers in finance earned the same as in the NFFP sector:

$$\widehat{\omega}_t = \frac{(1 - n_{\text{fin},t}^{\text{skilled}}) \cdot w_{\text{nffp},t}^{\text{unskilled}} + n_{\text{fin},t}^{\text{skilled}} \cdot w_{\text{nffp},t}^{\text{skilled}}}{(1 - n_{\text{nffp},t}^{\text{skilled}}) \cdot w_{\text{nffp},t}^{\text{unskilled}} + n_{\text{nffp},t}^{\text{skilled}} \cdot w_{\text{nffp},t}^{\text{skilled}}}. \tag{3}$$

Here $n_{s,t}^{j}$ is the employment share of type $j \in \{\text{unskilled , skilled}\}$ workers in sector s, and $w_{\text{nffp},t}^{j}$ is the wage of type $j \in \{\text{unskilled , skilled}\}$ workers in the NFFP sector.

Figure 3 reports ω_t^{excess} using the same country grouping as Figure 2. The sample is restricted relative to Figure 2 due to availability of data on wages and employment by skill level. The trends in ω^{excess} are almost identical to those of ω, with few exceptions. This reinforces the point made above: Most of the variation in the finance relative wage is due to within-skill wage shifts. A closer inspection of the data shows that most of the excess wage is due to the relative wage of high skilled workers in finance. The relative wage of skilled workers in finance tracks ω very closely, as we illustrate next.

The relative wage of skilled workers in finance is defined as

$$\omega_t^{\text{skilled}} \equiv \frac{w_{\text{fin},t}^{\text{skilled}}}{w_{\text{nffp},t}^{\text{skilled}}} \ , \tag{4}$$

where $w_{s,t}^{\text{skilled}}$ is the average wage of skilled workers in sector $s \in \{\text{fin,nffp}\}$, calculated as total compensation of skilled employees divided by the total hours worked by skilled employees. Figure 4 depicts ω^{skilled}, where we group countries based on whether it is increasing, decreasing or exhibits a mixed trend. The sample is restricted relative to Figure 2 due to availability of data on wages and employment by skill level. As with relative average wages, there is significant heterogeneity in the trends of ω^{skilled} across countries: 12 countries see increases, three see decreases, and seven exhibit mixed trends. Australia exhibits the largest increase (but recall the drop in ω until 1985), followed by the United Kingdom, the United States and Canada. In these countries skilled workers in finance command a wage premium of 50–80% relative to similarly-educated workers in the NFFP sector.

2.2 Finance relative skill intensity

We define the relative skill intensity in finance as

$$\eta_t \equiv n_{\text{fin},t}^{\text{skilled}} - n_{\text{nffp},t}^{\text{skilled}} \ ,$$

where $n_{s,t}^{\text{skilled}}$ is the employment share of high skilled workers in sector $s \in \{\text{fin,nffp}\}$. Figure 5 depicts η_t for two groups of countries. In Panel A we group countries who see relative skill intensity in finance consistently increasing. Spain and Japan see the largest increases, where finance becomes almost 30 percentage points more skill intensive than the rest of the economy in 2005.

It is interesting to compare the changes in relative skill intensity to changes in finance relative wages. Spain and the Netherlands see significant increases in both. But Luxemburg and the United States, while exhibiting the largest increases in ω, see only very modest increases in η. This is manifested in the poor ability of the benchmark wage, $\widehat{\omega}_t$, to track the finance relative wage, especially in the countries and periods when the increase in the finance relative wage is large.

What does relative skill intensity in finance, η_t, capture? Using Swedish data, Bohm, Metzger, and Stromberg (2015) show that relative skill (education) in finance is a poor measure of relative ability—measured as cognitive and non-cognitive test scores at age 18. While relative education increases, relative ability—thus measured—does not follow a similar trend.

If so, why does finance become so much more education-intensive over time in some countries? One reason may be barriers to entry: If there are industry rents, tertiary and even post-graduate education may serve only as a screening device. This resonates with Bohm, Metzger, and Stromberg (2015), who find that returns to ability in finance have not increased over time, and therefore cannot explain the increase in finance wages in Sweden.[19] Alternatively, certain types of fields of study may be relatively more important in finance, given ability. Our findings are consistent with both hypotheses: Increasing relative skilled wages in finance may reflect skilled workers capturing most of the industry's rents, as well as heterogeneity in fields of study.

Whatever the reason may be, variation in skill composition in finance does not help much explaining the variation in relative finance wages, as we saw above. Therefore, we do not explore in detail its determinants in the regression analysis below.

[19] This contrasts with Célérier and Vallée (2015), who find that differentially increasing returns to ability of French engineers fully explains increases in their wages in finance. However, Célérier and Vallée (2015) do not address the overall composition of ability in finance.

2.3 Contribution of finance wages to inequality

Changes in the relative wage of skilled workers are an important dimension of overall changes in wage inequality. Therefore, we wish to assess how much finance contributes to changes in the relative wage of skilled workers in the nonfarm private sector (including finance), denoted here as $\Delta\pi$.[20] We decompose $\Delta\pi$

$$\Delta\pi = \sum_s \Delta\pi_s \overline{n}_s + \sum_s \Delta n_s \overline{\pi}_s \ , \tag{5}$$

where $\Delta\pi_s$ is the change over some period in the relative wage of skilled workers in sector $s \in$ {fin,nffp} relative to the overall average wage of unskilled workers in the nonfarm private sector, denoted w_t, $\pi_s = w_{s,t}^{\text{skilled}}/w_t$, and $\overline{\pi}_s$ is the average relative wage of skilled workers in sector s, thus defined.[21] Here $\overline{n}_s$ is the average share of skilled workers employed in sector s out of total skilled nonfarm private sector employment and Δn_s is the change in that share for sector s. The first sum captures the contribution of wage changes within sectors, while the second sum captures the contribution of allocation of skill across sectors (the "between" component). We compute this decomposition for each country in the sample.

Another way to arrange the elements of (5) is

$$\Delta\pi = (\Delta\pi_{\text{fin}}\overline{n}_{\text{fin}} + \Delta n_{\text{fin}}\overline{\pi}_{\text{fin}}) + (\Delta\pi_{\text{nffp}}\overline{n}_{\text{nffp}} + \Delta n_{\text{nffp}}\overline{\pi}_{\text{nffp}}) \ . \tag{6}$$

We focus on the first term in parentheses, which captures the contribution of finance, due to both the effect of changes in finance skilled wages, and the effect of changes in allocation of skilled workers to finance.

Table 1 Panel B reports $\Delta\pi$, the within share ($\sum_s \Delta\pi_s\overline{n}_s/\Delta\pi$), the between share ($\sum_s \Delta n_s\overline{\pi}_s/\Delta\pi$), and the finance share ($(\Delta\pi_{\text{fin}}\overline{n}_{\text{fin}} + \Delta n_{\text{fin}}\overline{\pi}_{\text{fin}})/\Delta\pi$) for all countries, sorted by $\Delta\pi$ in decreasing order. We see that π has increased in several countries in our sample, while in others it has not, and in some cases even declined. Countries that see a large decrease in π are those who expanded educational attainment rapidly in this period.[22] More importantly, the within share completely dominates, and it is on average equal to one: Changes in relative skilled wages overall, not changes

[20] Using survey data and corrections for top coding, Philippon and Reshef (2012) find that finance accounts for 15% to 25% of the overall increase in wage inequality in the United States in 1980–2005. Roine and Waldenstrom (2014) show how close the finance relative wage in Philippon and Reshef (2012) tracks the share of income of the top percentile in the U.S. over the entire 20$^{\text{th}}$ century. In line with this, Bakija, Cole, and Heim (2012) document that financial professionals increased their representation in the top percentile of earners (including capital gains) from 7.7% in 1979 to 13.2% in 2005, while their representation in the top 0.1 percentile of earners from 11.2% in 1979 to 17.7% in 2005 (see also Kaplan and Rauh (2010)). For similar evidence for the United Kingdom and France, see Bell and Reenen (2013) and Godechot (2012). In line with these studies, Denk (2015b) shows that, with some variation, finance is over-represented in the top 1 percent of earners accross all European countries in 2010.

[21] Averages are over beginning and end of period of change.

[22] For example, see Verdugo (2014) for the case of France.

in allocation of skilled workers to finance (despite $\overline{\pi}_{\text{fin}} > \overline{\pi}_{\text{nffp}}$), drive $\Delta\pi$.

Finance skilled wages contribute disproportionately to the skill premium. When we examine this in Table 1 Panel B, it is useful to differentiate between cases in which the finance share is positive, and when it is negative. When the finance share is positive, finance contributes to changes in π in the same direction that π changes. The average contribution across these cases is 36% (26% without Australia). When the finance share is negative, this means that finance contributes to $\Delta\pi$ in the opposite direction. With the exception of Italy (where finance relative wages decline sharply, albeit from a high level), this happens when $\Delta\pi$ is negative. This implies that even as overall trends in the economy are to lower inequality, finance counters this and contributes to increasing inequality. The average contribution across these cases is -21%. The between component within the finance share, $\Delta n_{\text{fin}}\overline{\pi}_{\text{fin}}$, is very small (not reported); almost all of the finance share is explained by increases in relative skilled wages within finance, i.e. $\Delta\pi_{\text{fin}}\overline{n}_{\text{fin}}$. Given the size of finance in total skilled employment (on average 5.4%, excluding Luxemburg, which employs 20% of its skilled workers in finance) these are large contributions to the skill premium.[23]

3 Explaining the evolution of finance relative wages

We entertain five theories for explaining variation in finance relative wages: technology adoption; financial deregulation; domestic credit expansion; financial globalization; and banking competition. This section motivates each one of these and the explanatory variables used to measure them, followed by our analysis.

We stress that we wish to explain the *differential* part of the rise in wages in finance, i.e. relative to the NFFP sector. Some of the forces that affect wages in finance operate in analogous ways in the NFFP sector; for example, the precipitous drop in the price of computing power. Here we estimate the differential effects on finance.

3.1 Explanatory variables

Information and communication technology

The strong complementarity of ICT with non-routine cognitive skills — such as those valued in the financial sector — may be able to help explain changes in finance relative wages. Autor, Katz, and Krueger (1998) and Autor, Levy, and Murnane (2003) highlight the role of ICT in changing demand for skill—in particular, replacing routine tasks and augmenting non-routine cognitive skills.

[23] Denk (2015a) calculates more modest contributions of finance wages to inequality. The main reason for this is that his measure of inequality is the Gini coefficient, which is inadequate when most of the finance wage premium is concentrated at the top of the distribution. In addition, his analysis is based on employer survey data, which may not include all relevant wage concepts.

If highly educated workers possess such non-routine cognitive skills, then higher ICT intensity in finance can help explain the higher wages that highly educated workers in finance command, relative to similar workers in the rest of the economy.

We consider the share of computers, software, and information & communication technology in the capital stock of the financial sector minus that share in the aggregate economy. Investment in ICT should have a big return for finance, which is an industry that relies almost entirely on gathering and analyzing data.[24] The return may be greater than in the NFFP sector, leading to relatively more ICT investment and higher stocks in finance than in the rest of the economy.

The EU KLEMS dataset provides data on real capital stocks by industry (in 1995 prices), the share of ICT in the real capital stock, and quantity indices for the total industry capital stock, ICT capital and non-ICT capital. Not all countries in the sample report data on real capital stocks, although all report quantity indices (we use the latter in Section 3.2). For the purpose of illustrating an increase in ICT intensity we use the share of ICT in the real capital stock. We define the relative ICT intensity in finance as

$$\theta_{\text{fin},t} = ICT\_share_{\text{fin},t} - ICT\_share_{\text{nffp},t} \ ,$$

where $ICT\_share_{s,t}$ is the share of ICT in the real capital stock in sector $s \in \{\text{fin,nffp}\}$ at time t.

Table 2 reports θ_{fin} for countries that have the underlying data at four mid-decade years and decade-long changes. For almost all countries and decade intervals θ_{fin} increases over time. The changes also become bigger over time. Finance becomes more ICT-intensive relative to the NFFP sector practically everywhere, at an increasing rate. Finland exhibits by far the largest increase, followed by Denmark, Australia and the United States. Canada exhibits a low value of θ_{fin}, but this is because ICT intensity is high in the NFFP sector there.

Financial deregulation

The optimal organization of firms, and therefore their demand for various skills, depends on the competitive and regulatory environment. Tight regulation inhibits the ability of the financial sector to take advantage of highly skilled individuals because of rules and restrictions on the ways firms organize their activities, thus lowering demand for skill in finance. Philippon and Reshef (2012) argue that financial deregulation is the main driver of relative demand for skill in finance, and that technology and other demand shifters play a more modest role. As described before, Figure 1 plots both the average finance relative wage and level of deregulation across countries in our

[24] Indeed, the financial sector has been an early adopter of IT. According to U.S. fixed asset data from the Bureau of Economic Analysis, finance was the first private industry to adopt ICT in a significant way. In the EU KLEMS data, the average ICT share of the capital stock in finance is 2.6% in 1970, double the 1.3% share in the NFFP sector.

sample from 1973-2005. From this figure, it is clear that both average measures increased over the sample period. It also appears that increases in finance relative wages seem to follow changes in deregulation.

In order to capture the regulatory environment we rely on widely used data on financial reforms from the Abiad, Detragiache, and Tressel (2008) dataset. The dataset includes measures of financial reform along 7 dimensions:

1. *Credit controls.* This measure combines the restrictiveness of bank reserve ratios (>20%, 10-20%, <10%); and whether the government directs credit to certain sectors. Overall, this captures restrictiveness on the profitability of existing banks from lending, either by restricting leverage (but also risk), or by preventing optimal decisions on allocation of lending. When the measure is high, there are less restrictions.

2. *Interest rate controls.* This measure captures the degree to which the government regulates deposit and/or lending rates. Overall, these are interventions in the optimal choice of deposit and lending rates. When the measure is high, there are less restrictions.

3. *Entry barriers/pro-competition measures.* This measure captures: (1) The extent to which foreign banks are allowed to enter the domestic market; (2) Whether entry of new domestic banks is allowed; (3) Whether there are restrictions on bank branching; and (4) whether banks are allowed to engage in a wide range of activities. The last component distinguishes between universal banking versus Glass-Steagall-type separation of credit intermediation from investment activities, but it is not available separately. The measure is high when there is less restriction on activities and lower entry barriers.

4. *Banking supervision.* This measure captures: (1) Whether a country adopted a capital adequacy ratio based on the Basel standard; (2) Whether the banking supervisory agency is independent from executive branch influence; (3) Whether a banking supervisory agency conducts effective supervision through on-site and off-site examinations; and (4) Whether the country's banking supervisory agency covers all financial institutions without exception. A higher measure here implies that more of these conditions are met.

5. *Privatization.* This measure captures the degree to which the banking sector is government owned or controlled (>50%, 25-50%, 10-25%, <10%). Higher values mean a lower government share.

6. *International capital flows.* This measure captures three dimensions of interventions in foreign exchange: (1) Whether all types of international activities face the same exchange rate

("unified system"); (2) Whether there are restrictions on capital inflows; and (3) Whether there are restrictions on capital outflows. A higher measure implies fewer restrictions.

7. *Securities market policies.* This measure captures two different dimensions of securities market policy: (1) Whether a country takes measures to develop securities markets; (2) Whether a country's equity market is open to foreign investors.

All measures take values from 0 to 3 where higher values mean fewer restrictions.[25] In most of the paper we use the aggregate measure of financial deregulation that is the sum of all indices and is normalized to be between 0 and 1. We also investigate which indices have the most explanatory power.

One shortcoming of using these measures of regulation is that none of them addresses insurance services, which are an important part of the financial system. An additional shortcoming is that these measures, by virtue of being standardized across countries, miss country-specific differences in intensities, although they capture accurately the timing of reforms.[26] Table 3 summarizes levels of the regulation measures in 1973 and 2005, together with their change over this period. Many countries in the sample obtain the highest level in several dimensions before 2005, but there is some cross-country variation to the end of the sample.

Domestic credit and financial globalization

When demand for credit is high, it may be necessary to employ highly skilled workers to screen potential borrowers and investments, and then to monitor them and manage risk. Monitoring may require efficiency wages in order to avoid the threat of moral hazard. We capture this using domestic credit provided by the financial sector as a share of GDP. This concept includes gross credit to the private sector, as well as net credit to the government. The data are from the World Bank's World Development Indicators database.

We also use data from Jordà, Schularick, and Taylor (2014) (JST) on domestic bank credit to the private sector for 11 countries that are in our sample, and supplement these data with domestic bank credit data from the World Bank when possible. Overall, the bank credit data from JST and from the World Bank are very close for observations that exist in both sources. We use JST data to split bank credit into household versus corporate credit, and into mortgage

[25] All the indices but *Credit controls* take discrete values between 0 and 3, inclusive. *Credit controls* constructed based on two indices: *Directed credit*, which takes discrete values between 0 and 3, and *Credit ceilings*, which is binary (0 or 1). Specifically, *Credit controls* index is defined as *0.75*DirectedCredit+0.75*CreditCeilings*; when *Credit ceilings* is available, and as *Directed credit* otherwise (see Abiad, Detragiache, and Tressel (2008)).

[26] For example, the Abiad, Detragiache, and Tressel (2008) indices for the United States are not easily comparable to the deregulation measure in Philippon and Reshef (2012), which captures profound changes in the financial regulatory environment and removal of restrictions on organization and financial activities.

versus non-mortgage credit. These two splits are not the same: Although mortgage credit is a large part of household credit, substantial mortgage credit is obtained by the corporate sector, and households have substantial non-mortgage credit. When using World Bank domestic credit we made a few corrections for breaks in the series. See Appendix for detailed descriptions of data and the corrections we made.

Foreign investors that are represented by local financial firms may also demand high quality services, which can be performed only by skilled workers. Likewise, investment overseas is a more complex type of activity, which also requires highly skilled workers. If the skills needed to preform these tasks are in fixed supply, or supply does not keep up with demand, then wages of those who can perform these tasks well will be bid up. We capture this using a measure of *de facto* financial globalization, namely foreign assets plus foreign liabilities as a ratio to GDP. The data are from Lane and Milesi-Ferretti (2007).

Bank Concentration

Another important factor related to financial market structure that could explain the evolution of finance relative wages is bank concentration. First, if larger banks in concentrated markets have more market power this may contribute to abnormal profits and rents. This would affect the finance relative wage if profits and rents are shared with workers, as in Akerlof and Yellen (1990). Alternatively, bank concentration and higher profitability may create incentives to take on more risk and allocate a higher surplus to this sector at the expense of the rest of the economy, as in Korinek and Kreamer (2014).

We measure bank concentration by the log of the share of the three largest banks in total commercial banking assets.[27] The data are from the World Bank's November 2013 version of the Global Financial Development Database (originally collected by Bureau van Dijk in the Bankscope dataset). The data are available for many countries, but only from 1997 and on. Although banks do not comprise the entire financial sector, changes in bank concentration over time are indicative of overall concentration.

3.2 ICT and complementarity with high skilled workers

It is generally accepted that ICT capital is more complementary with skilled workers than with unskilled workers and indeed, we find this to be the case. We also estimate that ICT capital is more complementary with skilled workers in finance than with skilled workers in the NFFP sector. This,

[27] Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax, discontinued operations and other assets.

together with the increase in relative ICT intensity in finance, can be a mechanical force driving demand for skill and wages in finance.

A simple way to characterize complementarity is by using the following equation:

$$S^{\text{skilled}} = \eta + \alpha \ln \left(\frac{w^{\text{skilled}}}{w^{\text{unskilled}}} \right) + \beta \ln \left(\frac{C}{Q} \right) + \gamma \ln \left(\frac{K}{Q} \right) + \delta \ln Q \ , \tag{7}$$

where S^{skilled} is the wage bill share of skilled labor, C is ICT capital, K is all other forms of capital, and Q is output.[28] Here β and γ capture the degree of complementarity of skilled labor with ICT and other types of capital. Positive values imply complementarity to skilled labor.[29] If the underlying production function is constant returns to scale, then $\delta = 0$. While this is a reasonable assumption at the industry or aggregate level, we do not impose it.

We estimate empirical versions of (7) separately for finance, for the entire economy, and for the NFFP sector in panel data from the EU KLEMS dataset:

$$S_{ct} = \eta_c + \alpha \ln \left(\frac{w^{\text{skilled}}}{w^{\text{unskilled}}} \right)_{ct} + \beta \ln \left(\frac{C}{Q} \right)_{ct} + \gamma \ln \left(\frac{K}{Q} \right)_{ct} + \delta \ln Q_{ct} + \varepsilon_{ct} \ , \tag{8}$$

where c denotes countries, t denotes years, η_c are country fixed effects, and ε_{ct} is the error term. Our identifying assumption is that technology is stable over time, and that its curvature is the same across countries within an industry (the coefficients α, β, γ and δ do not vary over time or countries within an industry). The η_c terms allow technology to be different across countries within industries. All variables are industry-specific, including relative wages.

We use industry-specific quantity indices from the EU KLEMS dataset for C, K and Q, which are equal to 100 in 1995. This renders the C/Q and K/Q ratios equal to unity in 1995, but does not affect the estimation in the presence of country fixed effects. The proportional adjustment to make the ratios "real" is additive in logs and is absorbed by the country fixed effects η_c. Quantity indices are available for 22 countries in the EU KLEMS dataset, for different time periods.[30] Quantity indices are available for financial intermediation (finance in our taxonomy) and the aggregate economy. We manipulate indices for the aggregate economy, finance, farm and public sectors, to obtain indices for NFFP; see appendix for details. Doing this reduces the sample to the 16 countries in Table 2. We follow standard methodology (e.g. Berman, Bound, and Griliches (1994))

[28] Derivation of (7) starts with a translog cost function, and assumes that that capital is quasi-fixed. See, e.g., Berman, Bound, and Griliches (1994). We provide complete derivations in the appendix.

[29] To be precise, positive β or γ imply that either type of capital (ICT or other, respectively) is more complementary with skilled labor relative to unskilled labor.

[30] These are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Spain, Finland, France, Germany, Hungary, Irland, Italy, Japan, Korea, Luxemburg, Netherlands, Portugal, Slovenia, Sweden, United Kingdom, United States (NAICS based data).

and estimate (8) by TSLS, instrumenting for the capital shares using first, second and third lagged values; results using other lags are similar.

Table 4 reports the results, which indicate that ICT is complementary to skill for finance, the entire economy and the NFFP sector, but it is more complementary to skill in finance. The coefficient to $\ln(C/Q)$ is larger in finance, and this difference is also highly statistically significant. These results hold whether or not we include $\ln Q$ (i.e., whether we assume a constant returns to scale technology) or not. In untabulated results, we find similar results in specifications that constrain the country dummies to be equal in finance, the aggregate and NFFP.[31]

Stronger complementarity of ICT with skill in finance, together with the increase in relative ICT intensity in finance, can be a mechanical force driving demand for skill and wages in finance. We test this hypothesis below.

3.3 Econometric specification

In this section we describe our estimation of the relationships between the explanatory variables listed above and the measures of finance relative wages. We fit two sets of regressions.

The first set are descriptive regressions that are useful for summarizing the patterns in the data, but are less likely to identify causal effects. These take the form

$$y_{c,t} = \beta' x_{c,t-3} + \alpha_c + \delta_t + \varepsilon_{c,t} \ , \tag{9}$$

where y is either the finance relative wage ω or the finance skilled relative wage ω^{skilled}, both from Section 2. Here α_c and δ_t are country and year fixed effects, respectively, and ε_{ct} is the error term. The vector x includes explanatory variables, and the β vector of coefficients on these variables is what we are interested in. We lag x by three years to guard against simultaneity. Using longer lag lengths yield similar results, but reduces explanatory power. We estimate (9) using OLS; identification of β relies on within-country variation, relative to the average level in a particular year.

The second set of regressions are predictive regressions, which can have a causal interpretation, for which we also construct plausibly valid instruments to better identify causal effects. These take the form

$$\Delta y_{c,t+3} = \beta' \Delta x_{c,t} + \alpha_c + \varepsilon_{c,t} \ , \tag{10}$$

where $\Delta y_{c,t+3} = y_{c,t+3} - y_{c,t}$ and $\Delta x_{c,t} = x_{c,t} - x_{c,t-3}$. These regressions explain (within each country) the future 3-year changes in the dependent variables based on the past 3-year changes

[31] These results are available upon request.

in the right hand side variables, over and above country-specific trends and levels as they include country fixed effects. As a result, these regressions are less subject to omitted variable problems or endogeneity concerns. Identification of β relies on within-country variation in changes.

Specification (10) allows us to identify plausibly excludable instruments for variables in changes to further establish causality between financial deregulation and relative wages in finance. We use 3-year lagged financial regulation in levels as an instrument for changes in financial regulation over those three prior years. Abiad and Mody (2005) discuss political economy models that justify this specification.[32] The instrument is plausibly excludable. It is unlikely that the *level* of deregulation three years prior affects *changes* in wages over the subsequent three years, while controlling for changes in deregulation over those prior three years. And since the range of financial reform variables is limited between zero and three, a higher level (less regulation) is negatively correlated with increases (deregulation), and hence its relevance as an instrument.

Descriptive statistics for all regression variables are reported in Table 5. We report the levels and changes of relative finance wages and relative skilled wages in finance for each decade in the appendix Table A1. Correlations between all variables used in the regressions are also provided in the appendix Tables A2 and A3. All regressions report robust standard errors. The use of clustered errors by country is not appropriate due to the limited number of countries in our sample (Angrist and Pischke (2008)). Our standard errors do not change materially if we cluster by year, use Newey-West or if we use bootstrap estimation. We tested for serial correlation in all regressions using the procedure in Wooldridge (2002) pages 310–311 and did not reject the null hypothesis of no serial correlation at conventional levels of statistical significance.[33]

3.4 Finance relative wages descriptive level regressions

Table 6 reports the results from level regressions (9). First, we find that financial deregulation is positively associated both with overall finance relative wages and with relative skilled wages in finance—and the magnitude of the effect is economically significant. The estimated coefficients on the financial deregulation variable in columns 1 and 5 imply that weakening regulation by one standard deviation of the index in this sample is associated with an increase of overall wages and relative skilled wages in finance by 0.27 and 0.20 of a standard deviation, respectively. These effects grow significantly to 0.55 and 0.3 of a standard deviation in columns 3 and 8, respectively.

[32] Abiad and Mody (2005) use a nonlinear ordered logit regression, and include also the square of the level as predictor of change. We also experimented with adding the square of the level in the first stage and the results remain unchanged.

[33] Drukker (2003) presents simulation evidence that this test has good size and power properties. In addition, inspection of the partial autocorrelation functions revealed no evidence of autoregressive or moving averages in the errors.

Second, we find that relative ICT intensity in finance has a positive and statistically significant correlation with relative skilled wages in finance; however, the relationship with the overall finance relative wage is not significant. These results suggest that the positive effect of relative ICT intensity on skilled workers' wages is offset by a negative effect on unskilled wages, which is in line with findings in Autor, Levy, and Murnane (2002).

Third, *de facto* financial globalization (log of international assets plus liabilities as a share of GDP) is positively correlated with the overall finance relative wage but has no significant correlation with the skilled one. A one standard deviation increase in *de facto* financial globalization increases the average relative wage in finance by 0.57 of a standard deviation. The different results for the overall and skilled relative wages are due to a strong effect on relative skill intensity in finance (regressions not reported here, but are available upon request).

Fourth, domestic credit supply (as a share of GDP) is positively associated with both relative finance wage measures, and the effects are economically large. A one standard deviation increase in domestic credit increases overall wages and relative skilled wages in finance by 0.44 and 0.83 of a standard deviation.

Variation in different types of credit may have different effects on skilled wages in finance. The effect of non-bank credit is similarly strong as for overall credit in all regressions. However, bank credit only has a significant effect on the finance relative skilled wage. Within bank credit, it is credit to households and mortgage credit (which significantly, but not perfectly, overlap) that drive the result for skilled finance workers. This can be explained by the following observations. Most of the increase in the ratio of bank credit to GDP since 1970 in advanced economies has been driven by the dramatic rise in mortgage lending relative to GDP (Jordà, Schularick, and Taylor (2014)). This increase in mortgage lending made the creation and marketing of mortgage-backed securities and securitization more appealing, which subsequently led to higher skilled wages in finance as these activities are relatively complex and require specific skills.

We also examine whether the relationships we find above vary across countries with different financial systems. In particular, Anglo-Saxon countries have financial systems that are much more reliant on markets than on banks.[34] We add to the specification in Table 6 interactions of financial deregulation and financial globalization with a dummy for Anglo-Saxon countries. We conjecture that financial deregulation and financial globalization should be more important in Anglo-Saxon countries. The results in Table 7 support this hypothesis. Specifically, financial deregulation and financial globalization have a larger and statistically significant effect on relative (both average and skilled) wages in finance in Anglo-Saxon countries. When adding interaction terms for Anglo-Saxon

[34] The Anglo-Saxon countries in our sample are Australia, Canada, the United Kingdom, and the United States.

countries we also find that the effect of ICT increases. In unreported regressions we did not find differential effects for bank versus non-bank credit in Anglo-Saxon countries.

3.5 Finance relative wage predictive regressions

We now turn to the predictive regressions based on equation (10). These regressions predict the future 3-year changes in the finance relative wages within each country and controlling for any country-specific trends. Although this is a very demanding specification, we also use instrumental variables as an alternative identification of the causal effect of financial deregulation on relative wages in finance. We us the *level* of financial deregulation as an instrument for the next 3-year *changes* in financial deregulation. This instrument is strong, with very large first stage partial F-stats. In the appendix (Table A4) we report the first stage regressions, where, as expected, financial deregulation in levels is negatively correlated with future changes in deregulation.

Table 8 shows that the only robust predictor for changes in overall and skilled relative wages in finance is changes in financial deregulation. The magnitude of the effects are also economically large. In the OLS specification, a one standard deviation faster increase of the financial deregulation index corresponds to a 0.17 standard deviation faster increase in relative wages in finance, and 0.11 for skilled relative finance wages. The IV regression results are stronger. The standardized coefficients of financial deregulation changes on the overall and skilled relative wages are 0.44 and 0.31, respectively.

In unreported regressions, we also investigate differential effects for Anglo-Saxon countries in the predictive regressions. We interact financial deregulation and financial globalization with a dummy for the same set of Anglo-Saxon countries. Again, we find large additional effects that are statistically significant at the 1% level for both variables on overall and skilled relative wages in finance in these countries.

Finally, we investigate which elements of financial deregulation matter the most for relative wages in finance. To do so, we isolate the seven components of the deregulation variable one by one and estimate versions of (10).[35] These adjustments are made by removing each of the 7 indices one by one and including them in regressions together with a residual aggregate deregulation index which consists of the other 6 indices. We normalize the range to $[0, 1]$ for all deregulation variables. For brevity, we only report the results for our deregulation variables although the regressions include: relative ICT use in finance, financial globalization and domestic credit as a share of GDP. The estimated coefficients on these three explanatory variables are similar in value and magnitude

[35] We have also run the regressions adding all the indices as separate explanatory variables while including the initial aggregate deregulation variable. This does not change the overall conclusion but had the disadvantage of creating multicollinearity.

to those reported in Table 8.

Panel A of Table 9 shows the results when we use the finance relative average wage as the dependent variable, whereas Panel B of Table 9 shows similar results for the finance relative skilled wage. In most cases the residual deregulation index (an index based on 6 deregulation variables rather than 7) remains similar in value and statistical significance to the total index in Table 8. Among all seven indices, the only significant predictor of both overall and skilled relative wages in finance is deregulation of international capital flows. When the international capital controls deregulation measure is isolated the residual index sees a marked decline in its coefficient and loses statistical significance, whereas the coefficient on the international capital controls component is large and statistically significant.

The results of Table 9 suggest that deregulation of international capital controls is the most important when considering changes in finance wages versus the remainder of the economy. As regulations on international capital controls are reduced, more investment opportunities and the potential for greater financial profitability appear to increase the wages paid to finance workers. This fits with the aforementioned importance of *de facto* globalization for finance relative wages.

We perform several other robustness checks that are not reported here. First, we control for some country level macro variables that might be related to our dependent variables such as GDP growth and interest rates. Second, we drop top and bottom percentiles of the distribution of our dependent variables from the regressions and rerun the regressions. Third, we run the regressions without one country from the sample while keeping the rest; we do this for each country separately. The main results hold under these robustness checks.

Using several specifications and estimators, we find that deregulation of financial markets is the most important factor driving overall and skilled relative wages in finance. This effect is larger in Anglo-Saxon countries, and financial globalization has a larger effect than other dimensions of deregulation.

3.6 Bank concentration and finance relative wages

As described above, banking industry market concentration may also be an important driver of finance relative wages. Using the bank concentration data we ask whether overall and skilled finance relative wages are higher when banking is more concentrated using descriptive level regressions of the form in equation (9). Bank concentration data is only available from 1997 through 2005. We analyze this shorter sample separately, replacing the financial regulatory variable with bank concentration. The measure of bank concentration is the log share of the assets of the three largest banks in each country from the World Bank. As before, all regressions include country fixed

effects.[36] We report descriptive statistics of variables used in these regressions in Panel C of Table 5.

The results in Table 10 show that both overall and skilled finance relative wages are positively associated with bank concentration (log of the share of the three largest banks in total commercial banking assets). These results are also economically large. Columns 2 and 4 imply that a one standard deviation increase in bank concentration increases finance average relative wages and relative skilled wages by 0.20 and 0.40 of a standard deviation. We do not find a significant effect of ICT on either dependent variable. In fact, the point estimates are negative and statistically insignificant. These contrasting results *vis-a-vis* the results in the longer sample, together with the predictive regression results, strengthen our conclusion that ICT does not have a stable causal effect on relative wages in finance.

Overall, the results for these regressions are in line with the earlier results using data from the 1970s to 2005, in the following sense: Market structure (regulation and bank concentration) are the most important drivers of relative wages in finance.

4 Finance wages and brain drain

Given the findings above, it is natural to ask whether high wages in finance attract talent from other activities and locations. Providing a complete and convincing answer to this question is well beyond the scope of this paper. The results in this section should be taken as suggestive evidence that may inspire more research in this area.

It is very difficult to empirically characterize allocative effects between activities within an economy and make the distinction between social and private returns. Instead, in this section we ask whether high wages in finance lure qualified workers from other countries. We restrict attention to immigration within a sample of 15 industrialized countries. Among these countries remittances and backward knowledge spillovers to the country of origin are arguably not likely to be large, and therefore it is relatively clear that attracting skilled workers from other countries has detrimental effects on the country of origin, i.e., brain drain.

We find that wage premiums for skilled workers in finance—over and above overall skilled wages—predict skilled immigration and employment in finance, affecting both the magnitude of immigration and its allocation. We do not find evidence of this effect for unskilled immigrants in finance. This raises concerns that high wages in finance may have implications for brain drain across borders.

[36] The results remain similar when we add year fixed effect but the power goes down.

4.1 Immigration data

Ideally, we would have liked to investigate if high wages in finance in country A lure highly skilled workers in country B, who were working in other sectors, to immigrate to country A to work in the finance sector. Unfortunately, to the best of our knowledge, there are no comprehensive data sets that provide information on employment both before and after immigration. Moreover, data on immigration flows, rather than stocks, are also scant. Therefore, we rely on data on bilateral immigration stocks for 15 OECD countries in 2000.[37] All wages are calculated from the EU KLEMS database, and are converted to United States dollars when needed. Immigration stocks in a given sector in a destination country are classified by source country and education level. We focus on highly educated workers (attaining a bachelors degree from a four year college or university), but we also compare these results to those for less educated immigrants.

It is informative to study the sample properties in some detail. In general, this illustrates that the determinants of skilled immigration employed in finance in destination countries are destination and sector-specific; they are not simply proportional to country and sector sizes. Table 11 shows that there is considerable heterogeneity in immigration stocks by destination (column 1 in both panels). Columns a and 1–4 report statistics on immigrants who work in finance in destination countries (where they immigrated to), while columns b and 5–7 report statistics on those same immigrants by source country (i.e., by country from which they emigrated from). Panel A reports statistics for skilled workers. The average immigrant working in finance is relatively skill intensive, except in France (column a). However, emigrants from France who work in finance in destination countries are relatively highly skilled (column b). Comparing columns 4 and 7 we see that there is much more heterogeneity in the share of skilled immigration working in finance (standard deviation = 6) than in their shares in skilled emigration (standard deviation = 1.5). This illustrates a general pattern: The pattern of skill intensity in finance is not strongly influenced by source country characteristics. This conclusion is strengthened by column 3, which shows that there is enormous variation in skilled immigrants working in finance as a share of total skilled employment in finance (standard deviation = 8). Differences between the corresponding variations for overall immigration (of which skilled immigration is a part) are markedly smaller, which indicates that finance-specific forces are less important for unskilled workers.

Larger countries attract more skilled immigrants in finance, as can be seen in columns 1 and 2. However, attracting more skilled immigrants to finance is virtually uncorrelated with the share of

[37] The countries are: Australia, Austria, Canada, Denmark, Spain, Finland, France, Hungary, Ireland, Italy, Luxemburg, Portugal, Sweden, United Kingdom, United States. See appendix for more details on the sample. Data downloaded from: http://stats.oecd.org/Index.aspx?DatasetCode=MIG#

skilled immigrants in total skilled employment in finance (column 3, correlation = 0.01), and very weakly correlated with a country's share in overall skilled immigration to the destination (column 4, correlation = 0.12). This indicates that finance-specific forces play a role in attracting skilled immigration to that sector. The same correlations for overall immigrant employment in finance in Panel B are markedly higher (0.26 and 0.65, respectively), which indicates that finance-specific forces are less important for unskilled workers.

We can summarize the descriptive analysis using terms of art taken from the international trade literature: There is relatively little variation in countries' comparative advantage in producing skilled immigrants working in finance in destination countries, relative to variation in the absorptive capacity of such workers in finance in destination countries. This statement is much weaker for unskilled immigrants. We use these findings to guide the analysis that follows.

4.2 Finance wages and brain drain

In this section we study the drivers of skilled immigration to finance. We start by fitting the following regression, which resembles a trade or finance gravity equation (for example, see Ortega and Peri (2014)):

$$\ln m_{od}^{H,fin} = \alpha_o + \beta \ln w_d^{H,fin} + \gamma \ln w_d^{H,nffp} + \delta' X_{od} + \varepsilon_{od} \ . \tag{11}$$

Here m_{od} denotes immigration stock (not flow) in destination d from origin o, H denotes skilled workers, fin denotes employment in finance, and $nffp$ denotes employment outside finance and agriculture. X is a vector of standard "gravity" control variables: Common language and common border indicators, and the log of distance between origin and destination capital cities.[38] The α_o are origin fixed effects. Since we wish to estimate the effect of wages in the destination country, we cannot add destination fixed effects. We add overall skilled wages in the NFFP sector in the destination $w_d^{H,nffp}$ in order to control for the overall attractiveness of the destination for skilled immigrants. Descriptive statistics for the variables are reported in Table 12.

Regression results of fitting (11) to data are reported in Table 13, columns 1 and 2. The message from Panel A is that high skilled wages in finance predict more skilled immigration into finance, even after controlling for skilled wages elsewhere in the destination country. In column (2) we estimate an elasticity of 2.3 between skilled finance wages and skilled immigration, controlling for NFFP skilled wages. A one standard deviation increase in log finance wages increases finance immigration by 0.54 log points, which is 23% of the standard deviation of log skilled immigration

[38] Data from CEPII, downloaded from: http://www.cepii.fr/anglaisgraph/bdd/distances.htm#. Using different measures of distance from the CEPII dataset barely affects the results.

(2.32; see Table 12).

We compare this result to a similar regression for unskilled workers in Panel B (replace all H superscripts with L in (11)). We find that unskilled wages in finance do not predict low skilled immigration to finance once low skilled wages elsewhere are controlled for. The coefficient on $\ln w_d^{L,fin}$ is small and statistically insignificant. This is somewhat surprising: If unskilled workers do not have specific human capital and operate in a competitive environment, then differences in industry wages should have larger effects for them—but this is not the case in the data. It seems that for immigration, it is the skilled workers who respond more to industry wage differentials. This could be due to higher barriers of entry faced by unskilled immigrants, relative to skilled immigrants.

In the next specification, we replace the bilateral finance skilled immigration stock with its share in the total skilled immigration stock, $m_{od}^{H,fin}/m_{od}^{H}$

$$100 \times \left(\frac{m_{od}^{H,fin}}{m_{od}^{H}} \right) = \alpha_o + \beta \ln w_d^{H,fin} + \gamma \ln w_d^{H,nffp} + \delta' X_{od} + \varepsilon_{od} \ . \tag{12}$$

We multiply the dependent variable by 100 in order to make the magnitudes comparable to (11). This specification is preferable for estimating the effect of finance wages on the attractiveness of the sector.[39]

The results are reported in columns 3 and 4 of Table 13 and, as shown, we find a similar pattern as in columns 1 and 2: Finance wages increase skilled finance immigration even as a share of overall skilled immigration. A one standard deviation increase in log finance wages increases the share of finance immigration by 3.2 percentage points, compared to a standard deviation of 7 percentage points (i.e., 46% of the variation). As before, when we compare this to the corresponding regression for unskilled workers in Panel B (replace all H superscripts with L in (12)), we find that unskilled wages in finance have no predictive power for low skilled immigration in finance once overall low skilled wages are controlled for.

Our third specification asks whether the relative skilled wage within finance has an effect on immigrant skill intensity in finance over and above the relative skilled wage in the rest of the economy:

$$\left(\frac{m_{od}^{H,fin}}{m_{od}^{L,fin}} \right) = \alpha_o + \beta \left(\frac{w_d^{H,fin}}{w_d^{L,fin}} \right) + \gamma \left(\frac{w_d^{H,nffp}}{w_d^{L,nffp}} \right) + \delta' X_{od} + \varepsilon_{od} \ , \tag{13}$$

In column 6 we see that relative skilled wages within finance ($w_d^{H,fin}/w_d^{L,fin}$) have a stronger effect on the skill intensity of finance immigration ($m_{od}^{H,fin}/m_{od}^{L,fin}$) than do the relative skilled wages in

[39] This is simlar to analysis of import shares in the international trade literature.

the NFFP sector ($w_d^{H,nffp}/w_d^{L,nffp}$). A one standard deviation increase in $w_d^{H,fin}/w_d^{L,fin}$ increases $m_{od}^{H,fin}/m_{od}^{L,fin}$ by 0.34, compared to a standard deviation of 1.24 (i.e., 28% of the variation — this compared to 20% for $w_d^{H,nffp}/w_d^{L,nffp}$).

We document that high skilled wages in finance predict skilled immigration employment in finance and this affects both the magnitude and the allocation of immigration. We do not find strong evidence for this for unskilled immigrants in finance. This is most likely due to higher barriers to entry relative to the benefits of migrating into finance faced by unskilled immigrants, who, therefore, respond more to overall wage differentials across countries.

Overall, these results raise concerns that high wages in finance may cause brain drain across borders, with detrimental effects on the countries of origin.

5 Concluding remarks

In this paper we study the evolution of wages and human capital in the finance industry in a set of developed economies in 1970–2005. Relative wages and skill intensity in finance are generally increasing, but there is wide variation across countries. We find that half of the countries in our sample see increases, while the remainder are split between decreases and mixed trends. Changes in skill composition do not explain relative wages in finance. Most of the variation is driven by within-group wage changes, in particular skilled wages in finance relative to skilled wages in the rest of the private sector. Changes in finance wages help explain a large fraction of changes in the overall skill premium, despite a small sectoral employment share. We find that financial deregulation, financial globalization and bank concentration are the most important determinants of relative wages in finance. These results are consistent with the view that financial regulation limits the scope and scale of financial activity within the financial sector, in particular activity that is more prone to asymmetric information and risk taking.

We also document that increasing wages in finance are associated with the cross border allocation of talent. We find that when finance pays higher wages, it attracts more skilled immigrants. This suggests a negative externality that countries with high finance wages impose on other countries. We do not find comparable effects for unskilled workers.

Better understanding of the mechanisms through which deregulation and financial globalization affect wages in finance is an important field of future research. In addition, although we argue that financial deregulation and globalization lead to higher wages and skill intensity in the finance sector, we cannot provide evidence on whether these outcomes are socially optimal. This requires a structural model that is far beyond the scope of this paper.[40] The work of Kneer (2013), Cecchetti

[40] Philippon (2007) analyzes the case of endogenous growth with financial intermediation and innovation in the

and Kharroubi (2012) and Arcand, Berkes, and Panizza (2012) suggests that higher wages in finance, through their effect on talent absorption, may cause potential harm to some industries (but see also Martinsson (2013)). However, these studies only identify differential effects on some sectors versus others, and they do not address general equilibrium and social incentive considerations.

Philippon (2013) and Bazot (2014) estimate that the unit cost of financial intermediation has risen in the United States and in Europe after 1980.[41] A large fraction of this rise in costs can be attributed to labor costs. Therefore, it is difficult to argue that the efficiency of labor in financial intermediation has increased markedly, in a way that can explain higher relative wages, or variation in relative wages. Part of the increase in the cost of financial intermediation can be explained by changes in the composition of financial products, in particular more market-base intermediation versus bank lending. This composition is affected by regulation. An important and challenging task for future research is to understand the social value and cost of new financial products, their effects on labor demand and wages in finance, and how they respond to financial regulation.

non-financial sector. Laeven, Levine, and Michalopoulos (2015) model real and financial innovation in a symmetric way.

[41] Beck, Degryse, and Kneer (2014) differentiate the functioning of financial intermediation from the effect of overall size of finance. Philippon and Reshef (2013) show that the rise of the size of finance is not correlated with growth in a set of currenlty industrial countries, and that the relationship of finance to income is not straightforward. The evolution of wealth accumulation, as described in Piketty (2014), may have a direct effect on the total payments to finance—and indirectly on the wage rate per worker and on organization within finance.

Appendix

A EU KLEMS database sample used in this paper

All data are available from www.euklems.net. We use the 2008 release. The overall sample covers 22 countries: Australia (1970–2005), Austria (1970–2005), Belgium (1970–2005), Canada (1970–2004), Czech Republic (1995–2005), Denmark (1970–2005), Spain (1970–2005), Finland (1970–2005), France (1970–2005), Germany (1970–2005), Hungary (1991–2005), Ireland (1970–2005), Italy (1970–2005), Japan (1970–2005), Korea (1970–2005), Luxembourg (1970–2005), Netherlands (1970–2005), Portugal (1970–2005), Slovenia (1995–2005), Sweden (1970–2005), United Kingdom (1970–2005), United States (1970–2005). For the United States we use NAICS based data (1977–2005) and complete it with SIC based data (1970–2005) when NAICS based data are missing. Differences in series that we use between NAICS and SIC based methodology are not significant. Not all series are available for all countries and years.

B Derivation of complementarity equation

Let there be two types of capital, k_1 and k_2, which are quasi-fixed, and let there be two variable inputs: Skilled and unskilled labor, h and l, respectively (what follows extends to additional variable and/or quasi-fixed inputs). In this case, variable costs are given by $c = w_h \cdot h + w_l \cdot l$. If h and l are the argmin of costs, then c is the cost function. The logarithm of c can be approximated by a translog cost function:

$$\begin{aligned}
\ln(c) \;=\;& \eta_h \ln(w_h) + \eta_l \ln(w_l) + \eta_{k_1} \ln(k_1) + \eta_{k_2} \ln(k_2) + \eta_q \ln(q) + \\
&+\frac{1}{2}\left[\begin{array}{c} \alpha_{hh} \ln(w_h)^2 + \alpha_{hl} \ln(w_h)\ln(w_l) + \alpha_{lh} \ln(w_l)\ln(w_h) + \alpha_{ll} \ln(w_l)^2 \\ +\alpha_{k_1k_1} \ln(k_1)^2 + \alpha_{k_2k_2} \ln(k_2)^2 + \alpha_{yy} \ln(q)^2 \end{array}\right] \\
&+\gamma_{hk_1} \ln(w_h)\ln(k_1) + \gamma_{hk_2} \ln(w_h)\ln(k_2) + \gamma_{hy} \ln(w_h)\ln(q) \\
&+\gamma_{lk_1} \ln(w_l)\ln(k_1) + \gamma_{lk_2} \ln(w_l)\ln(k_2) + \gamma_{ly} \ln(w_l)\ln(q) \\
&+\gamma_{k_1k_2} \ln(k_1)\ln(k_2) + \gamma_{k_1q} \ln(k_1)\ln(q) + \gamma_{k_2q} \ln(k_2)\ln(q) \;\;,
\end{aligned}$$

where q is output. Symmetry implies $\alpha_{hl} = \alpha_{lh}$.

By Shephard's lemma, $\partial c/\partial w_h = h$, so that the cost share of skilled labor is

$$S \equiv \frac{w_h h}{c} = \frac{\partial \ln(c)}{\partial \ln(w_h)} = \frac{\partial c}{\partial w_h}\frac{w_h}{c} \;\;.$$

Using this in the translog we get

$$S = \eta_h + \alpha_{hh} \ln(w_h) + \alpha_{hl} \ln(w_l) + \gamma_{hk_1} \ln(k_1) + \gamma_{hk_2} \ln(k_2) + \gamma_{hy} \ln(q) \;\;.$$

By linear homogeneity of cost with respect to prices, cost shares are homogenous of degree zero; therefore $\alpha_{hh} + \alpha_{hl} = 0$. Write $\gamma_{hk_1} + \gamma_{hk_2} + \gamma_{hy} = \delta$. Using these gives

$$S = \eta + \alpha \ln\left(\frac{w_h}{w_l}\right) + \gamma_{k_1} \ln\left(\frac{k_1}{q}\right) + \gamma_{k_2} \ln\left(\frac{k_2}{q}\right) + \delta \ln(q) \;\;,$$

which is used in the main text. If the production function is linearly homogeneous, then $\delta = 0$ (increasing all inputs by same factor increases output by same factor, but this should not affect the

cost share).

C Quantity indices for non-farm, non-finance private sector (NFFP)

Capital quantity indices for the non-farm, non-finance private sector (NFFP) are given by

$$Q_{nffp,t} = \frac{Q_{agg,t} * v_{agg,1995} - \sum_{i \in \{farm,fin,public\}} Q_{i,t} * v_{i,1995}}{v_{agg,1995} - \sum_{i \in \{farm,fin,public\}} v_{i,1995}} ,$$

where $Q_{i,t}$ is the quantity index for sector i, $v_{i,1995}$ is the nominal value of the capital stock in 1995. This preserves the properties of the quantity indices since each quantity index is conceptually given by

$$Q_{i,t} = 100 \cdot \frac{q_{i,t}}{q_{i,1995}} = 100 \cdot \frac{q_{i,t}p_{i,1995}}{q_{i,1995}p_{i,1995}} = 100 \cdot \frac{q_{i,t}p_{i,1995}}{v_{i,1995}} ,$$

where q and p are real quantity and price, respectively. In particular, $Q_{nffp,1995} = 100$.

D Domestic credit data and corrections

Our measure of overall domestic credit is *Domestic credit provided by financial sector (% of GDP)*, from the World Bank: "Domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies."

The bank credit measure from the World Bank is *Domestic credit to private sector by banks (% of GDP)*: "Domestic credit to private sector by banks refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central banks), such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises." This is very similar to the definitions in Jordà, Schularick, and Taylor (2014) (JST), who split bank credit to household versus corporate credit, and to mortgage versus non-mortgage credit.

When examining the World Bank domestic credit series (both overall and bank credit), we detected a few breaks. In order to correct these breaks we spliced series based on the following criterion. In most years bank credit data from JST and from the World Bank are almost identical. Breaks in the World Bank data are invariably deviations from JST data. Therefore, we adjust all observations in which we observe large deviations from JST bank credit data. The source of the breaks is likely the denominator (GDP), because breaks appear both in the *Domestic credit provided by financial sector (% of GDP)* series and in the *Domestic credit to private sector by banks (% of GDP)* series, in the same proportion.

Here we list all corrections made to the *Domestic credit provided by financial sector (% of GDP)* series, as well as one correction to *Domestic credit to private sector by banks (% of GDP)* series for Korea:

- Belgium 1991/1992 break: multiply all years before 1992 by the 1992/1991 ratio.
- Canada 2000/2001 break: divide all years after 2000 by the 2001/2000 ratio.
- Denmark 1999/2000 break: multiply all years before 2000 by the 2000/1999 ratio.
- France 1976/1977/1978 and 1984/1985 breaks: we correct in two steps, in the following sequence:

1. Change the value for 1977 from 0.381 to 0.881. In 1976 the value is 0.880, so we assume that "3" was an "8" that got botched up.

2. Deduct from 1978–1984 observations the average of the difference between 1984 and 1985 and the new difference between 1977 and 1978.

• Korea 2000/2001 break: we divide all years after 2000 by the 2001/2000 ratio—for both credit concepts.

• Netherlands 1985/1986 break: divide all years before 1986 by the 1985/1986 ratio.

• Sweden 1982/1983 and 2000 break: multiply all years before 1983 by the 1983/1982 ratio; we drop the observation for year 2000.

• United Kingdom 1986/1987 break: multiply all years before 1987 by the 1987/1986 ratio.

Our main source for bank credit is JST data. We use the World Bank data whenever JST does not have it (Korea, Austria, Portugal, Czech Republic, Slovenia). This gives a maximum of 16 countries with bank credit data: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Sweden, United States, Slovenia. This is the sample for the bank concentration regressions reported in Table 10. We lose Slovenia in all other regressions because it does not report ICT data, leaving us with 15 countries. In addition to this, when we split bank credit we lose Austria, Czech Republic and Korea because the split is unavailable for these countries.

E Immigration data and sample

Data on immigration stocks in a sample of 15 countries in 2000 by country of origin and sector of employment in the destination country were downloaded from the OECD *StatExtracts* website: http://stats.oecd.org/Index.aspx?DatasetCode=MIG#. Sectors of immigrants' employment in Belgium and The Netherlands are not coded and therefore we cannot distinguish immigrants in different sectors in these two countries, so they are not part of our data. The data does not include Germany at all. Thus, the sample covers 15 countries: Australia, Austria, Canada, Denmark, Spain, Finland, France, Hungary, Ireland, Italy, Luxemburg, Portugal, Sweden, United Kingdom, United States.

There are potentially 210 bilateral observations ($15 \times 15 - 15 = 210$). There are 17 missing observations for skilled immigrants in finance, and another 17 missing observations for unskilled immigrants in finance (skilled have tertiary education; unskilled are all the rest). These missing observations are zeros and since we cannot employ them in our estimation, they are dropped. This gives us 193 bilateral observations of immigration stocks in working in finance, either skilled or unskilled. The 17 missing observations on each type of worker only partially overlap. Therefore, in specifications that use data on both we lose 10 additional observations because only 7 missing observations are common. In appendix Table A8 we report the incidence of missing observations.

When we estimate migration gravity equations using TSLS, we lose 14 additional observations because deregulation data for Luxemburg are missing; this gives us 179 observations in those regressions ($193 - 14 = 179$).

Samples for immigration stocks employed in other sectors of the economy vary in similar ways.

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Table 1: Decompositions of Changes in Wages

A. Decomposition of Finance Relative Wage

Country	Sample	Change in finance relative wage	Within share	Between share
Australia	1982 - 2005	1.30	0.87	0.13
United States	1970 - 2005	0.78	0.65	0.35
Spain	1980 - 2005	0.52	0.76	0.24
Netherlands	1979 - 2005	0.45	0.52	0.48
Canada	1970 - 2004	0.43	0.64	0.36
Luxemburg	1992 - 2005	0.42	0.76	0.24
Finland	1970 - 2005	0.40	0.50	0.50
Hungary	1995 - 2005	0.38	0.56	0.44
Denmark	1980 - 2005	0.36	0.78	0.22
France	1980 - 2005	0.32	0.57	0.43
Czech Republic	1995 - 2005	0.32	0.59	0.41
Sweden	1981 - 2005	0.30	0.61	0.39
Portugal	1992 - 2005	0.29	0.67	0.33
Japan	1973 - 2005	0.26	0.10	0.90
Ireland	1988 - 2005	0.26	0.04	0.96
Germany	1991 - 2005	0.12	0.81	0.19
United Kingdom	1970 - 2005	-0.02	16.39	-15.39
Austria	1980 - 2005	-0.04	4.70	-3.70
Belgium	1980 - 2005	-0.11	2.42	-1.42
Slovenia	1995 - 2005	-0.21	1.49	-0.49
Korea	1970 - 2005	-0.52	1.18	-0.18
Italy	1970 - 2005	-1.20	1.03	-0.03

Notes to Panel A: Countries are sorted by the change in finance relative wage. The decomposition for each country is based on equation (2) in the text. The within share captures the contribution of wage changes within skill groups (high skilled, low skilled); the between share captures the contribution of changes of skill composition. Data: EU KLEMS.

B. Decomposition of Changes in Skilled Relative Wage

Country	Sample	Change in skilled relative wage	Within share	Between share	Finance share
United States	1980 - 2005	0.58	0.98	0.02	0.22
Luxemburg	1992 - 2005	0.55	0.87	0.13	0.65
Portugal	1992 - 2005	0.33	0.98	0.02	0.19
Canada	1980 - 2004	0.33	0.98	0.02	0.30
Hungary	1995 - 2005	0.32	1.03	-0.03	0.01
Ireland	1988 - 2005	0.28	0.91	0.09	0.56
Germany	1991 - 2005	0.26	1.00	0.00	0.10
Italy	1980 - 2005	0.20	1.19	-0.19	-0.61
Czech Republic	1995 - 2005	0.08	1.05	-0.05	0.16
Australia	1982 - 2005	0.08	1.05	-0.05	1.57
Japan	1980 - 2005	-0.04	0.80	0.20	0.73
Sweden	1981 - 2005	-0.08	1.02	-0.02	-0.33
Spain	1980 - 2005	-0.10	1.05	-0.05	-0.48
Slovenia	1995 - 2005	-0.12	1.04	-0.04	0.11
Belgium	1980 - 2005	-0.14	1.03	-0.03	0.10
Finland	1980 - 2005	-0.15	0.98	0.02	0.23
Austria	1980 - 2005	-0.19	1.15	-0.15	-0.22
United Kingdom	1980 - 2005	-0.23	1.00	0.00	-0.08
Denmark	1980 - 2005	-0.32	1.03	-0.03	-0.13
Netherlands	1980 - 2005	-0.44	1.07	-0.07	-0.19
France	1980 - 2005	-0.55	1.01	-0.01	-0.03
Korea	1980 - 2005	-0.74	1.01	-0.01	0.07

Notes to Panel B: Countries are sorted by the change in skilled relative wage, which is defined as the wage of university-educated workers divided by the wage other workers, both in the nonfarm private sector (including finance). The decomposition for each country is based on equation 5 in the text. The within share captures the contribution of wage changes within skill groups (high skilled, low skilled); the between share captures the contribution of changes of skill composition; the finance share captures the overall contribution of finance, whether from within-finance changes or changes in the allocation of skilled workers to finance, and is based on equation 6 in the text. Data: EU KLEMS.

Table 2: Finance Relative ICT Capital Share

	Finance Relative ICT Share				Changes			
	1975	1985	1995	2005	1975-1985	1985-1995	1995-2005	Total
Australia	0.008	0.019	0.061	0.391	0.012	0.042	0.330	0.383
Austria		0.016	0.048	0.178		0.032	0.130	0.162
Belgium								
Canada*	-0.054	-0.015	0.012	-0.043	0.039	0.027	-0.055	0.011
Czech Republic			0.168	0.293			0.125	0.125
Denmark	0.006	0.041	0.125	0.592	0.035	0.085	0.466	0.586
Finland	0.075	0.146	0.350	0.836	0.071	0.204	0.486	0.761
France								
Germany			0.077	0.194			0.117	0.117
Hungary								
Ireland								
Italy	-0.005	0.004	0.014	0.137	0.009	0.010	0.122	0.141
Japan	0.046	0.047	0.122	0.306	0.001	0.075	0.184	0.260
Korea		0.085	0.153	0.186		0.069	0.033	0.102
Luxemburg								
Netherlands	0.008	0.019	0.066	0.300	0.011	0.047	0.234	0.292
Portugal			0.112	0.101			-0.010	-0.010
Slovenia			-0.027	0.284			0.311	0.311
Spain								
Sweden			0.163	0.276			0.113	0.113
United Kingdom	0.035	0.015	0.129	0.303	-0.020	0.114	0.174	0.268
United States	0.014	0.054	0.146	0.355	0.040	0.092	0.209	0.341
Average	0.015	0.039	0.107	0.293	0.022	0.072	0.186	0.248

Notes: The table reports ICT (Information and Communication Technology) shares in real capital stock in finance minus the ICT share in the nonfarm, non-finance private sector (NFFP) in different years and the changes between those years. The Total change is the sum of changes in the preceding three columns. * Data for Canada in 2005 is missing and is replaced in this table by data for Canada in 2004. Data: EU KLEMS.

Table 3: Financial Regulation

A. Indicators in levels

	Directed Credit		Interest Rate Controls		Entry Barriers, Activity		Banking Supervision		Privatization		International Capital Flows		Security Markets		Financial Deregulation Index	
	1973*	2005	1973*	2005	1973*	2005	1973*	2005	1973*	2005	1973*	2005	1973*	2005	1973*	2005
Australia	0	3	0	3	0	3	0	3	0	3	0	3	2	3	0.10	1.00
Austria	1	1	0	3	0	3	0	3	0	3	1	3	1	3	0.14	0.90
Belgium	2	3	1	3	1	3	1	3	2	3	0	3	2	3	0.43	1.00
Canada	2	3	3	3	0	3	0	3	3	3	2	3	3	3	0.62	1.00
Czech Republic*	1	2	0	3	3	3	0	2	0	3	0	3	0	3	0.19	0.90
Denmark	2	3	0	3	1	3	0	3	2	3	1	3	1	3	0.33	1.00
Finland	2	3	1	3	2	3	0	1	1	1	0	3	1	3	0.33	0.81
France	0	3	1	3	1	3	0	3	1	3	1	3	2	3	0.29	1.00
Germany	3	3	3	3	1	3	1	3	1	1	2	3	2	3	0.62	0.90
Hungary*	1	2	3	3	2	3	0	3	0	3	0	3	1	3	0.33	0.95
Ireland	1	3	1	3	3	3	0	3	3	3	1	3	2	3	0.52	1.00
Italy	0	3	1	3	0	3	0	2	0	3	1	3	1	3	0.14	0.95
Japan	1	2	0	3	0	3	0	2	2	2	2	3	1	3	0.29	0.86
Korea	0	3	0	2	0	3	0	1	1	0	1	3	1	3	0.14	0.71
Luxemburg**																
Netherlands	3	3	3	3	3	3	0	3	3	3	0	3	1	3	0.62	1.00
Portugal	0	1	0	3	0	3	0	3	1	1	1	3	1	3	0.14	0.81
Slovenia**																
Spain	1	3	1	3	1	3	1	3	2	3	1	3	1	3	0.38	1.00
Sweden	0	3	0	3	1	3	0	2	3	3	1	3	1	3	0.29	0.95
United Kingdom	2	3	2	3	1	3	0	3	2	3	1	3	2	3	0.48	1.00
United States	2	3	0	3	1	3	1	3	3	3	3	3	3	3	0.62	1.00

B. Changes in indicators

	Directed Credit	Interest Rate Controls	Entry Barriers, Activity	Banking Supervision	Privatization	International Capital Flows	Security Markets	Financial Deregulation Index
Australia	3	3	3	3	3	3	1	0.90
Austria	0	3	3	3	3	2	2	0.76
Belgium	1	2	2	2	1	3	1	0.57
Canada	1	0	3	3	0	1	0	0.38
Czech Republic*	1	3	0	2	3	3	3	0.71
Denmark	1	3	2	3	1	2	2	0.67
Finland	1	2	1	1	0	3	2	0.48
France	3	2	2	3	2	2	1	0.71
Germany	0	0	2	2	0	1	1	0.29
Hungary*	1	0	1	3	3	3	2	0.62
Ireland	2	2	0	3	0	2	1	0.48
Italy	3	2	3	2	3	2	2	0.81
Japan	1	3	3	2	0	1	2	0.57
Korea	3	2	3	1	-1	2	2	0.57
Luxemburg**								
Netherlands	0	0	0	3	0	3	2	0.38
Portugal	1	3	3	3	0	2	2	0.67
Slovenia**								
Spain	2	2	2	2	1	2	2	0.62
Sweden	3	3	2	2	0	2	2	0.67
United Kingdom	1	1	2	3	1	2	1	0.52
United States	1	3	2	2	0	0	0	0.38

Notes: The table reports financial regulation indicators and changes. Higher values indicate less restrictions or financial liberalization, except for Banking Supervision. For Banking Supervision higher values indicate adopting a capital adequacy ratio based on the Basle standard; banking supervisory agency independence; and whether the banking supervisory agency covers all financial institutions without exception. * Data for the Czech Republic and Hungary start in 1990. ** Data for Luxemburg and Slovenia are not available. Source: Abiad, Detragiache and Tressel (2008) and authors' calculations.

Table 4: ICT and complementarity with high skilled workers

	Dependent variable: Wage bill share of skilled workers					
	Finance	Aggregate	NFFP	Finance	Aggregate	NFFP
ln(wH/wL)	0.254***	-0.0266	-0.0116	0.229***	0.0543***	0.0355**
	(0.0314)	(0.0237)	(0.0241)	(0.0252)	(0.0133)	(0.0158)
ln(ICT/Q)	0.0562***	0.0472***	0.0465***	0.0409***	0.0227***	0.0273***
	(0.00234)	(0.00129)	(0.00263)	(0.00291)	(0.00212)	(0.00331)
ln(NonICT/Q)	-0.0946***	0.00367	-0.0475***	-0.0671***	0.0636***	0.0686***
	(0.00901)	(0.0224)	(0.00656)	(0.00628)	(0.0171)	(0.0137)
ln(Q)				0.0751***	0.120***	0.0898***
				(0.00923)	(0.00919)	(0.0104)
Observations	456	456	353	456	456	353
Number of countries	22	22	16	22	22	16
Test of equality of ln(ICT/Q) coefficient with finance						
Chi-squared		11.45	7.61		25.59	9.55
p-value		0.001	0.006		0.000	0.002

Notes: All regressions are estimated with two stage least squares, and include country fixed effects. Here wH and wL are wages of skilled and all other workers, respectively; ICT and NonICT are quantity indices for ICT and non-ICT capital, respectively; and Q is the output quantity index. See text for details on the construction of quantity indices for the NFFP sector. The sample for NFFP reduces due to data limitations. Data: EU KLEMS. Test statistics are obtaied by pooling data series for aggregate or NFFP with finance. Robust standard errors in parentheses. *** p<0.01.

Table 5: Descriptive Statistics for Descriptive, Predictive, and Bank Concentration Regressions

A. For descriptive level regressions

	Mean	S.D.	Min	p10	p25	p50	p75	p90	Max
Finance relative wage (t)	1.57	0.35	0.61	1.20	1.35	1.54	1.69	2.03	3.01
Finance skilled relative wage (t)	1.45	0.37	0.61	1.05	1.22	1.42	1.61	1.81	3.62
Finance relative ICT intensity (t-3)	0.12	0.14	-0.07	0.00	0.02	0.08	0.17	0.27	0.84
Domestic credit/GDP (t-3)	1.14	0.58	0.38	0.50	0.74	1.06	1.39	1.83	3.19
Non-bank domestic credit/GDP (t-3)	0.42	0.51	-0.31	0.05	0.16	0.24	0.41	1.31	2.38
Bank domestic credit/GDP (t-3)	0.72	0.28	0.21	0.40	0.48	0.68	0.91	1.08	1.63
Household bank credit/GDP (t-3)	0.36	0.19	0.06	0.11	0.22	0.33	0.49	0.62	0.84
Corporate bank credit/GDP (t-3)	0.37	0.20	0.11	0.15	0.18	0.29	0.53	0.66	0.84
Mortgage bank credit/GDP (t-3)	0.34	0.20	0.07	0.14	0.21	0.28	0.43	0.70	1.05
Non-mortgage bank credit/GDP (t-3)	0.39	0.15	0.13	0.17	0.30	0.36	0.50	0.60	0.80
Financial globalization (t-3)	0.38	0.78	-1.55	-0.66	-0.13	0.36	0.89	1.43	2.17
Financial deregulation index (t-3)	0.74	0.23	0.10	0.38	0.60	0.81	0.94	1.00	1.00

B. For predictive regressions

	Mean	S.D.	Min	p10	p25	p50	p75	p90	Max
Change in finance relative wage (t,t+3)	0.01	0.20	-1.17	-0.16	-0.04	0.03	0.09	0.17	0.79
Change in finance skilled relative wage (t,t+3)	0.02	0.19	-0.85	-0.20	-0.03	0.03	0.10	0.18	0.75
Change in finance relative ICT intensity (t-3,t)	0.03	0.04	-0.08	0.00	0.01	0.02	0.04	0.08	0.23
Change in domestic credit/GDP (t-3,t)	0.09	0.14	-0.34	-0.09	0.00	0.09	0.17	0.24	0.49
Change in financial globalization (t-3,t)	0.24	0.23	-0.73	0.00	0.11	0.24	0.35	0.53	1.01
Change in financial deregulation index (t-3,t)	0.08	0.09	-0.10	0.00	0.00	0.05	0.14	0.23	0.48

C. For Bank Concentration Regressions

	Mean	S.D.	Min	p10	p25	p50	p75	p90	Max
Finance relative wage (t)	1.72	0.33	1.30	1.41	1.53	1.61	1.89	2.08	2.74
Finance skilled relative wage (t)	1.47	0.23	0.98	1.16	1.19	1.50	1.64	1.76	1.88
Finance relative ICT intensity (t-3)	0.27	0.18	-0.06	0.10	0.18	0.25	0.30	0.50	0.84
Domestic credit/GDP (t-3)	1.39	0.67	0.42	0.56	1.01	1.38	1.65	2.14	3.19
Financial globalization (t-3)	1.12	0.58	0.05	0.43	0.60	1.26	1.51	2.06	2.17
Log bank concentration (t-3)	-0.41	0.39	-1.46	-1.05	-0.53	-0.33	-0.13	0.00	0.00

Notes: Wage, skill and ICT variables are calculated based on EU KLEMS data. Domestic credit covers all forms of credit to the non-financial sector on a gross level, except for credit to the government, which is on a net basis; data from the World Bank World Development Indicators databse. Bank domestic credit data are from Jorda, Schularick and Taylor (2014), except for Austria and Korea where the data are from the Bank World Development Indicators databse. Non-bank domestic credit is total domestic credit minus bank credit. The split of bank domestic credit to households versus corporations, and to mortgage versus non-mortgage lending is given in Jorda, Schularick and Taylor (2014). Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). Statistics on the financial reform indices are reported in Table 3. Bank concentration is the log of the share of the largest three banks; data from the World Bank. Statistics in Panel A and Panel B are computed for 356 observations for 15 countries; the range for t is 1976-2005. Statistics in Panel C are computed for 60 observations for 16 countries (15 countries as in Panel A and B plus Slovenia); the range for t is 2000-2005. The sample of 15 countries is determined by ICT data availability in the EU KLEMS data; these countries are: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Sweden, United States. We lose Austria, Czech Republic, Korea and Slovenia when we split bank credit due to data unavailability.

Table 6: Finance Relative Wages: Descriptive Regressions in Levels

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	Finance relative wage				Finance skilled relative wage			
Financial deregulation index, t-3	0.408***	0.473***	0.811***	0.552***	0.320**	0.324**	0.492**	0.390**
	(0.133)	(0.135)	(0.173)	(0.151)	(0.154)	(0.158)	(0.217)	(0.190)
Finance relative ICT intensity, t-3	0.287	0.200	0.168	0.0629	0.991***	0.986***	1.167***	1.073***
	(0.219)	(0.221)	(0.237)	(0.230)	(0.244)	(0.248)	(0.287)	(0.276)
Financial globalization, t-3	0.257***	0.270***	0.193**	0.174**	-0.0769	-0.0762	-0.0684	-0.156*
	(0.0556)	(0.0555)	(0.0814)	(0.0739)	(0.0633)	(0.0638)	(0.101)	(0.0916)
Domestic credit/GDP, t-3	0.265***				0.528***			
	(0.0713)				(0.0797)			
Non-bank domestic credit/GDP, t-3		0.341***	0.368***	0.273***		0.532***	0.682***	0.548***
		(0.0782)	(0.0933)	(0.0807)		(0.0880)	(0.113)	(0.0971)
Bank domestic credit/GDP, t-3		0.0937				0.518***		
		(0.103)				(0.119)		
Household bank credit/GDP, t-3			0.247				1.203***	
			(0.202)				(0.251)	
Corporate bank credit/GDP, t-3			-0.300				-0.280	
			(0.290)				(0.355)	
Mortgage bank credit/GDP, t-3				0.314				1.068***
				(0.213)				(0.256)
Non-mortgage bank credit/GDP, t-3				0.0554				0.205
				(0.218)				(0.267)
Observations	356	356	279	296	341	341	268	282
R-squared, within	0.303	0.315	0.371	0.369	0.211	0.211	0.262	0.251
Number of countries	15	15	12	12	15	15	12	12

Notes: All regressions include country fixed effects and year fixed effects. The right hand side variables are lagged 3 periods. Deregulation data are from Abiad, Detragiache and Tressel (2008). The dependent variables as well as relative ICT use in finance are calculated from EU KLEMS database. Domestic credit covers all forms of credit to the non-financial sector on a gross level, except for credit to the government, which is on a net basis; data from the World Bank World Development Indicators databse. Bank domestic credit data are from Jorda, Schularick and Taylor (2014), except for Austria and Korea where the data are from the Bank World Development Indicators databse. Non-bank domestic credit is total domestic credit minus bank credit. The split of bank domestic credit to households versus corporations, and to mortgage versus non-mortgage lending is given in Jorda, Schularick and Taylor (2014). Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). The sample ends in 2005. The sample of 15 countries is determined by ICT data availability in the EU KLEMS data; these countries are: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Sweden, United States. We lose Austria, Czech Republic and Korea when we split bank credit due to data unavailability. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Finance Relative Wages: Descriptive Regressions in Levels, Anglo-Saxon versus Other Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	Finance relative wage				Finance skilled relative wage			
Financial deregulation index, t-3	0.408***	-0.160	0.150	-0.00620	0.320**	-0.234*	0.184	-0.180
	(0.133)	(0.112)	(0.105)	(0.122)	(0.154)	(0.122)	(0.122)	(0.135)
Finance relative share of ICT in capital stock, t-3 to t	0.287	0.578***	0.556***	0.577***	0.991***	1.273***	1.227***	1.272***
	(0.219)	(0.173)	(0.172)	(0.171)	(0.244)	(0.185)	(0.193)	(0.185)
Financial globalization, t-3	0.257***	0.226***	0.228***	0.226***	-0.0769	-0.0655	-0.0538	-0.0633
	(0.0556)	(0.0437)	(0.0435)	(0.0432)	(0.0633)	(0.0477)	(0.0499)	(0.0478)
Domestic credit/GDP, t-3	0.265***	0.201***	0.182***	0.187***	0.528***	0.411***	0.385***	0.404***
	(0.0713)	(0.0562)	(0.0560)	(0.0556)	(0.0797)	(0.0606)	(0.0637)	(0.0610)
Interactions with Anglo-Saxon dummy								
Financial deregulation index, t-3		1.095***		0.517**		1.419***		1.224***
		(0.0790)		(0.207)		(0.0947)		(0.230)
Financial globalization, t-3			0.492***	0.278***			0.607***	0.0977
			(0.0351)	(0.0925)			(0.0453)	(0.105)
Observations	356	356	356	356	341	341	341	341
R-squared, within	0.303	0.572	0.575	0.584	0.211	0.554	0.512	0.555
Number of countries	15	15	15	15	15	15	15	15

Notes: All regressions include country fixed effects and year fixed effects. The right hand side variables are lagged 3 periods. Deregulation data are from Abiad, Detragiache and Tressel (2008). The dependent variables as well as relative ICT use in finance is calculated from EU KLEMS database. Domestic credit covers all forms of credit to the non-financial sector on a gross level, except for credit to the government, which is on a net basis; data from the World Bank World Development Indicators databse. Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). The sample ends in 2005. Out of original 22 countries, we do not have sufficient data for Slovenia, and we drop Luxemburg as an outlier. The sample of 15 countries is determined by ICT data availability in the EU KLEMS data; these countries are: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Sweden, United States. Anglo-Saxon countries are: Australia, Canada, United Kingdom, United States. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Finance Relative Wages: Predictive Regressions in Changes

Dependent Variable: Changes from t to t+3 in	(1)	(2)	(3)	(4)
	Finance relative wage		Finance skilled relative wage	
	OLS	IV	OLS	IV
Change in financial deregulation, t-3 to t	0.373***	0.988***	0.235**	0.651**
	(0.100)	(0.336)	(0.107)	(0.314)
Change in finance relative share of ICT in capital stock, t-3 to t	0.0326	0.549	-0.215	0.188
	(0.241)	(0.356)	(0.257)	(0.339)
Change in financial globalization, t-3 to t	0.0843**	0.0690	0.0545	0.0423
	(0.0397)	(0.0648)	(0.0410)	(0.0624)
Change in domestic credit/GDP, t-3 to t	-0.0306	-0.0781	-0.0924	-0.105*
	(0.0742)	(0.0666)	(0.0775)	(0.0609)
Observations	293	293	278	278
R-squared	0.069	0.212	0.038	0.354
Number of countries	15	15	15	15
First stage partial F-stat	-	16	-	16

Notes: All regressions include country fixed effects. The right hand side variables are the three-year changes (from t-3 to t) for each variable. In IV regressions, we use the level of deregulation at t-3 as an instrument for changes in deregulation from t-3 to t. Deregulation data are from Abiad, Detragiache and Tressel (2008). The dependent variables as well as relative ICT use in finance is calculated from EU KLEMS database. Domestic credit is normalized by GDP, data from the World Bank World Development Indicators databse. Bank domestic credit data are from Jorda, Schularick and Taylor (2014), except for Austria and Korea where the data are from the Bank World Development Indicators databse. Non-bank domestic credit is total domestic credit minus bank credit. Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). The sample ends in 2005. Out of original 22 countries, we do not have sufficient data for Slovenia, and we drop Luxemburg as an outlier. The sample of 15 countries is determined by ICT data availability in the EU KLEMS data; these countries are: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Sweden, United States. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Finance Relative Wages: Predictive Regressions in Changes with Isolated Deregulation Components

A: Finance relative wage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	Change in finance relative wage, t to t+3						
Isolated financial deregulation measure:	Credit Controls	Interest Rate Controls	Entry Barriers	Banking Supervision	Privatization	International Capital Controls	Securities Markets
Residual financial deregulation index, t-3 to t	0.373***	0.383***	0.389***	0.294***	0.376***	0.136	0.310***
	(0.101)	(0.101)	(0.104)	(0.0920)	(0.0910)	(0.0967)	(0.0874)
Isolated financial deregulation measure, t-3 to t	0.00559	0.0191	-0.00101	0.0867*	-0.0260	0.200***	0.0915
	(0.0495)	(0.0328)	(0.0484)	(0.0453)	(0.0465)	(0.0409)	(0.0601)
Observations	293	293	293	293	293	293	293
R-squared	0.073	0.074	0.074	0.071	0.080	0.116	0.071
Number of countries	15	15	15	15	15	15	15

B: Finance skilled relative wage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	Change in finance skilled relative wage, t to t+3						
Isolated financial deregulation measure:	Credit Controls	Interest Rate Controls	Entry Barriers	Banking Supervision	Privatization	International Capital Controls	Securities Markets
Residual financial deregulation index, t-3 to t	0.201*	0.369***	0.128	0.194**	0.260***	0.0217	0.197**
	(0.108)	(0.108)	(0.110)	(0.0977)	(0.0971)	(0.103)	(0.0934)
Isolated financial deregulation measure, t-3 to t	0.101	-0.155	0.273*	0.134	-0.148	0.539***	0.159
	(0.157)	(0.101)	(0.148)	(0.142)	(0.144)	(0.128)	(0.187)
Observations	278	278	278	278	278	278	278
R-squared	0.038	0.067	0.044	0.038	0.050	0.086	0.038
Number of countries	15	15	15	15	15	15	15

Notes: All regressions include country fixed effects and the other three explanatory variables in Table 8: relative ICT use in finance, financial globalization, and domestic credit as a share of GDP. The right hand side variables are the three-year changes (from t-3 to t) for each variable. Deregulation data are from Abiad, Detragiache and Tressel (2008). The dependent variables are calculated from EU KLEMS database. The sample ends in 2005. Out of original 22 countries, we do not have sufficient data for Slovenia, and we drop Luxemburg as an outlier. The sample of 15 countries is determined by ICT data availability in the EU KLEMS data; these countries are: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Sweden, United States. Each residual and isolated index is divided by the sum of the maximum possible values of the variables in the numerator. When we use only 6 indices (instead of 7), we divide by 18 (rather than 21). This logic holds also for the index that is pulled out. That is, we divide it by 3 because it is only one index and it can get values of at most 3. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Bank Concentration & Finance Relative Wages: Descriptive Regressions in Levels, 2000-2005

	(1)	(2)	(3)	(4)
Dependent Variable:	Finance relative wage		Finance skilled relative wage	
Bank concentration, t-3	0.181***	0.167***	0.230***	0.236***
	(0.0521)	(0.0547)	(0.0665)	(0.0718)
Finance relative share of ICT in capital stock, t-3		-0.104		-0.0904
		(0.171)		(0.225)
Financial globalization, t-3		0.108*		0.0663
		(0.0583)		(0.0766)
Domestic credit/GDP, t-3		-0.00730		-0.0369
		(0.0381)		(0.0500)
Observations	60	60	60	60
R-squared, within	0.219	0.282	0.217	0.238
Number of countries	16	16	16	16

Notes: All regressions include country fixed effects. The right hand side variables are lagged 3 periods. Bank concentration is the log of the share of the largest three banks; data from the World Bank. The dependent variables as well as relative ICT use in finance are calculated from EU KLEMS database. Domestic credit covers all forms of credit to the non-financial sector on a gross level, except for credit to the government, which is on a net basis; data from the World Bank World Development Indicators databse. Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). The sample is from 1997 (start of bank concentration data) to 2005. These regressions include 16 countries (15 countries in our previous regressions plus Slovenia for which deregulation data was not available). The sample of 16 countries are: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Slovenia, Sweden, United States. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Immigration and Employment in Finance

A. Skilled workers

	Skilled immigration employed in finance, by destination					Skilled emigration employed in finance in destination, by source			
	(*a*)	(1)	(2)	(3)	(4)	(*b*)	(5)	(6)	(7)
	Skill intensity (skilled/all immigrants) (%)	Number	Share in sample finance skilled immigration (%)	Share in total skilled employment in finance (%)	Share of skilled immigration to destination (%)	Skill intensity (skilled/all emigrants) (%)	Number	Share in sample finance skilled emigration (%)	Share in total skilled emigration from source (%)
Australia	38.1	10458	8.2	10.97	4.67	62.6	6697	5.27	8.50
Austria	33.7	347	0.3	2.74	2.88	51.3	1744	1.37	5.43
Canada	51.0	19450	15.3	10.61	5.25	59.0	17580	13.82	6.14
Denmark	33.2	221	0.2	3.07	1.80	54.9	1710	1.34	6.03
Spain	58.5	2060	1.6	1.55	3.76	24.2	5195	4.08	6.82
Finland	49.6	132	0.1	0.57	2.61	47.3	1628	1.28	4.14
France	11.9	9429	7.4	6.59	8.69	67.4	12929	10.17	6.80
Hungary	67.4	58	0.05	0.27	2.84	51.4	1790	1.41	4.34
Ireland	62.3	4145	3.3	19.03	6.10	45.9	8354	6.57	6.78
Italy	35.8	1343	1.1	1.69	3.68	31.2	12154	9.56	8.00
Luxemburg	49.3	2261	1.8	29.44	25.65	32.4	232	0.18	8.04
Portugal	47.0	568	0.4	2.55	3.14	11.0	5525	4.34	9.58
Sweden	32.9	775	0.6	3.04	1.93	64.7	2735	2.15	6.73
United Kingdom	62.5	24131	19.0	10.55	9.06	49.0	37454	29.45	5.57
United States	56.2	51804	40.7	1.98	6.57	71.1	11455	9.01	5.89
Total		127182	100				127182	100	
Standard deviation				8.1	5.9				1.5
Correlation with coumn 2, "Share in sample finance skilled immigration (%)"				0.01	0.12				

B. All workers

	Overall immigration employed in finance, by destination				Overall emigration employed in finance in destination, by source		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Number of immigrants in finance	Share in sample finance immigration (%)	Share in finance employment in destination (%)	Share of total immigration to destination (%)	Number	Share in sample finance emigration (%)	Share in total immigration from source (%)
Australia	27450	9.2	8.55	3.67	10692	3.57	7.24
Austria	1030	0.34	0.91	2.53	3399	1.13	4.56
Canada	38130	12.73	6.32	4.55	29785	9.94	5.30
Denmark	666	0.22	0.84	1.92	3112	1.04	4.82
Spain	3520	1.18	1.08	2.06	21483	7.17	8.71
Finland	266	0.09	0.65	1.37	3440	1.15	2.65
France	79074	26.40	11.33	11.36	19177	6.40	4.38
Hungary	86	0.03	0.12	2.08	3481	1.16	3.41
Ireland	6649	2.22	10.07	4.44	18194	6.07	5.00
Italy	3752	1.25	0.72	2.57	38993	13.02	6.06
Luxemburg	4589	1.53	15.30	9.00	715	0.24	7.62
Portugal	1209	0.40	1.51	1.69	50271	16.78	7.42
Sweden	2355	0.79	2.51	1.63	4230	1.41	5.00
United Kingdom	38626	12.90	3.92	6.29	76431	25.52	4.83
United States	92107	30.75	1.54	5.37	16106	5.38	5.08
Total	299509	100			299509	100	
Standard deviation			4.8	2.9			1.6
Correlation with column 2, "Share in sample finance immigration (%)"			0.26	0.65			

Notes: Data are immigration stocks of workers that are employed in financial intermediation in the destination country, regardless of their past employment sector or employment status in the source country. Panel A reports statistics for skilled workers, which are consistently defined as having a college or university Bachelors' degree. In this panel all statistics, except for the skill intensity, are relative to skilled workers. Panel B reports statistics for all types of workers. The first set of columns in each panel report the distribution of immigrants in their destination countries (where they moved to), while the latter set of columns report the distribution of those immigrants by source country (where they came from). Immigration data source: OECD. Column 3 uses employment (skilled or total) in finance from EU KLEMS in order to compute the share of finance employment in destination.

Table 12: Summary Statistics

	Mean	S.D.	Min	Median	Max
A. Migration stocks					
Log(mH_fin)	4.15	2.32	0.0	4.09	9.62
(mH_fin/mH)*100	6.47	6.99	0.75	4.30	46.26
mH_fin/mL_fin	1.46	1.24	0.05	1.06	6.50
Log(mL_fin)	4.12	2.32	0.0	4.01	10.53
(mL_fin/mL)*100	5.05	7.26	0.26	2.58	43.33
B. Wages					
Log(wH_fin)	4.39	0.23	3.97	4.41	4.84
Log(wH_NFFP)	4.06	0.19	3.53	4.10	4.32
wH_fin/wL_fin	1.62	0.35	1.07	1.62	2.55
wH_NFFP/wL_NFFP	1.88	0.53	1.29	1.84	3.66
Log(wL_fin)	3.95	0.29	3.03	3.97	4.36
Log(wL_NFFP)	3.47	0.25	2.59	3.54	3.71

Notes: 193 observations. Here m denotes imgration stocks and w denotes wages. H denotes high-skill and L denotes low-skill workers, where high-skill is consistently defined as four-year college or a university degree. Here "fin" denotes employment in finance and NFFP denotes employment in the nonfarm, non-finance private sector. All data are for the year 2000. Immigration data source for Panel A: OECD. Wage data for Panel B: EU KLEMS.

Table 13: Immigration Stocks Employed in Finance vs Wages in Finance

A. Skilled immigration

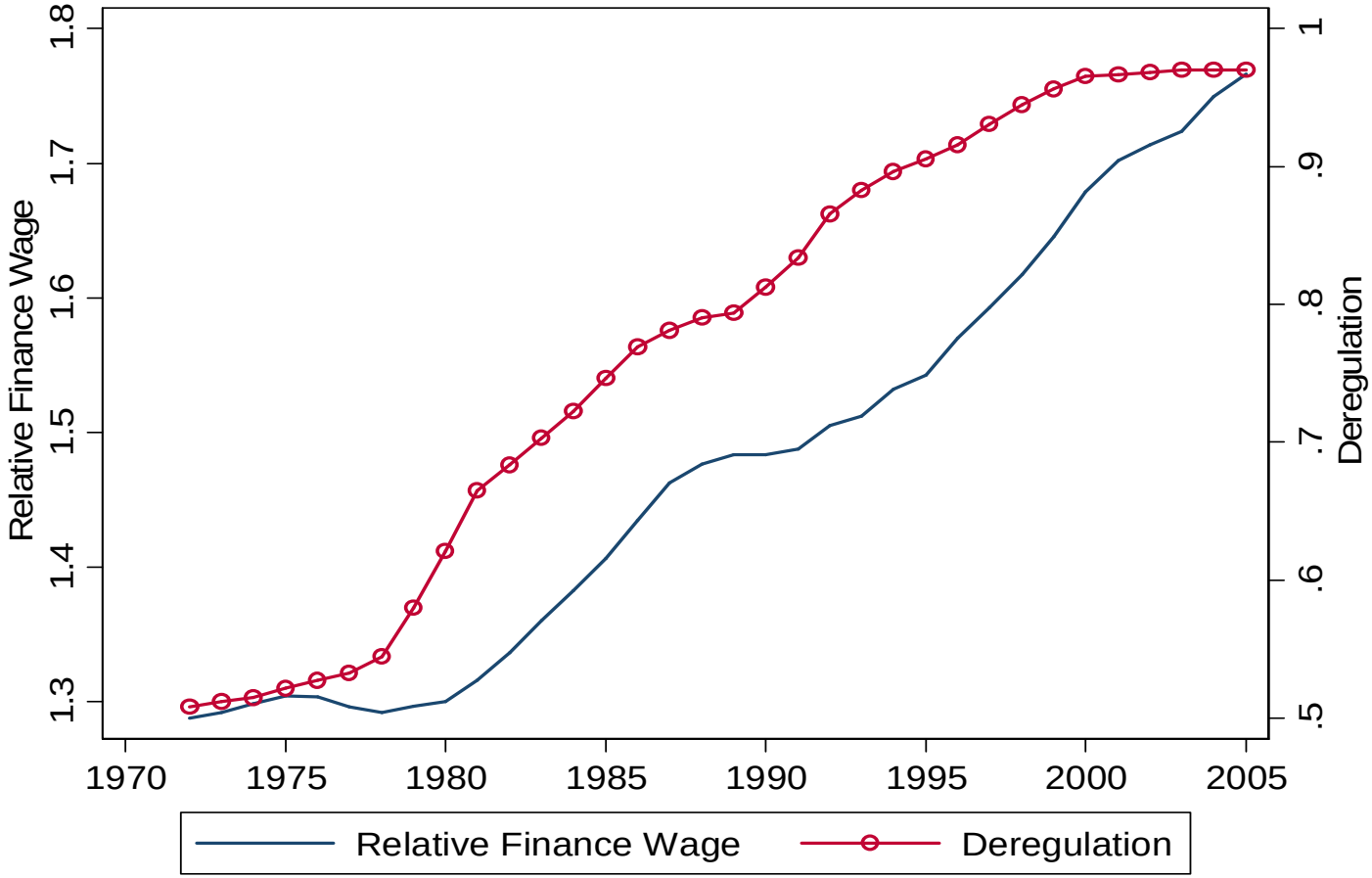
Dependent variable:	log(mH_fin)		(mH_fin/mH)*100		mH_fin/mL_fin	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(wH_fin)	3.783***	2.335***	16.52***	13.91***		
	(0.570)	(0.789)	(3.005)	(3.023)		
Log(wH_NFFP)		2.735***		4.912**		
		(0.789)		(1.912)		
wH_fin/wL_fin					0.968***	0.983***
					(0.298)	(0.302)
wH_NFFP/wL_NFFP						0.487***
						(0.141)
Observations	193	193	193	193	183	183
R-squared	0.511	0.540	0.359	0.369	0.232	0.272

B. Unskilled immigration

Dependent variable:	log(mL_fin)		(mL_fin/mL)*100	
	(1)	(2)	(3)	(4)
Log(wL_fin)	2.562***	0.374	6.442***	3.411
	(0.398)	(0.592)	(2.247)	(2.322)
Log(wL_NFFP)		3.712***		5.141**
		(0.702)		(2.032)
Observations	193	193	193	193
R-squared	0.444	0.518	0.149	0.163

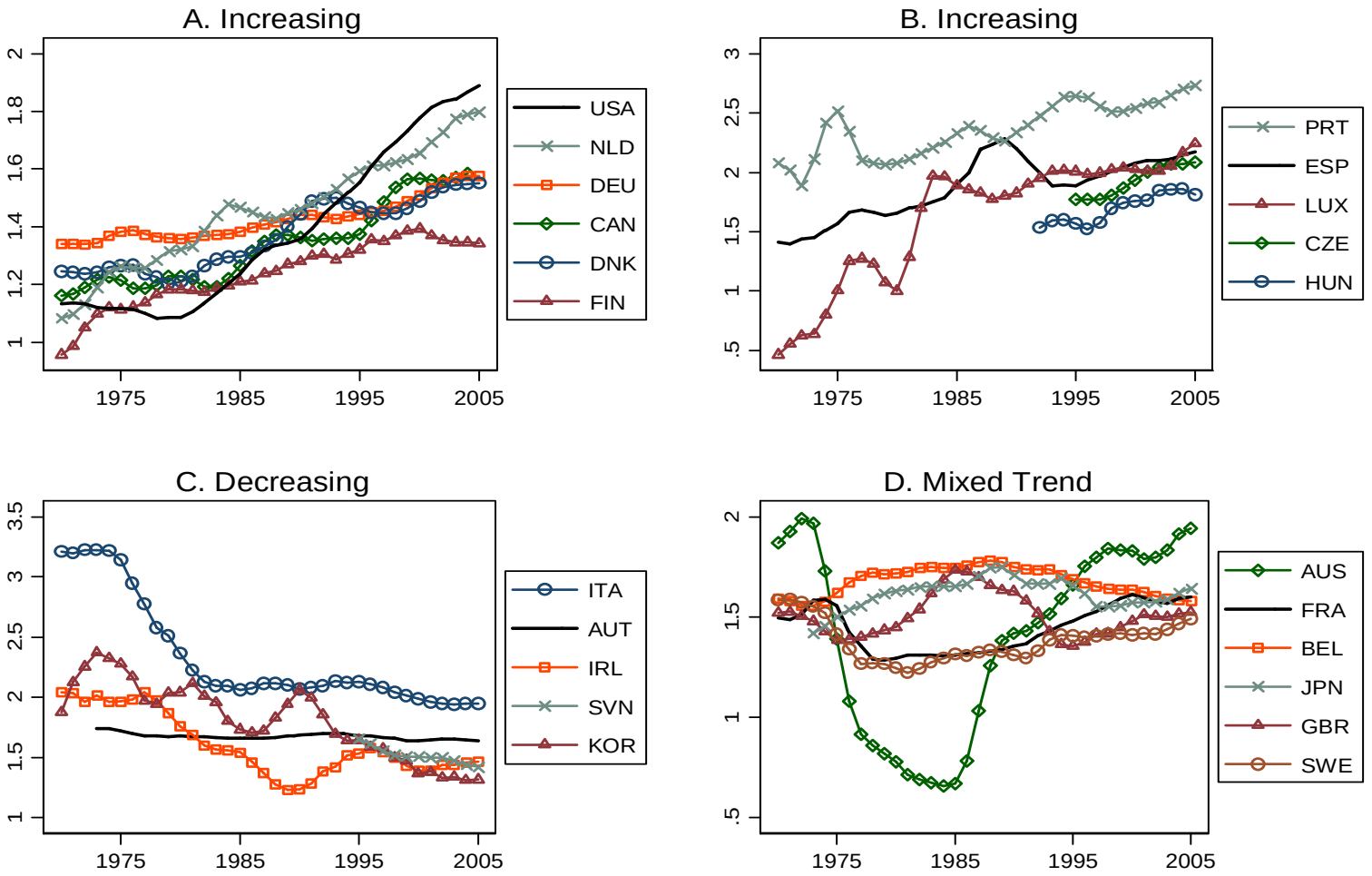
Notes: m denotes imgration stocks in 2000, and w denotes wages in 1999. H denotes high-skill and L denotes low-skill workers, where high-skill is consistently defined as four-year college or university degree. "fin" denotes employment in finance, and "NFFP" in the nonfarm, non-finance private sector. All regressions include source country fixed effects and the following gravity variables: contiguity indicator, commonlanguage indicator, and log distance between capital cities. Although regressions in both panels have the same number of observations, the sample varies slightly due to data availability. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Data sources: migration data from OECD and wage data from EU KLEMS. Regression include (but do not report coefficients for) distance between capital cities, common language and contiguity indicators (data from CEPII).

Figure 1: Finance Relative Wage and Financial Deregulation



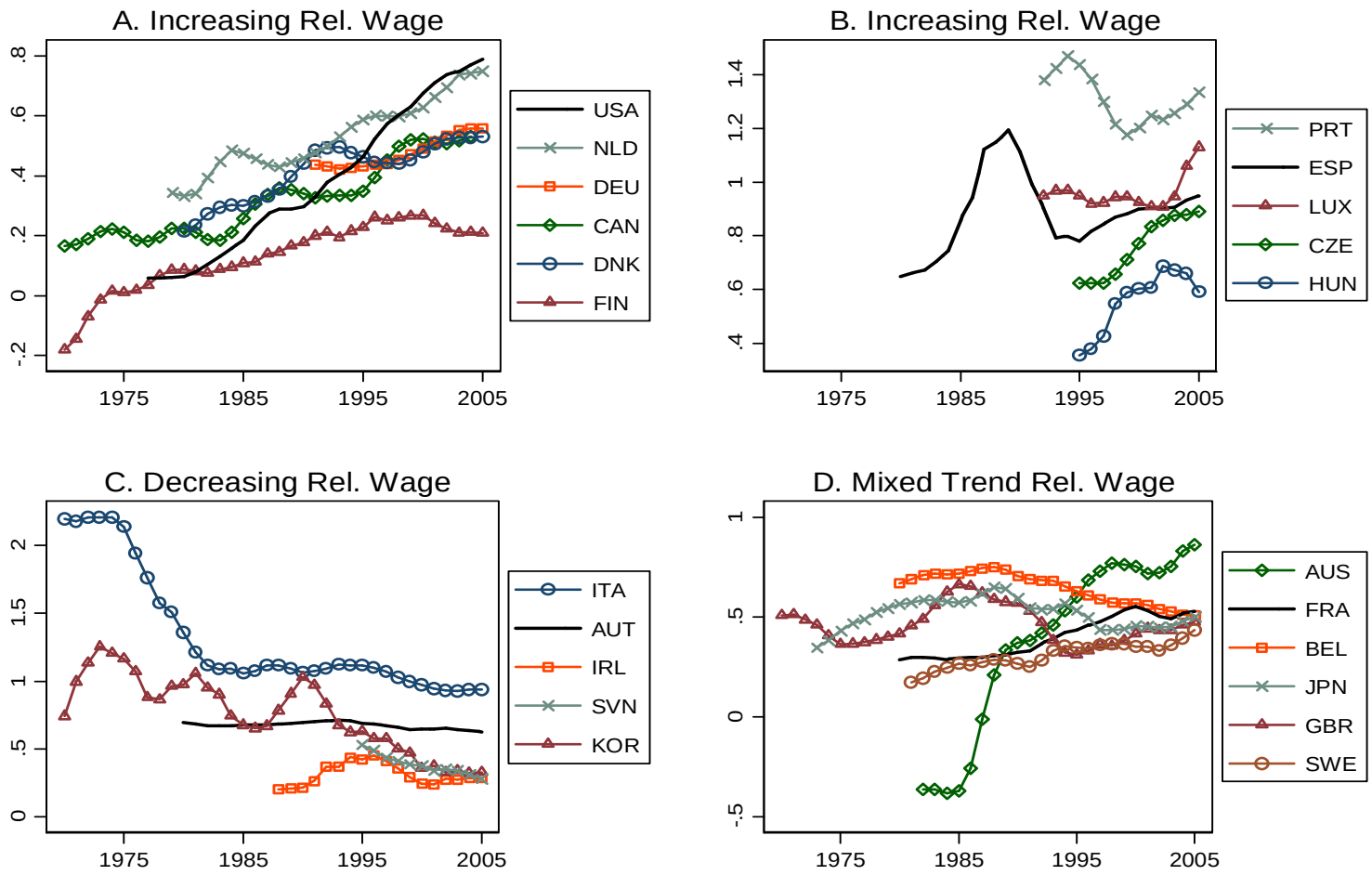
Notes: This figure plots averages of relative wages in finance and deregulation index across countries from 1973 to 2005. Relative finance wage in each country is constructed as the average wage in Finance divided to the average wage in non-farm and non-finance private sector. Deregulation index is the sum of 7 deregulation indices: Directed credit/reserve requirements, Interest rate controls, Entry barriers, Banking supervision, Privatization, International capital flows, Securities market policies. Each index takes values between 0 and 3 where higher values indicate lower regulation. We normalize the index to be between 0 and 1. The sample includes: Austria, Belgium, Canada, Czech Republic, Denmark, Germany, Spain, Finland, France, Hungary, Japan, Netherlands, United Kingdom, United States. We compute averages across these countries, weighted by employment in finance. The plotted series are three-year moving averages. Data on wages are from EU KLEMS. Financial regulation data are from Abiad, Detragiache, and Tressel (2008).

Figure 2: Finance Relative Wage



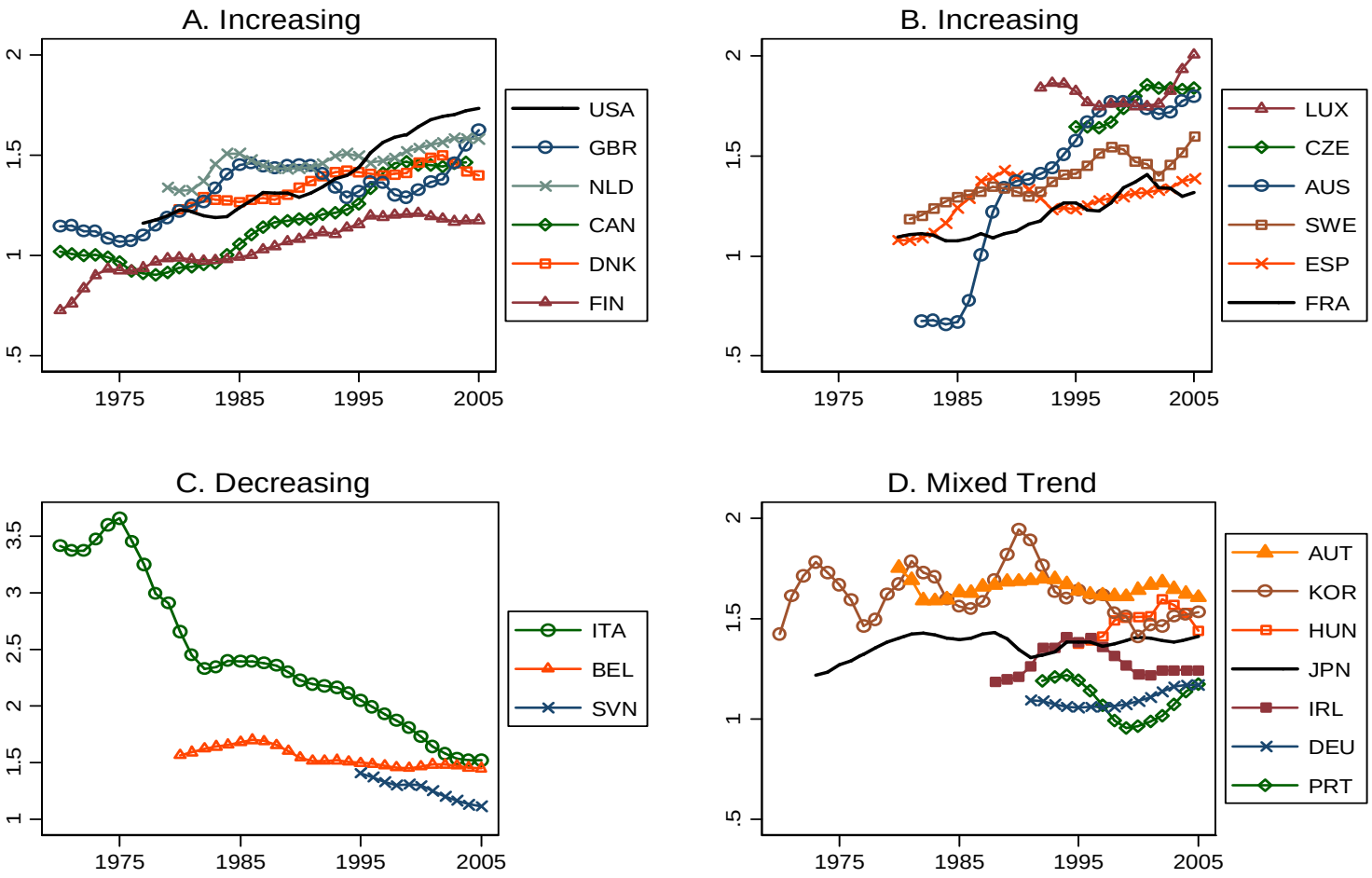
Notes: Finance relative wage is the average wage in finance divided by the averagre wage in the the non-farm, non-finance private sector. Average wages are computed by dividing employee compensation by hours worked. Data: EU KLEMS. Series are three-year moving averages. Panels A and B groups countries that exhibit an increasing trend. Panel C groups countries that exhibit decreasing trend and Panel D groups countries that exhibit mixed trends.

Figure 3: Finance Excess Wage



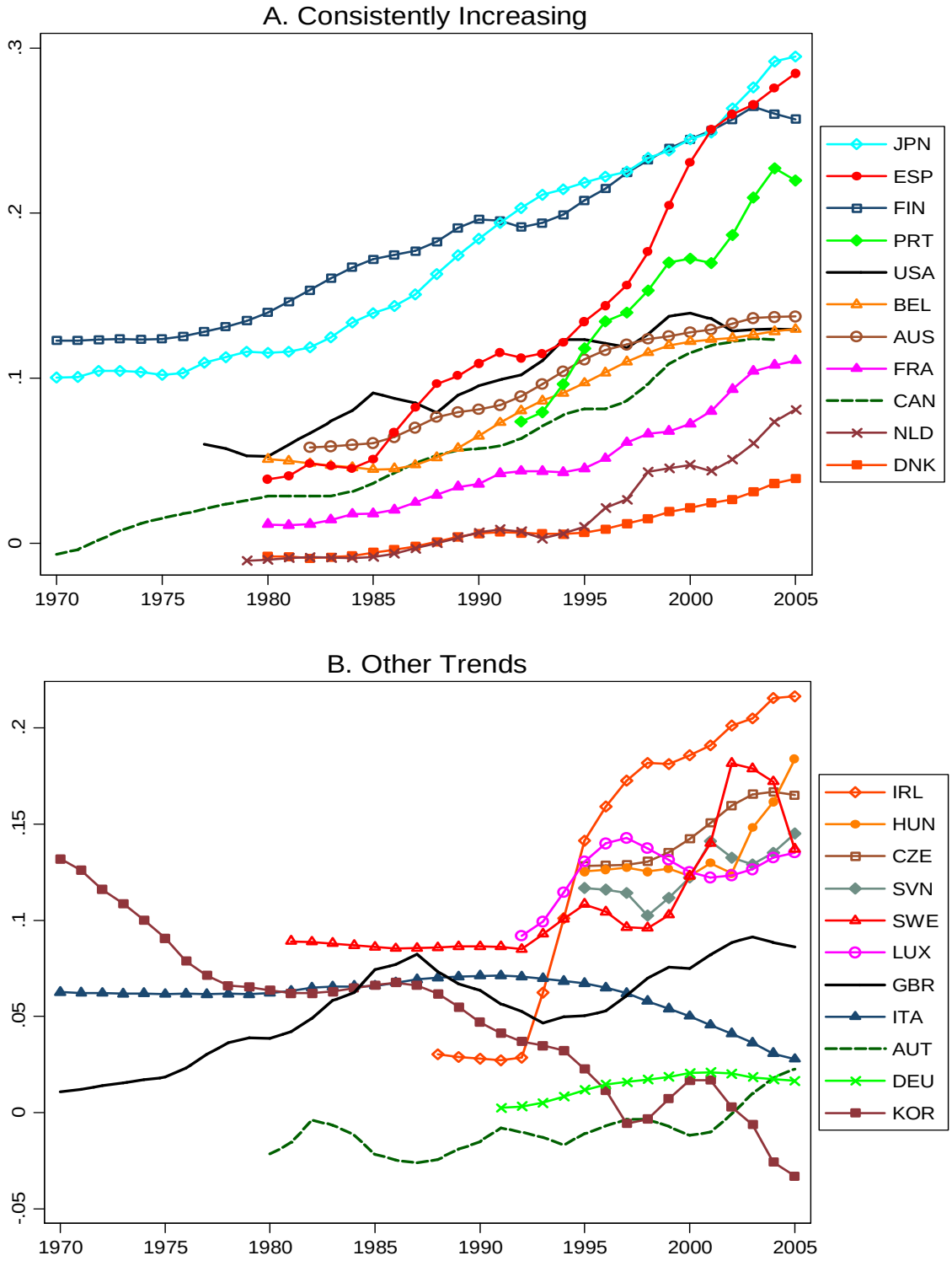
Notes: Finance ecess wage is the finance relative wage minus the benchmark wage. The benchmark assumes equal skilled and unskilled wages in finance and in the non-farm, non-finance private sector (NFFP), and allows for skill differences in finance versus NFFP. Data: EU KLEMS. Series are three-year moving averages. Panels A and B groups countries that exhibit an increasing trend in the finance relative wage. Panel C groups countries that exhibit decreasing finance relative wage and Panel D groups countries that exhibit mixed trends in finance relative wages.

Figure 4: Finance Relative Skilled Wage



Notes: Finance relative skilled wage is the average wage of skilled workers in finance relative to the averagre wage of skilled workers in the rest of the non-farm, non-finance private sector. Average wages are computed by dividing employee compensation by hours worked. Data: EU KLEMS. The definition of skilled workers in the EU KLEMS is consistent across countries, and implies a university-equivalent bachelors degree. Series are three-year moving averages. Panels A and B groups countries that exhibit an increasing trend. Panel C groups countries that exhibit decreasing trend and Panel D groups countries that exhibit mixed trends.

Figure 5: Finance Relative Skill Intensity



Notes: Finance relative skill intensity is the share of college-educated workers in finance relative to the share of college-educated workers in the rest of the non-farm, non-finance private sector. These shares are computed using hours worked. Data: EU KLEMS. The definition of skilled workers in the EU KLEMS is consistent across countries, and implies a university-equivalent bachelors degree. Series are three-year moving averages. Panel A groups countries that exhibit an increasing trend. Panel B groups countries that exhibit mixed trends.

Table A1: Finance Relative Wages and Relative Skill Intensity

A. Finance Relative Wage

	Levels				Changes			
	1975	1985	1995	2005	1975-1985	1985-1995	1995-2005	Total
Australia	1.34	0.61	1.69	1.97	-0.73	1.08	0.28	0.63
Austria	1.74	1.65	1.69	1.63	-0.09	0.04	-0.06	-0.11
Belgium	1.62	1.75	1.66	1.59	0.12	-0.08	-0.08	-0.04
Canada*	1.21	1.28	1.35	1.59	0.07	0.07	0.24	0.38
Czech Republic			1.78	2.10			0.32	0.32
Denmark	1.29	1.29	1.45	1.55	0.00	0.16	0.10	0.26
Finland	1.12	1.20	1.36	1.33	0.09	0.16	-0.03	0.22
France	1.49	1.31	1.48	1.62	-0.17	0.17	0.14	0.13
Germany	1.41	1.38	1.45	1.57	-0.03	0.07	0.12	0.16
Hungary			1.51	1.89			0.38	0.38
Ireland	1.86	1.53	1.64	1.51	-0.33	0.10	-0.12	-0.35
Italy	3.15	2.02	2.11	1.96	-1.14	0.09	-0.15	-1.19
Japan	1.53	1.66	1.73	1.66	0.13	0.07	-0.07	0.13
Korea	2.48	1.79	1.63	1.34	-0.69	-0.16	-0.29	-1.14
Luxemburg	1.23	1.90	1.99	2.39	0.67	0.09	0.40	1.16
Netherlands	1.28	1.48	1.60	1.79	0.20	0.12	0.19	0.51
Portugal	2.80	2.31	2.68	2.73	-0.49	0.37	0.05	-0.07
Slovenia			1.65	1.44			-0.21	-0.21
Spain	1.58	1.84	1.90	2.21	0.25	0.07	0.30	0.62
Sweden	1.50	1.29	1.39	1.52	-0.21	0.10	0.13	0.02
United Kingdom	1.39	1.76	1.30	1.55	0.37	-0.46	0.25	0.16
United States	1.13	1.24	1.55	1.90	0.11	0.32	0.35	0.78
Average	1.638	1.541	1.663	1.765	-0.097	0.125	0.102	0.126

B. Finance Relative Skilled Wage

	Levels				Changes			
	1975	1985	1995	2005	1975-1985	1985-1995	1995-2005	Total
Australia		0.61	1.59	1.83		0.98	0.23	1.21
Austria		1.60	1.63	1.59		0.03	-0.04	0.00
Belgium		1.69	1.48	1.45		-0.21	-0.03	-0.24
Canada*	0.95	1.06	1.24	1.48	0.11	0.18	0.23	0.53
Czech Republic			1.66	1.85			0.19	0.19
Denmark		1.25	1.41	1.39		0.16	-0.02	0.13
Finland	0.92	0.98	1.21	1.18	0.06	0.22	-0.03	0.26
France		1.04	1.25	1.33		0.21	0.08	0.29
Germany			1.06	1.15			0.10	0.10
Hungary			1.41	1.49			0.08	0.08
Ireland			1.47	1.28			-0.19	-0.19
Italy	3.68	2.39	2.09	1.53	-1.29	-0.30	-0.56	-2.15
Japan	1.27	1.40	1.44	1.41	0.13	0.04	-0.03	0.15
Korea	1.83	1.60	1.60	1.57	-0.23	0.00	-0.03	-0.26
Luxemburg			1.81	2.11			0.30	0.30
Netherlands		1.53	1.47	1.56		-0.06	0.09	0.03
Portugal			1.19	1.18			-0.01	-0.01
Slovenia			1.40	1.10			-0.30	-0.30
Spain		1.22	1.22	1.41		-0.01	0.20	0.19
Sweden		1.29	1.41	1.64		0.12	0.23	0.35
United Kingdom	1.05	1.49	1.26	1.65	0.44	-0.22	0.39	0.60
United States		1.21	1.41	1.74		0.20	0.34	0.53
Average	1.616	1.358	1.441	1.496	-0.129	0.089	0.056	0.081

C. Finance Relative Skill Intensity

	Levels				Changes			
	1975	1985	1995	2005	1975-1985	1985-1995	1995-2005	Total
Australia		0.061	0.113	0.136		0.052	0.023	0.075
Austria		-0.019	-0.009	0.026		0.010	0.035	0.045
Belgium		0.045	0.096	0.131		0.051	0.035	0.086
Canada*	0.015	0.036	0.083	0.123	0.021	0.048	0.040	0.108
Czech Republic			0.128	0.162			0.034	0.034
Denmark		-0.006	0.006	0.041		0.012	0.035	0.047
Finland	0.122	0.174	0.204	0.240	0.052	0.030	0.036	0.118
France		0.021	0.045	0.101		0.025	0.056	0.081
Germany			0.012	0.017			0.005	0.005
Hungary			0.124	0.182			0.058	0.058
Ireland			0.142	0.226			0.084	0.084
Italy	0.062	0.065	0.066	0.024	0.003	0.001	-0.042	-0.038
Japan	0.100	0.142	0.218	0.303	0.042	0.076	0.084	0.203
Korea	0.089	0.066	0.031	-0.046	-0.022	-0.035	-0.077	-0.134
Luxemburg			0.131	0.141			0.011	0.011
Netherlands		-0.009	0.018	0.093		0.027	0.075	0.102
Portugal			0.120	0.231			0.111	0.111
Slovenia			0.118	0.155			0.036	0.036
Spain		0.040	0.144	0.293		0.104	0.149	0.253
Sweden		0.086	0.110	0.135		0.025	0.025	0.050
United Kingdom	0.019	0.062	0.056	0.085	0.043	-0.006	0.029	0.066
United States		0.093	0.128	0.129		0.036	0.001	0.036
Average	0.068	0.057	0.095	0.133	0.023	0.030	0.038	0.065

Notes: The table reports wages and skill intensity in finance relative to the nonfarm, non-finance private sector (NFFP) in different years and the changes between those years. The total change is the sum of changes in the preceding three columns. Skilled workers are consistently defined across countries as those who hold a university-equivalent bachelors degree or more. * Data for Canada in 2005 is missing and is replaced in this table by data for Canada in 2004. Data: EU KLEMS.

Table A2: Correlations for Level and Predictive Regressions

A. Correlations across variables in levels

	Finance relative ICT intensity	Domestic credit	Non-bank domestic credit/GDP	Bank domestic credit/GDP	Household bank credit/GDP	Corporate bank credit/GDP	Financial globalization	Deregulation Index	International capital restrictions	Privatization	Entry barriers	Banking supervision	Directed credit	Interest rate control
Finance relative ICT intensity	1													
Domestic credit/GDP	0.13	1												
Non-bank domestic credit/GDP	0.03	0.87	1											
Bank domestic credit/GDP	0.22	0.46	-0.04	1										
Household bank credit/GDP	0.29	0.03	-0.36	0.71	1									
Corporate bank credit/GDP	0.06	0.64	0.30	0.75	0.08	1								
Financial globalization	0.47	0.04	-0.27	0.57	0.76	0.10	1							
Deregulation Index	0.38	0.28	0.08	0.43	0.59	0.07	0.76	1						
International capital restrictions	0.27	0.35	0.23	0.30	0.31	0.14	0.49	0.82	1					
Privatization	0.05	0.33	0.21	0.30	0.52	-0.01	0.39	0.63	0.49	1				
Entry barriers	0.54	0.15	-0.09	0.48	0.56	0.15	0.75	0.76	0.51	0.23	1			
Banking supervision	0.29	0.25	0.07	0.40	0.52	0.07	0.62	0.84	0.58	0.46	0.65	1		
Directed credit	0.37	0.00	-0.10	0.17	0.53	-0.20	0.61	0.78	0.56	0.53	0.65	0.57	1	
Interest rate control	0.25	0.19	0.03	0.32	0.32	0.17	0.63	0.72	0.60	0.22	0.50	0.51	0.43	1

B. Correlations across variables in changes (t-3,t)

	Finance relative ICT intensity	Domestic credit	Non-bank domestic credit/GDP	Bank domestic credit/GDP	Household bank credit/GDP	Corporate bank credit/GDP	Financial globalization	Deregulation Index	International capital restrictions	Privatization	Entry barriers	Banking supervision	Directed credit	Interest rate control
Finance relative ICT intensity	1													
Domestic credit/GDP	0.08	1												
Non-bank domestic credit/GDP	-0.12	0.58	1											
Bank domestic credit/GDP	0.21	0.65	-0.25	1										
Household bank credit/GDP	0.21	0.54	-0.22	0.85	1									
Corporate bank credit/GDP	0.17	0.57	-0.20	0.87	0.49	1								
Financial globalization	0.14	0.21	-0.02	0.26	0.15	0.29	1							
Deregulation Index	-0.29	0.03	0.04	0.00	-0.09	0.08	0.03	1						
International capital restrictions	-0.18	-0.05	-0.04	-0.03	-0.08	0.03	0.02	0.63	1					
Privatization	-0.03	-0.08	-0.10	0.00	0.07	-0.06	-0.01	0.28	-0.02	1				
Entry barriers	-0.17	0.05	0.05	0.01	-0.12	0.13	0.03	0.61	0.32	0.07	1			
Banking supervision	-0.15	0.00	-0.05	0.05	0.01	0.05	-0.11	0.44	0.11	0.13	0.20	1		
Directed credit	-0.11	-0.06	-0.08	0.01	-0.03	0.04	0.09	0.56	0.29	0.05	0.31	0.10	1	
Interest rate control	-0.14	0.10	0.13	-0.01	-0.12	0.10	0.08	0.45	0.18	-0.07	0.03	-0.09	0.16	1

Notes: Statistics are computed for 356 observations for 15 countries. The range for t is 1976-2005. Wage, skill and ICT variables are calculated based on EU KLEMS data. Domestic credit covers all forms of credit to the non-financial sector on a gross level, except for credit to the government, which is on a net basis; data from the World Bank World Development Indicators databse. Bank domestic credit data are from Jorda, Schularick and Taylor (2014), except for Austria and Korea where the data are from the Bank World Development Indicators databse. Non-bank domestic credit is total domestic credit minus bank credit. The split of bank domestic credit to households versus corporations is given in Jorda, Schularick and Taylor (2014). Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). Statistics on the financial reform indices are reported in Table 5. All correlation coefficients that are strictly greater than 0.11 are statistically significant at the 5% level; in Panel B most correlation coefficients are not statistically significant at conventional levels.

Table A3: Correlations for Bank Concentration Regressions

	Finance relative ICT intensity	Domestic credit	Non-bank domestic credit/GDP	Bank domestic credit/GDP	Household bank credit/GDP	Corporate bank credit/GDP	Financial globalization	Bank concentration
Finance relative ICT intensity	1							
Domestic credit/GDP	-0.14	1						
Non-bank domestic credit/GDP	-0.06	0.89	1					
Bank domestic credit/GDP	-0.17	0.15	-0.31	1				
Household bank credit/GDP	-0.10	-0.25	-0.55	0.69	1			
Corporate bank credit/GDP	-0.12	0.45	0.09	0.77	0.12	1		
Financial globalization	0.18	-0.49	-0.69	0.49	0.78	0.04	1	
Bank concentration	0.19	-0.61	-0.76	0.36	0.27	0.27	0.39	1

Notes: Bank concentration is the log of the share of the largest three banks; data from the World Bank. Domestic credit covers all forms of credit to the non-financial sector on a gross level, except for credit to the government, which is on a net basis; data from the World Bank World Development Indicators databse. Bank domestic credit data are from Jorda, Schularick and Taylor (2014), except for Austria and Korea where the data are from the Bank World Development Indicators databse. Non-bank domestic credit is total domestic credit minus bank credit. The split of bank domestic credit to households versus corporations is given in Jorda, Schularick and Taylor (2014). Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). Statistics are computed for 60 observations for 16 countries. The range for t is 2000-2005. The sample of 16 countries is determined by ICT data availability in the EU KLEMS data; these countries are: Australia, Austria, Canada, Czech Republic, Germany, Denmark, Finland, United Kingdom, Italy, Japan, Korea, Netherlands, Portugal, Sweden, United States, Slovenia. All correlations above 0.3 are statistically significant.

Table A4: Finance Relative Wage and Relative Skill Intensity, Predictive Regressions, TSLS --- First Stage Regressions

Instrumented, Dependent Variable: Change in financial deregulation, t-3 to t		
Instrument: Financial deregulation, t-3		
	(1)	(2)
Second Stage Dependent Variable: Changes from t to t+3 in	Relative Wage	Relative Skilled Wage
Financial deregulation, t-3	-0.0936**	-0.183***
	(0.0367)	(0.0329)
Change in finance relative share of ICT in capital stock, t-3 to t	-0.511***	-0.380***
	(0.141)	(0.126)
Change in domestic credit/GDP, t-3 to t	0.0770**	0.0129
	(0.0374)	(0.0416)
Change in financial globalization, t-3 to t	0.0269	0.0349
	(0.0255)	(0.0239)
Observations	293	293
R-squared	0.248	0.275

Notes: All regressions include country fixed effects. Deregulation data are from Abiad, Detragiache and Tressel (2008). The dependent variables as well as relative ICT use in finance is calculated from EU KLEMS database. Domestic credit is normalized by GDP, data from the World Bank World Development Indicators databse. Financial globalization is log(foreign assets + liabilities/GDP), data are from Lane and Milesi-Ferretti (2007). The sample ends in 2005. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A5: Missing Observations on Finance Immigrants

A. Skilled Immigrants

	Origin									
Destination	AUS	AUT	DNK	FIN	HUN	IRL	ITA	LUX	PRT	Total
AUS	0	0	0	0	0	0	0	1	0	1
DNK	0	0	0	0	0	0	0	1	0	1
ESP	1	0	0	1	1	0	0	1	0	4
FIN	0	0	0	0	1	0	1	1	1	4
HUN	0	0	1	1	0	1	0	1	1	5
PRT	0	1	0	0	1	0	0	0	0	2
Total	1	1	1	2	3	1	1	5	2	17

A. Unskilled Immigrants

	Origin									
Destination	AUS	AUT	DNK	ESP	FIN	HUN	IRL	LUX	SWE	Total
AUS	0	0	0	0	0	0	0	1	0	1
CAN	0	0	0	0	0	0	0	1	0	1
ESP	0	1	0	0	0	1	0	0	0	2
FIN	0	0	0	1	0	0	1	0	0	2
HUN	1	0	1	0	1	0	1	1	1	6
IRL	0	0	1	0	0	0	0	1	0	2
PRT	0	0	0	0	1	1	0	0	0	2
SWE	0	0	0	0	0	0	0	1	0	1
Total	1	1	2	1	2	2	2	5	1	17

Notes: The table reports missing (those with the value of zero) bilateral observations in the OECD immigration data for the finance sector. Although there are 17 missing observations for each type of worker employed in finance, these missing observations overlap in only 7 cases.