Finance, Talent Allocation, and Growth

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ABSTRACT

In general equilibrium, the growing finance wage premium is associated to a modest net reallocation of skilled workers from non-finance sectors into finance in a sample of 13 sectors in 24 countries over 35 years. Reallocation is higher when the finance wage premium grows faster than the contribution of finance to the economy, whose variation we capture with the finance value added premium. Yet, the growing finance wage premium appears unrelated to sectoral or aggregate growth, innovation, student enrollment in STEM degrees, or the banks' riskiness. The reallocation of skilled labor after periods of high finance wage premium does not appear associated with lower economic growth.

JEL Codes: D72, G20, J23, J31, N20

Keywords: Finance Wage Premium, Skilled Labor, Misallocation, Growth, Innovation, STEM Education, Patents, Banking Sector, Value Added, Social Value of Finance.

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I Introduction

Over the last four decades, the size of the financial sector and the compensation of finance workers relative to workers in other industries have grown considerably all over the world.[1] Academics and policy makers worry that excessive finance compensation might distort the efficient allocation of talent in the economy, because talented individuals maximize their private return by moving into lucrative finance jobs instead of engaging in occupations that generate higher social returns, such as entrepreneurship and scientific research. In the words of Brink Lindsey and Steven Teles, the growing U.S. financial sector creates "growth-sapping diversion of some of the nation's best minds into unproductive or counterproductive pursuits" (*The Captured Economy, 2017*).

This paper aims to assess whether, in general equilibrium, a growing finance wage premium has the potential to change the allocation of talent across sectors to the extent of reducing economic growth at the sectoral and aggregate level. Using a large sample covering 13 sectors in 24 countries over 35 years we detect a reallocation of skilled workers from non-finance sectors into finance when the finance wage premium is high, consistent with earlier studies. Yet the average magnitude of this reallocation is modest, and appears too low to hinder sectoral or aggregate economic growth, research productivity, and innovation, which we measure globally using several proxies and over various horizons. The net reallocation of skilled workers from non-finance sectors into finance at times of high finance wage premium does not appear to affect materially the riskiness, efficiency, or competitiveness of the banking sector either. Overall, growing finance wages *per se* do not seem to have the potential to hinder short-, medium-, and long-run growth or worsen the quality of a country's banking sector substantially.[2]

Our results do not imply that an increasing finance wage premium does not have a causal effect on the allocation of skilled workers across sectors. In fact, our paper does not aim to estimate such a causal effect, which earlier work has already documented. Rather, this paper aims to assess the association between the finance wage premium, skill reallocation, and economic growth across sectors and countries in a large representative sample.

[1] For instance, see Kaplan and Rauh (2010), Philippon and Reshef (2012), and Boustanifar, Grant, and Reshef (2017).

[2] Lack of statistical power is an unlikely explanations for these non-results, because we detect a small yet statistically significant reallocation of talent to finance in the same data with similar empirical specifications.

As we discuss in more detail below, our definition of skilled workers includes all college graduates. One might argue that only pivotal and elite skilled workers might be important to change the economic growth of sectors and countries over time. For instance, Vivek Wadhwa told the U.S. Congress that "thirty to forty percent of Duke Masters of Engineering Management students were accepting jobs outside of the engineering profession. They chose to become investment bankers or management consultants rather than engineers" (*Testimony to the U.S. House of Representatives, May 16, 2006*). Such pivotal cases are included in our measure of skills, and hence if a reallocation of pivotal workers was enough to affect economic growth our tests would capture such changes of economic growth at times of higher finance wage premium, if such pivotal workers were move around across sectors and if they were able to affect aggregate growth.

To understand the interplay between the compensation of finance workers, talent allocation, and economic growth, we note the optimal allocation of talent across sectors could be distorted if the private returns in finance – employees' compensation – exceed its social returns – the contribution of finance to the economy. As Baumol (1990) and Murphy, Shleifer, and Vishny (1991) argue, when private returns are high in rent-seeking sectors that produce low social returns, talent flows excessively into socially unproductive sectors. A higher finance wage premium might thus induce harmful allocative distortions if it is not commensurate with the social returns finance provides to the rest of the economy (Philippon (2010)). A wedge between private and social returns can arise if the financial sector captures substantial rents at the expense of other sectors. This condition is often taken for granted even if the mechanisms and magnitude of rents in finance remain elusive.[3]

At the same time, a large literature documents important social returns associated with the financial sector (see Levine (2005) for a survey). An efficient financial sector offers talented individuals more opportunities to create, develop, or join productive firms in non-finance sectors (e.g., Guiso, Sapienza, and Zingales (2004)).[4] If the finance wage premium is proportional to the benefits finance

[3]The financial sector might extract rents through complex services and its capturing of the government (e.g., Stiglitz (2012) or Lindsey and Teles (2018)). Research provides evidence that financial complexity is increasing (Celerier and Vallee (2017)) and can be socially inefficient (Perignon and Vallee (2017)). We are not aware of direct evidence that the social costs of rent-seeking in finance exceed the social benefits of financial activities.

[4]Starting with Schumpeter (1911), research shows that the financial sector provides benefits to other sectors, which fosters economic growth (e.g., King and Levine (1993), Levine (1997), Beck et al. (2000), or Beck (2002)). Finance might help manage risks, limit agency problems, and allocate capital efficiently.

provides to the rest of the economy, a high finance wage premium might even promote a more efficient allocation of talent, because individuals could obtain more resources to exploit their talent outside finance. For instance, skilled financiers might be better at monitoring and assessing startups' quality, and hence channel more funds towards skilled entrepreneurs (see King and Levine (1993), Rajan and Zingales (1998), Beck (2002), and Cochrane (2013)). The finance sector might offer high wages and high returns to workers' skills at times in which the demand for skill in finance increases (Gibbons, Katz, Lemieux, and Parent (2005)), which thus does not necessarily imply that a reallocation of talent from other sectors to finance is not optimal or detrimental to aggregate and sectoral growth.

Assessing whether the higher and increasing compensation of finance workers relates to a misallocation of talent requires linking talent allocation to the potential wedge between the private and social returns associated with financial activities.[5] To this aim, we use detailed sectoral-level data on employment, compensation, skills, value added, and productivity between 1970 and 2005 from the WORLD-KLEMS 2008 initiative. These data allow us to measure the private returns in finance as the average compensation (henceforth "wage") of skilled workers in finance relative to the wage of skilled workers in the rest of the economy (*finance wage premium*).[6]

Measuring the social returns of finance is notoriously challenging, especially in our setting in which we aim to capture the variation in the social returns of finance homogeneously across countries and over time. To capture this variation, we rely on the value added per skilled worker in finance relative to the average value added per skilled worker in the rest of economy (*finance value-added premium*). By construction, the measured value added of finance aggregates the overall value of the services the financial sector provides to the rest of the economy, (e.g., payment processing, screening and monitoring borrowers, or underwriting financial securities), net of purchases from other sectors.

A concern with this proxy is it may capture in part the private returns of finance. For instance, the finance value-added premium might be higher if financial institutions charge excessively high prices for the services they provide. To validate our interpretation, we show that the growing finance value

[5] This idea is similar in spirit to that put forth by Cochrane (2013), who argues that to evaluate the social contribution of the financial sector, one needs to focus on its function and not its size.

[6] Workers' compensation includes wages, salaries, and supplements, employers' contributions to social programs, tips, bonuses. Corporate executives are also part of the sample. We label the sum of all these components "wage" following Philippon and Reshef (2012) and Boustanifar, Grant, and Reshef (2017).

added premium is positively correlated with proxies for the benefits of the financial sector to other sectors, such as the efficiency of capital allocation within countries, or the share of high-skill workers employed in non-finance sector. In addition, we show that the growing finance value added is negatively associated with booming cycles of household debt which leads to lower growth and misallocation of resources (Mian, Sufi, and Verner (2018)), suggesting that our measure is inversely related to financial "excess" cross countries. Importantly, we do not argue that the finance value added should be used as a *measure* of the social returns of finance, but that this variable – which in principle we can measure consistently across countries and over time – captures variation related to the social returns of finance.

We then define the wedge between the private and social returns of the financial sector in each country and year by taking the difference between the growth of the finance wage and value-added premia at various horizons. We label this difference as the *adjusted growth of finance wages*, henceforth AGFW. Intuitively, a positive AGFW in a given country-year implies the relative compensation of finance workers in that country has grown *more* than their relative contribution to that country's economy. Our central prediction is that if the high relative wages in finance trigger a reallocation of talent into finance, such reallocation should occur in periods of high AGFW, that is, when private returns in finance exceed social returns. Our tests exploit the substantial variation of AGFW across countries and over time. As in Philippon and Reshef (2012), we focus on the education attainment of the labor force to measure talent, and calculate the skill intensity of a given country-sector-year as the fraction of the labor force holding a university degree (or equivalent).

First, we document that a higher finance wage premium is associated with a detectable reallocation of skilled workers from non-finance sectors into finance. We estimate a positive relationship between the AGFW and the share of skilled workers employed in the financial sector in a given country-year.[7] At the same time, we find a negative relationship between the share of skilled workers employed in non-finance sectors and the AGFW, indicating the talent intensity of non-finance sectors is lower when the AGFW is high. The negative association between the AGFW and the share of skilled labor in non-finance sectors holds at all horizons where we measure the AGFW. It also holds when we partial out country-sector and year fixed effects, indicating our results cannot be explained by time-invariant

[7]This result is consistent with the evidence in Bertrand, Goldin, and Katz (2010), Oyer (2008), and Shu (2013), as well as in Philippon and Reshef (2012) and Gupta and Hacamo (2017).

characteristics specific to each country-sector observation or unobserved shocks that are common to all countries, such as a worldwide recession or the well-documented increase in wage inequality among the top earners skilled employees in each country (for instance, see Piketty and Saez (2003) and Lemieux (2006)). We further show our results are not due to variation in the country-level supply of skilled labor, to countries' credit cycles that could correlate with variation in the finance wage premium, or to a set of proxies for the size and development of countries' financial sectors.[8]

When we consider the two components of the AGFW separately, we find the share of skilled workers in non-finance sectors is negatively associated with the recent growth of finance relative wages, but positively associated with the growth of finance value added. These results further corroborate the use of the value added of finance as a proxy for the contribution of finance to other sectors.

In terms of magnitude, the coefficient on the AGFW is more than twice as large as the coefficient on the growth of finance relative wages. This discrepancy suggests scaling the finance wage premium by the contribution of the financial sector is important to avoid an omitted-variable bias when evaluating the real implications of increasing finance wages. The magnitude of such implications is underestimated when regressing the share of skilled workers on the mere finance wage premium, because this specification does not consider the fact that the private and social returns of finance partly comove over time. This result emphasizes the importance of considering proxies for both the private and social returns of finance.

Our baseline negative association between skilled workers in non-finance sectors and the AGFW might be driven by unobserved time-varying country-specific variables, such as local recessions or unexpected changes in regulation, which are correlated with the AGFW and with the allocation of skills across sectors. To tackle this concern and further investigate the economic mechanisms behind our results, we conduct an analysis in the spirit of Rajan and Zingales (1998). We explore how the sensitivity of skilled labor to the AGFW varies across non-finance sectors *within* countries, holding time-varying country characteristics constant with the interaction of country and year fixed effects. We show the sensitivity of skilled labor to the AGFW is stronger in sectors in which the costs of

[8]The AGFW does not vary systematically with episodes of financial deregulation, because the increase in the finance wage premium post-deregulation (e.g., Philippon and Reshef (2012) and Boustanifar et al. (2017)) is accompanied by a parallel increase in the finance value-added premium.

transitioning to the financial sector are lower and in more innovative sectors, which potentially echoes the concern that a growing finance wage premium might distort talent allocation by attracting skills to finance from productive and growing-enhancing sectors.

Although statistically significant, though, the estimated sensitivity of the share of skilled workers in non-finance sectors to the AGFW is economically small. In our preferred specification, a one-standard-deviation increase in the AGFW in the previous five years (0.25) is associated with a 0.5-percentage-point decrease in the share of skilled workers in non-finance sectors. This magnitude represents a relative decline of 3% compared to the average share of skilled workers in our sample (which is 16%). When we focus on the top quintile of the distribution of AGFW, the association with the share of skilled workers in non-finance sectors is -1.5 percentage points, which is about 9% of the average share of high-skilled workers in non-finance sectors. The relatively small magnitude of the estimated reallocation may have several explanations, ranging from substantial frictions to the inter-sectoral mobility of skilled workers (e.g., Pissarides (2010)) to non-pecuniary incentives driving occupational choices (e.g., Hurst and Pugsley (2011)).

Based on these results, we move on to assess directly whether the statistically-significant talent reallocation from non-finance sectors to finance at times of high AGFW has the potential to predict economic growth at various horizons. We find no significant link between the AGFW and aggregate outcomes. Higher AGFW does not predict lower GDP growth measured at various horizons. Because the reallocation of talent related to the AGFW may take time to translate into real economic outcomes, we also consider long-run determinants of economic growth. A higher AGFW is not significantly associated with the allocation of students across fields of study, including STEM degrees (i.e., sciences, technology, engineering, and math) and business degrees. Neither do we find an association between the AGFW and countries' innovative capacity, measured using yearly patent applications, trademark applications, or scientific articles published in each country-year.

We obtain the same non-result when focusing on sector-level measures of growth within countries, such as sectoral output, value added, total factor productivity, the sectoral market-to-book ratio, and sales growth. This non-result is true even for those sectors for which talent reallocation to finance is statistically significant. In each case, we find no relationship between the AGFW and the subsequent

growth of non-finance sectors.

Finally, we explore the link between the AGFW and the characteristics of banking sectors. Because a higher finance wage premium can reflect rent-seeking activities, it might hinder long-run growth via a deterioration of the banking sector in terms of riskiness and/or competitiveness. Using a host of proxies for the riskiness, efficiency, and competitiveness of countries' banking sectors proposed in earlier research, we find no evidence that the AGFW is associated with a deterioration of banking sectors. If anything, a higher AGFW is associated with more competition in banking.

Stressing what our results do *not* show is also important. Our results do not show that it is optimal for the financial sector and/or welfare improving for society to pay disproportionally high salaries to its skilled employees. We limit our analysis to talent reallocation and related growth outcomes and we do not consider other potential reasons why disproportionally high salaries in finance might be welfare decreasing, such as the potential negative effects on rising income inequality and wealth on the voting attitudes of the population or on within-firm organizational efficiency. Moreover, our paper does not attempt to assess whether the level of compensation in finance jobs is an equilibrium outcome based on the demand and supply of skills or other considerations like entrenchment or absence of competition in the financial sector determine this outcome.

Our findings add to the recent literature studying the growth of the financial sector, and in particular, the higher relative wages earned by finance workers. Most of the existing studies in this area, both theoretical and empirical, focus on the determinants of the rising finance wage premium. Existing evidence is mixed (e.g., Bertrand et al. (2010), Celerier and Vallee (2016)), or Böhm, Metzger, and Strömberg (2016)).[9] In this paper, we study the *consequences* of the rising finance wage premium for talent allocation across sectors and economic growth. Although we are not the first to study this question, we provide direct evidence of the implications of the increasing finance wage premium for both talent allocation and economic growth. Existing research provides indirect and/or mixed evidence. Kneer (2013) shows financial liberalization hurts the growth of skill-intensive manufacturing sectors. Cecchetti and Kharroubi (2015) report that credit growth is more detrimental to the productivity

[9]See for instance Glode and Lowery (2016), Axelson and Bond (2015), Biais and Landier (2017), or Bolton, Santos, and Scheinkman (2016).

growth of R&D-intensive manufacturing sectors. Boustanifar, Grant, and Reshef (2017) find high wages in finance attract skilled workers from other countries. Gupta and Hacamo (2017) show U.S. engineers are more likely to work in finance when the local financial sector grows more and are less likely to produce patents.

The main difference between our setting and within-country settings is that the cross-country and cross-industry approach allows us to consider the *general equilibrium effects* of a growing finance wage premium on talent allocation and growth both across sectors and across regions of a same country. For instance, growing compensation of venture capital employees in Silicon Valley might attract non-finance talent into those jobs. At the same time, it might allow the sorting into high-growth entrepreneurship of other talented individuals that would have otherwise been unable to employ their talent in such high-productivity sectors due to severe asymmetric information in the startup segment and the inability of a financial sector populated by non-technical employees to evaluate high-tech business ideas. We discuss in more detail the advantages and disadvantages of our setting compared to within-country settings in section II.A.

We also contribute to the ongoing debate about the social value of the financial sector. Methodologically, our use of the AGFW aims to answer the calls in Cochrane (2013), Levine (2014), and Zingales (2015) to consider the benefits of a growing financial sector alongside its costs. Our goal is *not* to evaluate the net social value or the optimal size of the financial sector. Instead, we assess one debated channel through which the growth of the financial sector might reduce economic growth. Our results suggest the reallocation of talent due to growing finance wages is barely related to subsequent economic growth.

II Data and Measures

Our main data source is the WORLD-KLEMS 2008 initiative, which provides harmonized data on value added, employment, wages, education levels of workers, and productivity, obtained from national statistical institutes and other complementary sources. O'Mahoney and Timmer (2009), Timmer et al. (2007a) and Timmer et al. (2007b) describe in detail the sources and computation for the data on

inputs, outputs, and productivity at the country-sector level. The main sources for the productivity and growth-accounting variables are national statistical institutes. The data set also includes labor-related information, the underlying sources of which are typically not national statistical institutes but other employment and labor force statistics. Timmer et al. (2007a), (pages 30-31) list the sources used for the labor-related information to obtain homogeneous and comparable series across countries and years. Moreover, Timmer et al. (2007b) describe the sources of each variable employed in the analysis by country and industry.

Key to our analysis, WORLD-KLEMS contains detailed information on the educational achievement of the labor force. For each country-sector-year observation, the labor force is split into three categories: high skilled (holding a university degree or equivalent), medium skilled, and low skilled (no formal qualifications). Because educational attainment and skills are sometimes not obviously comparable across countries (see Timmer et al. (2007a), pages 28-29), absorbing country-level time-invariant fixed effects in our empirical analysis is crucial to avoid any undue comparisons of talent and skills across countries.

Data on employment, hours worked, and wages are available for each group at the sectoral level. The availability of the wage and educational attainment information is available consistently and homogeneously at the level of 13 broad sectors based on the 1-digit European NACE revision 1 industry classification for 24 developed and emerging countries in North America, Europe, Asia, and Oceania. We thus focus on this level of sectoral disaggregation because it is the finest partition for which we observe the education-level split of the workforce across countries and sectors, which is crucial to our analysis. [10] The maximum country-level time span in the sample is from 1970 to 2005.[11] WORLD-KLEMS 2008 has been used by Philippon and Reshef (2013), Boustanifar, Grant, and Reshef (2017), Larrain (2015) and Pellegrino and Zingales (2017).

Following the 1-digit NACE categorization, we define the financial sector in a broad sense – it

[10] An important caveat about the educational attainment data and other labor-related data is that for those countries in which systematic administrative information on self-employed does not exist, KLEMS assumes the same labor characteristics for self-employed and employed workers (see O'Mahoney and Timmer (2009)).

[11] Data for Japan are available from 1973 to 2005. Data for Eastern European countries are only available from 1995 to 2005. For the case of Germany, the data refer to the Federal Republic of Germany from 1970 to 1994, and to the reunified country since 1995.

includes banks, insurances, pension funds, and other activities related to financial intermediation (KLEMS code "J" for Financial Intermediation).[12]

Following Philippon and Reshef (2013) and Boustanifar, Grant, and Reshef (2017), we define the relative wages of high-skilled workers in the financial sector compared to all the other sectors as the average wage of skilled workers in finance divided by the average wage of skilled workers in the country for each country c and year t, which we label $\overline{wage}^{skill}_{c,fin,t}$. Average wages equal total labor compensation divided by the total full-time equivalent (FTE) employment. In KLEMS, labor compensation includes wages, salaries and supplements, employers' contributions to social programs, tips, bonuses, and executive compensation. It excludes, however, income from the exercise of stock options and the compensation of the labor services of business owners. Note this limitation is not negligible. For instance, it hinders us from measuring precisely the overall compensation of senior partners of private equity funds or hedge funds. At the same time, because we observe crucial aspects of performance pay like bonuses, we can account for the positive trend in performance pay and wage inequality across jobs and sectors (Lemieux, McLeod, and Parent (2009)), as well as for variation likely related to the incentives to take risks in finance jobs.

A Why is a Cross-Country-Sector Setting Important?

The cross-country-sector setting is well-suited to assess the opposite predictions described above for at least four reasons. First, it allows us to track the general equilibrium effects of growing finance wages on talent allocation and economic growth. If we only tested for a reallocation of talented individuals from productive non-finance sectors to finance at times of high finance wages, we would miss the sorting of *other* talented individuals into productive sectors made possible by the availability of more or higher-quality financial capital. For instance, growing wages of venture capital and private equity employees in Silicon Valley might attract non-finance talent into those jobs. At the same time, it might allow the sorting into high-growth entrepreneurship of other talented individuals that would have otherwise been unable to employ their talent in such high-productivity sectors. For instance,

[12] This sector aggregates three industry groups: "Financial intermediation, except insurance and pension funding," "Insurance and pension funding, except compulsory social security," and "Activities related to financial intermediation".

due to the inability to access finance because of severe asymmetric information in the startup segment and the inability of a financial sector populated by non-specialized employees to evaluate specialized business ideas.

The cross-country-sector setting also allows us to measure aggregate outcomes at the country level, as opposed to relying on regional variation within countries. The potential increase or drop in regional growth is a relevant economic phenomenon for many reasons,[13] but this variation is not helpful to assess aggregate effects. For instance, if growing finance wages attracted talented individuals to Silicon Valley and reduced the concentration of talent in manufacturing areas like the Rust Belt, documenting lower growth in the Rust Belt would not help to assess aggregate outcomes if we did not consider the higher growth in Silicon Valley.

A third reason why we design our test across countries and sectors is this setting allows us to control for country-wide time-varying shocks, like local recessions or regulatory reforms, which might explain at the same time within-country talent reallocation and subsequent country-level aggregate outcomes.

Finally, exploiting country-sector variation allows us to assess the possibility that agents in different countries and institutional settings react differently to the same shock in the labor market, which is plausible based on recent evidence of varying preferences and beliefs across countries (e.g. Falk, Becker, Dohmen, Enke, Huffman, and Sunde (2018)). Thus, a within-country analysis would lack the external validity we aim to achieve with our tests.

Of course, our cross-country-sector setting also has drawbacks. First, this setting does not allow us to exploit very localized exogenous shocks to help with the identification of causal effects. We do not aim to push for a causal interpretation of the results in this paper, but mainly to assess whether the idea that growing finance wages are an important negative determinant of economic growth might be true in the aggregate, in terms of magnitude and significance of the effect. Yet most of our specifications absorb any systematic variation across countries-sectors and time-varying shocks common to all countries. We also propose specifications in which any time-varying shock at the

[13] Regional variation in productivity and innovation is of course important in many respects, including the understanding of migration patterns, the effectiveness of location-based policies, local business cycles, etc.

country level cannot identify the coefficients we estimate, which thus rules out many concerns about the endogeneity of our estimated effects.

A second drawback of our setting is the need to use variables that can be measured homogeneously across a large set of countries and sectors, even if in some cases within-country data would allow for more precise and appropriate measurement of the dimensions we consider. For instance, we would ideally measure talent in more direct ways than using educational attainments, but we are not aware of any such measure of talent available for the existing workforce across countries and across industries within each country. Ideally, we would have direct measures of cognitive skills and talent at the individual level for representative populations of each industry in each country, which to the best of our knowledge is unavailable.

B Finance Value Added and Social Returns of Finance

Arguably, high relative wages in finance may not automatically attract skilled workers from non-finance sectors. For instance, higher wages might reflect the higher productivity of finance workers, which improves the quality and quantity of financial services to non-finance sectors. A crucial feature of this paper is proposing a variable that might capture variation in the social returns of finance, that is, the extent to which the financial sector contributes to non-finance sectors in the economy.

To capture variation in the contribution of finance to the rest of the economy, we rely on the gross value added of the financial sector, which following the input-output table methodology across industries within countries aggregates for each industry the value of all the services provided to other sectors and consumers, net of the purchases from other sectors. Measuring the value of each individual service is complicated. Yet, national statistics typically provide disaggregated data on the value-added contribution of each sector to GDP based on input-output tables. For each country-sector, gross value added is obtained as gross output minus intermediate consumption.[14] Intermediate consumption includes the goods and services the industry consumes to produce its output, whether transformed or simply used in production, excluding the consumption of fixed assets.[15]

[14] Gross output is measured at basic prices, whereas intermediate consumption at purchaser prices.

[15] In KLEMS, labor contributions are subtracted from value added to obtain capital contributions as the residual

Mirroring the construction of the finance wage premium, we define for each country c and year t, the finance value-added premium as the value added per skilled worker in the financial sector divided by the average value added per skilled worker in the economy, $\overline{va}^{skill}_{c,fin,t}$. Note that, by construction, value added also includes the costs of the labor employees supply in each industry and year. Hence using the finance value-added premium might raise the concern that value added per se also captures in part the extent of the rents finance employees might extract from other sectors. Moreover, an increase in the value added of finance, which is computed starting from gross output, can occur following an increase in the demand for financial services from other sectors and/or an increase in the unit price of financial services. For instance, if a higher value added premium was driven by colluding financial institutions that charged higher fees to provide services of unchanged quality, the higher finance value-added premium would not be capturing a higher contribution of finance to the economy.

To assess the concern that the finance value added might simply proxy for rents in finance, we propose a set of direct validation tests for our interpretation that the finance value-added premium is correlated with the benefits of finance to the rest of the economy. Specifically, we consider three outcomes – two at the country-year level and one at the country-sector-year level – which we regress on the growth of the finance value-added premium. Table I reports the results for these validation tests.

[Insert Table I about Here]

The first outcome we consider is the efficiency of capital allocation at the country-year level. We first compute a set of investment-Q sensitivities at the country-year level as follows (e.g., Wurgler (2000)). We start from firm-level data in Worldscope. We regress capital expenditures separately for the firms in each country-year on the firms' Tobin's Q. We thus obtain an investment-Q sensitivity parameter for each country-year as the OLS coefficient associated with Tobin's Q for each country-year pair. As a first validation, we regress the investment-Q sensitivities at the country-year level on the growth of finance value-added premium at the country-year level. Columns (1)-(3) of Table I report the results when estimating these regressions by weighted least squares (WLS), where we

component.

weigh observations by the t-statistics associated with the firm-level regressions described above.[16] Efficiency of capital allocation is a benefit of a well-functioning financial sector to the rest of the economy. Intuitively, a higher sensitivity of realized investment to firms' investment opportunity sets captures a higher efficiency of the allocation of capital across firms in the economy. Columns (1)-(3) of Table I show that a higher growth of the finance value-added premium is associated with a higher investment-Q sensitivity in our sample, irrespective of the horizon at which we compute the growth of the finance value-added premium.

The second outcome we consider is the overall amount of household debt available in the economy, scaled by GDP. Mian, Sufi, and Verner (2018) show that booms in household debt over GDP predict lower growth at the country-year level, and hence could be interpreted as periods of misallocation of capital across borrowers in the economy. In columns (4)-(6) of Table I, we regress the share of household-level debt over GDP on the growth of the finance value-added premium and the two dimensions appear to be negatively correlated. To the extent that household debt booming cycles capture capital misallocation in the economy, the growth of the finance value-added premium is negatively associated with subsequent capital misallocation in our sample period and set of countries.

As a third outcome, we consider the share of skilled workers employed in non-finance sectors in each country and year. If a growing finance value-added premium was associated with a higher share of skilled workers in non-finance sectors, our proxy for the social returns of finance would indeed predict a higher likelihood that talented individuals engage in activities in productive sectors at times of a growing financial sector. Indeed, in columns (7)-(9) of Table I we find a higher growth of the finance value-added premium is positively associated with the share of skilled workers in non-finance sectors, both in simple baseline regressions as well as in regressions that absorb any year-level variation and any time-invariant variation at the country-sector levels.

Overall, despite the potential concerns with using the finance value-added premium to proxy for the social returns of finance, we find that positive and negative outcomes we can measure in our data in terms of the allocation of capital and labor across non-finance sectors relate with the finance value-

[16]The results are virtually unchanged if we use alternative weighting schemes, such as the number of firms in each country-year regression.

added premium. We do not argue that the finance value added is the best *measure* of the social returns of finance, but that this variable – which in principle we can measure consistently across countries and over time – captures variation related to the social returns of finance, and hence we can use it in comparison to the finance wage premium, which proxies more directly for the private returns of finance.

C The Adjusted Growth of Finance Wages (AGFW)

To capture the wedge between the private and social returns of the financial sector in each country and year, we take the difference between the growth of the finance wage and value-added premia at various horizons. To this aim, we define the adjusted growth of finance wages (AGFW) for each country c and year t as:

$$AGFW^{n}_{c,t} = \triangle(\overline{wage}^{skill}_{c,fin})_{t-n,t} - \triangle(\overline{va}^{skill}_{c,fin})_{t-n,t}, \tag{1}$$

where $\triangle$ denotes growth rates (in percentage terms), and n denotes the horizons over which growth rates are computed. In the analysis, we consider two horizons: three and five years (n=3,5). Hence, $AGFW^{5}_{c,t}$ corresponds to the adjusted growth of finance wages for country c and year t measured over the past five years (from $t-5$ to t). By construction, the AGFW is expressed in percentage and can be positive or negative, depending on whether the growth of relative wages in finance has been larger or smaller than the growth of the value added per worker in finance.

We compute the AGFW using growth rates for each component – finance wage premium and finance value-added premium – instead of levels. Growth rates are not only free of units of measurement (unlike the levels of the two premia) but also allow us to compare directly the magnitudes of any changes in each component. If we used the levels of the two premia, we would not be able to easily interpret the sign and size of the differences in the two premia because of their different distributions. Difference of growth rates instead provides a clear-cut interpretation of the values of AGFW, because positive (negative) values imply that the finance wage premium has grown (decreased) proportionally more than the finance value-added premium over the previous years.

Table II reports the summary statistics. For each horizon, we report the statistics for the full

sample, as well as separately for each decade from 1970 to 2005. Across all countries and years, the AGFW is positive, with averages of 2.9% and 4.3% at the five- and three-year horizons, respectively. The relative wages of financial sectors all over the world have grown faster than the contribution of finance to other sectors over the period 1970-2005. Yet the variation in the AGFW is substantial. Standard deviations range between 18.1% (at the one-year horizon) and 23.8% (at the five-year horizon).

[Insert Table II and Figure 1 about Here]

In the time-series dimension, the AGFW has decreased by roughly 10 times from the 1970-1985 period to the 1996-2005 period, even if its standard deviation has barely changed. Figure 1 plots the annual average of the AGFW measured at the five-year horizon, as well as its two components. The AGFW peaks in 1989 and falls below zero in the early 1990s. Figure 1 shows this swing is determined by the asynchronous variation of the two components of the AGFW. For instance, the early 1990s are characterized by a drop in the growth of the finance wage premium and a simultaneous increase in the growth of the finance value-added premium.

Table A.1 in the Online Appendix reports statistics for the AGFW measured in each country. Although our empirical analyses exploit within-country variation in the AGFW, its cross-country variation is remarkable. Over the whole period, the average AGFW at the five-year horizon is negative in Finland, Greece, Hungary, Italy, Luxembourg, and Slovakia. It is close to zero in Spain and South Korea, and large in Poland (30.4%), Portugal (22.3%), and Denmark (22.5%). Countries such as the United States (3.7%), France (6.8%), Germany (4.4%), and the United Kingdom (4.4%) display average values of the AGFW that are close to the sample average (4.3%). The AGFW varies substantially also within countries, with standard deviations at the five-year horizon ranging between 7.7% in Greece and 35.8% in Australia. This pattern indicates countries in our sample experience periods during which the gap between the growth of the finance wage and value-added premium widens, and periods during which the gap narrows or turns negative. This within-country variation is the main source of variation we exploit in the analysis.

To further illustrate the within-country heterogeneity of the AGFW, Figure 2 plots its average for

a subset of countries that provide interesting comparisons. The top panel contrasts the United States and the United Kingdom. The AGFW evolves quite differently in these two countries, despite the fact that they are commonly considered similar in terms of the characteristics of their financial sector (e.g., see Demirguc-Kunt and Levine (1999)). For instance, the AGFW is negative in the late 1980s and 1990s in the United States, but is positive in the United Kingdom. The time-series variation of the AGFW is substantially higher in the United Kingdom than in the United States.

[Insert Figure 2 about Here]

The medium panel of Figure 2 compares Germany with Italy. Italy is often proposed as an example of a country in which rent-seeking activities are substantial compared to Germany, but the growth of the finance wage premium does not capture this difference, because the AGFW is mostly negative in Italy and mostly positive in Germany throughout the sample period.

The bottom panel of Figure 2 plots the evolution of the AGFW measure in South Korea and Japan. In Japan, the AGFW was large and positive in the late 1970s and 1980s, but has declined persistently since then. The pattern is quite distinct for South Korea., which experienced a large spike in the early 1980s, a period during which South Korea liberalized its financial sector and opened its capital markets.

Based on the time-series variation of the AGFW in South Korea, one might wonder whether the AGFW is closely tied to financial deregulation episodes, but we find it is not on average. In particular, following Philippon and Reshef (2013), we construct an index of financial deregulation at the country-year level that aggregates seven dimensions of financial reforms using data from Abiad et al. (2017).[17] In unreported tests, we show that the AGFW does not vary systematically with financial deregulation events, because *both* increase on average after deregulations. Financial deregulations lead to higher relative wages for skilled finance workers (e.g., Boustanifar, Grant, and Reshef (2017)), but on average are also associated with higher value added per skilled worker, consistent with the literature documenting the benefits of financial deregulation for non-finance sectors (e.g., Henry (2000) or

[17]These seven dimensions are reduction in credit controls, removal of interest-rate controls, removal of entry barriers, privatization, capital-account liberalization, securities-market development, and introduction of prudential regulation and supervision.

Bekeart and Harvey (2005)).

III AGFW and Talent Allocation

We move on to exploit the substantial variation of the AGFW within countries to assess its association with the allocation of talent across sectors. If high relative wages in the financial sector trigger a reallocation of talent into finance and away from non-finance sectors, we should observe (i) a positive association between the share of skilled workers employed in the financial sector and the AGFW as well as (ii) a negative association between the share of skilled workers employed in non-finance sectors and the AGFW.

A Measuring Talent

Talent encompasses various cognitive and non-cognitive skills that are hard to observe on a large scale (see Celerier and Vallee (2016) for a detailed discussion of measurement issues). In this paper, we focus on one measurable variable that is arguably related to talent, namely, educational attainment. Existing research studying the aggregate effects of talent allocation across space, across sectors, and/or over time uses routinely educational attainment as a proxy for talent (e.g., see Philippon and Reshef (2012), Bazzi et al. (2016), Doepke and Zilibotti (2017), Hurst et al. (2017)). Educational attainment is unlikely to provide a precise measure of skills, because large variation exists in the skill level of individuals that hold the same degree, as well as in the types of skills typical of individuals that reached the same grade of education in different areas. At the same time, educational attainment is the *only* correlate of skill levels we can observe for a large set of countries and for employees in different sectors within the same country. We are not aware of any other possible proxy for talent that would allow us to perform our representative analysis.[18]

Specifically, our proxy for sectoral talent intensity is the proportion of the labor force in each sector

[18] A potential alternative also used in recent research – the cross-country results of the *Program for International Student Assessment* (PISA) Test – cannot allow us to construct a country-sector-year measure of talent because it is based on the skills of pupils who are not yet employed, and hence by construction cannot capture any of the variation of talent across sectors within countries for the employed population.

holding a university degree or equivalent. We compute the fraction of total employment composed of workers in the high-skilled category in each country c, sector k, and year t ($skilled_{c,k,t}$) as the number of FTE skilled employees divided by the total number of FTE employees. The varying quality of university degrees across countries is one of the reasons our analysis uses only the variation in the allocation of talent intensity across sectors *within* countries.

We provide summary statistics for the share of skilled workers, the skilled-worker wage premium, and the finance wage premium for the overall sample and across time periods in Table A.2 in the Online Appendix. Panel A of Table A.2 provides summary statistics for $skilled_{c,k,t}$. Across all years, the average share of skilled workers is 16.6%, with a substantial standard deviation (15.7%). Consistent with the secular increase in educational attainment worldwide documented by the labor literature, the fraction of skilled workers across countries and sectors increased from 14.5% in the 1975-1985 period to 18.8% in the 1996-2005 period.

Our definition of skilled workers is meaningful only if skilled workers enjoy a wage premium over other workers in the same industries, both across countries and over time. Consistently, Panel B of Table A.2 indicates skilled workers earn about 74% more than other workers in our sample. This wage gap increased slightly to 76.1% in the 1996-2005 period.

We follow Philippon and Reshef (2012) to compute the finance wage premium as the share of compensation of workers in finance over the average compensation of workers in other industries at the country-year level. Panel C of Table A.2 provides summary statistics for the finance wage premium that replicate the results of Philippon and Reshef (2012). We confirm a substantial finance wage premium, which on average increased over time from 57% in the 1975-1985 period to 61% in the 1996-2005 period. This average increase across all countries masks the spectacular increase in the finance wage premium in countries such as the United States over the last two decades.

B The AGFW and Talent Reallocation

Before moving to the multivariate analysis, we assess the relationship between the AGFW, skill intensity in non-finance sectors, and a set of proxies for industry- and country-level contemporaneous

and mid-term growth in the raw data. Figure 3 provides a vivid representation of these associations. For each outcome variable of interest, we average the variable in our sample across quintiles of the AGFW. We then plot the average of the variable within each quintile in the form of bars, and the value of the AGFW for each quintile in the form of connected dots.

[Insert Figure 3 about Here]

Panel A of Figure 3 plots the average share of skilled employees in non-finance sectors by AGFW quintiles. A negative monotonic relationship appears evident, which suggests that in the raw data, after periods of higher growth of the finance wage premium with respect to the finance value added premium, the share of skilled workers in non-finance sectors is systematically lower. This association in the raw data is consistent with the possibility of talent reallocation to finance from non-finance sectors at times of high AGFW. Panel B, C, and D of Figure 3 propose the same exercise for a subset of the proxies for growth at the sectoral and country level we consider in the second part of the analysis. Specifically, Panel B plots the average growth of sectoral output for the 3 years after the year in which we measure the AGFW, Panel C plots the logarithm of the total number of patents filed each year in a country, and Panel D plots the share of university-level students that are enrolled in STEM fields (engineering, computer science, hard sciences, and biotechnology) each year in each country. Contrary from the monotonic negative relationship between skilled employees outside finance and the AGFW, we fail to detect negative relationship for any of these outcomes. If anything, patents and STEM-enrolled student shares seem to be positively associated to the AGFW in the raw data.

Motivated by the associations in the raw data, we move on to perform a multivariate analysis, which allow us to restrict the variation we use to asses the baseline associations between the AGFW and other outcomes. We start by assessing whether the AGFW relates to an increase in the skill intensity of finance. This condition is necessary to conclude that talent reallocates to finance at times of AGFW if we observe lower shares of skilled workers in non-finance sectors in the same years. We estimate the following specification:

$$skilled_{c,fin,t} = \gamma_0 + \gamma_1 AGFW^n_{c,t} + \eta_c + \eta_t + \epsilon_{c,fin,t}, \tag{2}$$

where $skilled_{c,fin,t}$ represents the proportion of skilled workers employed in the financial sector of country c in year t, and $AGFW^n_{c,t}$ is the adjusted growth of finance wages measured at two different horizons (n=3,5). The unit of observation is a country-year. We include country fixed effects (η_c) to control for time-invariant characteristics affecting the demand for skills in finance in each country, and year fixed effects (η_t) to absorb time-varying shocks that affect the demand for skills similarly across all countries. The coefficient γ_1 in specification (2) thus measures how the fraction of skilled workers employed in finance in a given country varies when that country experiences a higher AGFW. We allow $\epsilon_{c,fin,t}$ to be correlated within countries by clustering the standard errors at the country level, following the few-cluster correction of Donald and Lang (2007).

In our baseline specification (2), the outcome variable is a ratio, whereas the main covariate of interest (AGFW) is the difference of two growth rates. This is our preferred specification, because we seek to assess whether workers in non-finance sectors have a relative incentive to move to finance (or to convert their skills to change career and move to finance) at times where finance wages grow substantially. A specification that regressed the share of skilled workers on the contemporaneous (or lagged) finance wage premium might be inappropriate, because moving from non-finance sectors into finance is costly and takes time (e.g., learn about the changes in relative finance wages, convert their skills, and move into finance jobs). Nonetheless, we discuss alternative specifications that do not regress a share on growth rates in section III.D.

[Insert Table III about Here]

Table III reports the results for estimating specification (2) at the five-year horizon (Panel A) and at the three-year horizon (Panel B). The first column of Table III confirms that the talent intensity of financial sectors worldwide is positively related to the AGFW ($\hat{\gamma_1} > 0$), and we reject the null hypothesis that the two variables are not associated at all standard levels of significance. This result is in line with that of Philippon and Reshef (2012) and Celerier and Vallee (2016), who document positive relationships between finance relative wages and skill intensity in the United States and France, respectively.

To assess whether the AGFW is related to a *reallocation* of talent from non-finance sectors, we

estimate the following baseline specification:

$$skilled_{c,k,t} = \beta_0 + \beta_1 AGFW^n_{c,t} + \eta_{c,k} + \eta_t + \epsilon_{c,k,t}, \tag{3}$$

where $skilled_{c,k,t}$ is the proportion of skilled workers employed in non-finance sector k of country c in year t, and $AGFW^n_{c,t}$ is the adjusted growth of finance wages measured at two different horizons (n=3,5). The unit of observation is now a country-sector-year. Compared to specification (2), we include country×sector fixed effects ($\eta_{c,k}$) to absorb time-invariant unobserved heterogeneity at the sectoral level in each country. The coefficient β_1 in specification (3) measures the sensitivity of skilled labor in non-finance sectors to the AGFW, and is estimated using the time-series variation in the AGFW within countries.

Column (2) of Table III reports the estimated $\hat{\beta}_1$. The fraction of skilled workers in a given non-finance sector is negatively related to the AGFW, with point estimates of -0.035 and -0.022 for the five- and three-year horizons. These estimates are also statistically different from zero. Consistent with the idea that high relative wages in the financial sector attract talent from other sectors, our estimates indicate the share of skilled workers in non-finance sectors in year t is on average *lower* when relative wages in finance have grown faster than finance value added in the preceding years.

Note the negative association between skilled labor in non-finance sectors and the AGFW is obtained in a restrictive specification, in which the fixed-effects structure absorbs any time-invariant variation across country-sectors as well as any time-varying factor common to all country-sectors, which is why the adjusted R^2 range between 0.92 and 0.97. The results do not change if we use the variation across countries and over time (column (3)), or if we only restrict the variation of the variables within countries and within years (column (4)).

[Insert Figure 4 about Here]

We move on to assess the heterogeneity of the negative association between the AGFW and skilled workers in non-finance sectors by time period and by countries' GDP per capita. In Panel A, we estimate the baseline specification (3) separately across adjacent five-year periods and plot the period-

specific coefficients $\hat{\beta}_1$. The negative sensitivity of skilled labor to the AGFW is especially strong from the mid-1980s onward. In Panel B, we split the sample into four groups, based on countries' GDP per capita. We find the negative association between the share of skilled workers in non-finance sectors and the AGFW is similar in countries featuring high or low levels of development. We also consider the extent to which a country imports and exports capital through international capital flows, because the domestic benefits of finance might not be proportional to the size of finance in countries that export financial services (e.g. Luxembourg). We split our sample between countries that are above and below the median in the extent of international capital flows (both inbound and outbound) based on the country-year data underlying the *International Monetary Fund Financial Liberalization Index*. The size of the estimated sensitivity of skilled labor to the AGFW does not vary substantially across partitions. We obtain a point estimate of -0.012 and a t-statistic of -0.69 in country-years below the median, and a point estimate of -0.016 with a t-statistic of 2.09 in country-years above the median.

C Is Finance Special?

Next, we ask whether the negative association between the AGFW and the skill intensity in other sectors is a unique feature of the financial sector, or also operate when relative wages in other sectors are high. To do so, we compute our measure of adjusted growth for each non-finance sector over each horizon (i.e., equation (1)), and estimate (sector-specific) regressions similar to our baseline specification (3) in which we replace the AGFW by the "adjusted growth" of each sector. Table V reports the estimated coefficients (i.e., the sector-specific β_1). Except for the real estate sector, we do not detect any reallocation of skills when the relative wages of skilled workers of non-finance sectors grow faster than the value added per skilled worker in these sectors. The sign of the estimated coefficient varies, but the point estimates are never statistically significant.[19] Overall, these findings indicate that the reallocation of talent associated with increasing relative wages is a phenomenon that is primarily present when skilled workers employed in the financial sector earn a significant wage premium compared to their contribution to other sectors.

[19] We obtain virtually similar results if we exclude the financial sector from the set of sectors and only focus on non-finance sectors.

D Robustness and Additional Evidence

We perform additional tests to assess the robustness of our baseline results. First, we estimate our baseline specification by weighted least squares (WLS), using countries' GDP as weights, instead of OLS. Column (1) of Table IV indicates our baseline findings are not solely driven by small countries. In fact, the estimated coefficient is three times as large once we give more weight to larger countries. In column (2), we replace the share of skilled workers in an industry in year t by the share in year $t+1$ as the dependent variable to avoid any overlap between the outcome variable and the horizon over which we compute the AGFW. The results are virtually identical. In column (3), we change the dependent variable and use the share of skilled workers in sector k and year t over the total amount of available in the country-year. In column (4), we change the definition of the AGFW. We use the difference between the growth of the share of the finance wage bill over countries' total wage bill and the growth of the share of value added of the financial sector over countries' GDP. None of these modifications have any material effects on the results.

[Insert Table IV about Here]

To further assess the robustness of our results, we include the growth of value added ($\triangle(va^n_{c,k,t})$) and of employment ($\triangle(emp^n_{c,k,t})$) in country c and sector k computed over the same horizon as the AGFW to control for time-varying sectoral economic conditions. We use this approach because a potential concern is that the observed negative sensitivity of skilled labor to the AGFW is driven by economic shocks occurring during the years over which we measure the AGFW. For instance, non-finance sectors may have declined in periods during which finance salaries rose the most. In this case, our results would not reflect a reallocation of skilled workers that are actively attracted by higher finance salaries, but might reflect a weaker demand for skilled workers in declining sectors. Column (5) of Table IV shows our results do not change while we control directly for sectoral economic conditions within countries.

We then consider the issue that not only finance wages might grow relative to other wages over time, but finance wages might also be relatively riskier than wages in other industries because of higher volatility of bonuses and performance-based pay. If the relative finance wages grow at times

in which finance-wage volatility with respect to wages in other sectors also grows, the associations we documented so far might be driven by the second moment of the relative finance wage distribution. To address this concern, we compute the 10-year rolling window standard deviation of the relative finance wage across countries as a proxy for the volatility of the relative finance wage. In column (6) of Table IV, we repeat our baseline specification adding this proxy for the volatility of the relative finance wage as a control. We find that our baseline results are largely unchanged when we add this control at both the 3-year and 5-year horizons.

In column (7), we include a host of measures of financial development and credit cycles as additional controls in the baseline specification (3). These measures include the relative size of the financial sector (measured as the share of the gross output of the financial sector in the total output produced in a country-year using KLEMS), total bank private credit, total private credit, total market capitalization, total bank assets, and total bank deposits, all scaled by GDP, as well as GDP per capita, and a binary variable that equals 1 if a country experienced any banking crisis in the previous five years. The data are from the World Bank Global Financial Development dataset, as described by Cihak, Demirguc-Kunt, Feyen, and Levine (2012). We continue to observe a negative sensitivity of skilled labor to the AGFW even after including these additional controls, suggesting the AGFW is not simply capturing an effect of financial development on the distribution of skills within countries.

Finally, we consider alternative specifications where we modify the definition of the main covariate and outcome variable. In column (8), we compute the difference of the average finance wage premium and the average finance value added premium at the 5 and 3 year horizons, regressing a variable in levels (share of skilled workers in non-finance sectors) on another variable in levels. Moreover, we consider quintiles of the main covariate to allow for non-linearities in the relationship between the difference between the two finance premia and the share of skilled workers in non-finance sectors. At both horizons, our results are broadly consistent with the baseline results in terms of signs and magnitudes of the estimated coefficients. Statistical significance is detected across all quintiles for the 3-year horizon – with the notable exception of the top quintile – whereas it is sparse at the 5-year horizon. In column (9), we modify the definition of the outcome variable and consider the growth of the share of skilled workers in non-finance sectors over the same horizon at which we compute the

AGFW. At both horizons, the sign of the relationship between the growth of skilled workers in non-finance sectors and the AGFW is negative, consistent with the baseline analysis. At both horizons, though, statistical significance is sparse.

[Insert Table V about Here]

E Economic Magnitudes and Discussion

Although statistically significant, the negative association between skilled workers in non-finance sectors and the AGFW is economically small. To assess the magnitude of the associations, note that all the variables in our specifications are standardized. Consider the baseline estimate in column (2) of Table III, in which we absorb any systematic time-varying shock that affects all countries at the same time, as well as any time-invariant systematic characteristics of country-sectors. A one-standard-deviation increase in the AGFW in the previous five years (σ_{AGFW}=0.238) is associated with a 3.5%-standard-deviation decrease in the share of skilled workers in the average non-finance sector, which, based on the statistics in Table II, corresponds to a decrease of about 0.55 percentage points ($\approx \hat{\beta}_1 \times \sigma_{skilled}$). Similarly, an increase in the AGFW from the 25^{th} to the 75^{th} percentile of its distribution (0.276) is associated with a 0.64-percentage-point drop in the share of skilled workers. Such effects represents relative declines of about 3% compared to the average share of skilled workers in the sample, which is 16.6%.

To provide a different perspective on the magnitude of the talent reallocation our estimates imply, we re-estimate the baseline specification (3) but replace the AGFW with five variables delineating the quintiles of the AGFW's distribution. Figure A.1 in the Online Appendix plots the coefficient estimates within quintiles. All the estimates are negative, and the size is largest for the top quintile, in which the AGFW is above 0.32, with a point estimate of -0.098 (t-statistic: -2.73). This effect implies a corresponding drop in the share of skilled workers in non-finance sectors of 1.54 percentage points, or about 9% of the sample average. Note that the majority of countries in our sample, including, for instance, the United States, never attain values of the AGFW in the top quintile of the distribution from 1970 to 2005.

Although they point to an economically small reallocation of talent, our estimates might be conservative due to the difficulty in accurately measuring the "true" contribution of the financial sector to the economy. An increase in the value added of finance might originate from higher demand for financial services or higher prices, and higher prices could reflect better quality of financial services but also higher surplus financiers extract from those who access their services. Because such rents are unlikely to benefit non-finance sectors, our reliance on value added might overestimate the contribution of finance (i.e., value added = true contribution + rents), and therefore underestimate the level of the AGFW.

To investigate this possibility and better interpret the magnitude of our estimates, we re-estimate our baseline specification (3) but focus on the association between the fraction of skilled workers in non-finance sectors and each component of the AGFW separately, instead of the AGFW. We report the results in the last two columns of Table III. Column (5) indicates that the share of skilled workers in non-finance sectors is negatively associated with the recent unadjusted growth of the finance wage premium $\triangle(\overline{wage}^{skill}_{c,fin})$. Yet the estimated association is weak because the statistical significance is only present when the growth of the finance wage premium is measured over the past five years (with a t-statistic of -1.90). In sharp contrast, column (6) reveals a positive and significant association between the fraction of skilled workers employed in non-finance sectors and the relative value added per skilled worker in finance $\triangle(\overline{va}^{skill}_{c,fin})$. This latter result confirms that an increase in our proxy for the contribution of finance to other sectors indeed leads to more skilled labor in non-finance sectors, as noted in Table I

In terms of magnitude, note also that the baseline coefficients reported in column (2) of Table III are more than twice as large as the coefficients of the unadjusted growth of the finance wage premium (column (5) of Table III). This discrepancy emphasizes the importance of adjusting the finance wage premium with the contribution of the financial sector when estimating the real implications of growing finance compensation. Failing to do so could severely bias the estimates downwards, because the growth of the finance wage premium is often accompanied by a parallel growth in the contribution of the financial sector, which is positively linked to skilled labor across non-finance sectors. Contrasting results across columns (2), (5), and (6) thus indicate that growing relative wages in finance

are associated with a reallocation of talent only when they outgrow the contribution of finance to other sectors.

F Variation across Sectors

Our baseline results indicate that, on average, the share of skilled workers employed in non-finance sectors is significantly lower in years in which the AGFW has been large. This result is consistent with the conjecture that high relative wages in the financial sector induce a modest reallocation of skilled workers from non-finance sectors to finance. Yet our baseline test cannot rule out the possibility that the negative association between skilled workers in non-finance sectors and the AGFW is spurious. In particular, the negative sensitivity of talent intensity to the AGFW in non-finance sectors might be driven by unobserved time-varying country-specific shocks, which are correlated with the AGFW and with the allocation of skills across sectors.

To address this concern and clarify the economic mechanisms behind the baseline results, we conduct an analysis in the spirit of Rajan and Zingales (1998) and explore how the sensitivity of skilled labor to the AGFW varies across non-finance sectors *within* countries. To do so, we estimate the following specification:

$$skilled_{c,k,t} = \alpha_0 + \alpha_1 AGFW^n_{c,t} \times \Psi_k + \eta_{c,k} + \eta_{c,t} + \eta_{k,t} + \epsilon_{c,k,t}, \tag{4}$$

where $skilled_{c,k,t}$ is the proportion of high-skilled workers employed in (non-finance) sector k of country c in year t, $AGFW^n_{c,t}$ is the adjusted growth of finance wages measured at two horizons (t=1,3,5), and Ψ_k represents a sector characteristic (e.g., its R&D intensity). The unit of observation is a country-sector-year. The specification includes a set of country×sector ($\eta_{c,k}$), country×year ($\eta_{c,t}$), and sector×year ($\eta_{k,t}$) fixed effects. As a result, we do not include $AGFW^n_{c,t}$ and Ψ_k separately, because their variation is fully absorbed by the fixed effects. The parameter of interest α_1 is estimated using the within-country cross-sectional variation of the sector's characteristic Ψ_k.

The central ingredient in specification (4) is the inclusion of country×year fixed effects ($\eta_{c,t}$), which absorb unobserved time-varying country-specific variation. Thus, α_1 measures the differential

sensitivity of skilled labor to the AGFW in sectors in which the characteristic Ψ is high relative to the sensitivity in sectors in which Ψ is low, within the same country and year. This specification thus allows us to rule out that the baseline results might be driven by unobserved shocks that happen in some countries but not others in the sample – e.g., reforms that change the mobility of labor across sectors within countries, or localized economic shocks that make employees move to the financial sectors from other sectors for reasons that are unrelated to the relative increase of the finance wage premium over the finance value added and we cannot capture with our observables. Note that this specification helps our interpretation to the extent that unobserved country-year-specific variables do not imply heterogeneous sectoral sensitivities that coincide with the heterogeneous sectoral sensitivities the AGFW induces.

[Insert Table VI about Here]

We consider three broad types of sectoral characteristics. First, we proxy for the frictions non-finance workers would face if they wanted to transition to the financial sector. We argue that the extent of talent reallocation to finance should be stronger from sectors in which the costs to transition to finance are lower. Second, inspired by Murphy, Shleifer, and Vishny (1991), we consider proxies for sectoral innovation intensity. The *societal costs* of a finance-induced reallocation of talent would be higher if the transitioning workers moved from jobs that produce innovation in research-oriented sectors to jobs in finance. Third, we focus on proxies for each sector's need of financial services. The *societal benefits* of a finance-induced reallocation of talent should be higher if more workers move into sectors that need finance to produce and grow, which would suggest that higher relative wages in finance allow finance-dependent sectors to attract more talent.

F.1 Transitioning Costs

To proxy for the cost of transitioning from non-finance sectors into finance, we first construct an index capturing the similarity of the inputs used by non-finance sectors and finance. Using data from KLEMS on the composition of sectoral inputs, we compute the share of each intermediate input (i.e., intermediate energy inputs, intermediate material inputs, and intermediate service inputs) so that the

three shares sum up to 1. For each U.S. non-finance sector, we then compute the absolute difference between their shares and the corresponding shares for finance. The index of *Input Similarity* ranges between -1 and 0, and is closer to 0 for sectors whose input structure deviates the least from the input structure of the financial sector. This index aims to capture industries in which the baseline skills needed to transform the factors of production are more similar to the skills needed in finance, and hence industries whose employees have skills that might be useful to the financial sector. Second, we consider the intensity with which non-finance sectors transact with finance. Using the U.S. BEA Input-Output tables (the 1997 version), we compute for each sector the annual amount of product and services supplied to the financial sector. This variable captures the extent to which companies in each sector are suppliers to finance. We conjecture that transitioning into finance jobs is relatively easier from sectors that transact more with the financial sector. The rationale is that the extent of asymmetric information regarding the quality of a potential non-finance hire is lower if financial institutions interact with the non-finance workers on a regular basis, compared to assessing the quality of a worker with which they have never interacted. For instance, an employee of a large consulting firm that interacts often with the M&A team of an investment bank will be vetted more closely by the bank than an employee in a company with whom the bank has never interacted, and hence the former might be more likely to obtain a job offer from the bank if his/her quality is high. Columns (1) and (2) of Table VI show that indeed the negative sensitivity of skilled labor to the AGFW is more pronounced in sectors whose workers face lower transitioning costs to finance, irrespective of the horizon over which we compute the AGFW.

F.2 Innovation Intensity

To measure differences in innovation intensity across sectors, we use information on the R&D intensity and presence of scientists in the workforce across sectors in the United States. Using data from the National Science Foundation (NSF) Yearly Survey of R&D and Innovation Activities, we calculate the average share of total R&D expenses by companies that engage in R&D activities – financed by public or private sources – over the total amount of sales of these companies. We then define *R&D Intensity* as the average share within each U.S. sector from 1997 to 2005. Using the same source, we

define *Scientist Intensity* as the average share of scientists and engineers over all workers employed by companies that engage in R&D activities in each sector. Columns (3) and (4) of Table VI indicate that, within countries, the negative sensitivity of skilled labor to the AGFW is significantly larger in more innovative sectors than in less innovative sectors.

F.3 Need of Finance

Finally, we capture a sector's reliance on financial services using two proxies. First, we use the average financial leverage of mature firms in the sector, which is directly linked to firms' reliance on financial services in the form of capital. We compute sectoral leverage ratios using data from Compustat, averaged across the period 1970-2005. Second, we use sectoral investment in information and communication and technology (ICT) to capture the sectoral need for finance. We use investment data from KLEMS and compute the share of ICT for each country-sector-year. We consider ICT investment because it is the only type of investment for which we have direct information in KLEMS, but this test could be potentially run considering any type of physical investment that requires financing. Results are reported in columns (5) and (6) of Table VI. Across specifications, the coefficients on the interaction between the AGFW and both proxies are positive, but statistical significance is low.

IV Growing Finance Wages as an Impediment to Growth?

Our evidence so far supports the view that abnormal growth of relative wages in finance compared to the growth of the relative value added of finance is systematically associated with the reallocation of skilled workers from non-finance sectors to finance, even though the size of this reallocation seems modest. In this section, we examine whether this talent reallocation is large enough to affect sectoral and aggregate economic growth.

A Sectoral Evidence

Ideally, we would be able to *directly* measure the impact of the AGFW-induced talent reallocation on sectoral growth. Yet because our measure of reallocation – the estimated coefficient β_1 in our baseline specification (3) – is indirect, this strategy is not feasible. Instead, we assess whether the AGFW itself is systematically related to several measures of growth at the sectoral level. We thus estimate the following specification:

$$growth_{c,k,t} = \omega_0 + \omega_1 AGFW^n_{c,t} + \eta_{c,k} + \eta_t + \epsilon_{c,k,t}, \tag{5}$$

where $growth_{c,k,t}$ is a measure of the growth of non-finance sector k in country c in year t, and $AGFW^n_{c,t}$ is the adjusted growth of finance wages measured at two different horizons (n=3,5).

Table VII presents the results. We first consider the logarithm of output, the logarithm of value added, and total factor productivity (TFP) as computed in KLEMS as proxies for sectoral growth. The unit of observation is a country-sector-year. Similar to specification (2), we include year fixed effects (η_t) to absorb time-varying factors affecting the worldwide demand for skills over time. We further include country×sector fixed effects ($\eta_{c,k}$) to absorb time-invariant unobserved heterogeneity across each country and sector. The coefficient of interest, ω_1, measures the association between the AGFW and sectoral growth. As in specification (2), we cluster the standard errors at the country level. For each measure, we employ both levels and annual growth, computed over three years (from t to $t+3$).

[Insert Table VII about Here]

In columns (1) to (3), we detect no significant relationship between the AGFW and variation in non-finance sectors' output, value added, or productivity. The estimated t-statistics range between -0.32 and 0.94. A one-standard-deviation increase in the AGFW in the past five years is associated with an increase of 0.004 in the log output of the average non-finance sector, corresponding to an increase of 0.4% of a standard deviation in the average log output. A similar shock is associated with an increase of 0.006 in value added, and 0.012 in productivity, or 0.6% and 1.2% of a standard deviation,

respectively. We complement the KLEMS-based growth measures using the average valuation (market-to-book ratio) and sales growth of all listed firms in each country-sector-year from Worldscope in columns (4) and (5). Again, we fail to reject the null of no association between these outcomes and the AGFW.

In columns (6) to (8) of Table VII, we display the results with the subsequent three-year growth rates of output, value added, and TFP as dependent variables. We fail to detect any statistically significant relationship between the AGFW and the future output, value added, or productivity growth of non-finance sectors. The t-statistics are low and the point estimates are modest. Despite a decrease in the share of skilled workers employed in non-finance sectors after periods of high AGFW, these sectors do not seem to exhibit lower economic growth going forward. Overall, the lack of a significant link with growth at the sectoral level suggests the reallocation of skills away from non-finance sectors associated with the AGFW might be too small to hinder the economic performance of these sectors.

So far, we have tested whether any significant relationship exist between the AGFW and the level of real outcomes at the sectoral level. One could be concerned that the measures of real outcomes at the sector level are particularly noisy, or that a relationship might exist but be hard to detect in levels. To further test whether any relationship with real outcomes exist, we propose an analysis similar to the one in Table VI, in which we exploited several sources within-sector cross-sectional variation to test whether the effect of AGFW on the share of skilled workers at the sector level survives within industries. We therefore estimate a set of cross-sectional regressions as in equation (4), but using sector-level real outcome measures as the outcome variable. Table VIII reports the results of this analysis when using two measures. In Panel A, we consider the 3-year growth of the logarithm of industry-level gross output. In Panel B, we consider the 3-year growth of the logarithm of value added.

[Insert Table VIII about Here]

The cross-sectional analysis of Table VIII shows that no detectable differential association exists between the AGFW and sector-level real outcome variables even when we rank industries based on the sources of cross-sectional variation described above. Overall, we fail to detect any systematic

association between the AGFW and real outcomes of non-finance sectors, not only for the average outcomes, but also when considering variation across sectors.

B Aggregate Evidence

In Table IX, we examine whether the adjusted growth of finance wages is related to countries' aggregate economic outcomes. We use a specification similar to specification (5), but regress time-varying country-dependent variables on the AGFW (measured at two horizons) as well as country and year fixed effects. Column (1) indicates that within-country variation in the AGFW is unrelated to variation in countries' GDP. Column (2) further shows the AGFW is largely unrelated to three-year-ahead GDP growth. In both cases, the point estimates are positive, but the t-statistics (i.e., 0.40 and 0.07) unambiguously indicate statistically insignificant relationships.

[Insert Table IX about Here]

Arguably, the reallocation of talent related to the AGFW may take a long time to translate into real aggregate economic outcomes such as GDP growth. To assess this possibility, we first look at the determinants of human capital and ask whether high relative wages in finance are related to the allocation of students across fields of study within countries. To do so, we use data on the distribution of university degrees from the United Nations Educational, Scientific and Cultural Organization (UNESCO), which contain the annual fraction of graduates across nine fields of study by country.[20] We aggregate these fields to create a "STEM" (i.e., sciences, technology, engineering and math) and a "Services" field, in addition to "Business, Administration and Law." In columns (3) and (4), we find no evidence that the AGFW correlates with the allocation of graduates. In particular, column (4) reveals that the fraction of graduates in a STEM major is not significantly related to the adjusted growth of finance wages. Column (4) also indicates that higher relative wages in finance are not associated with significant changes in the fraction of students graduating with a business or law degree.

[20]The fields are: "Education," "Arts and Humanities," "Social Sciences," "Business, Administration and Law," "Natural Sciences, Mathematics, and Statistics," "Information and Communication Technologies," "Engineering, Manufacturing, and Construction," "Agriculture, Forestry, Fisheries, and Veterinary," "Health and Welfare," and "Services."

Second, we focus on countries' innovative capacity. In column (5) of Table IX, we ask whether high relative wages in finance are related to the ratio of R&D expenditures to GDP. If anything, we detect a *positive* association, which suggests that at times of high relative wages in finance, on average, countries devote a higher share of their GDP to investment in R&D. Similarly, we explore whether variation in the AGFW within countries is associated with their production of innovation, which is likely to be an important determinant of long-term growth. Using aggregated data from the World Bank on the number of patent applications, trademark applications, scientific articles, and the share of exports made of high-tech products in each country and year, columns (7) to (9) of Table IX indicate the AGFW is unrelated to any of these outcomes, either economically or statistically.

The non-results in Table IX suggest the talent reallocation associated with increasing adjusted finance wages might be too small to predict negative aggregate economic outcomes. In Table A.3 of the Online Appendix, we propose an analysis similar to Table IX, using additional proxies for economic growth at the country-year level, including the share of students that enroll in service sectors, different types of R&D expenditures and patents, as well as the number of scientific articles per capita. Consistent with the results in Table IX, we fail to detect any systematic association between the AGFW and any of these outcomes.

[Insert Table X about Here]

A third channel through which growing finance wages might hamper economic growth in the long-run is via a deterioration of the functioning of the financial sector. To assess this possibility, we rely on data measuring the riskiness, efficiency, and competitiveness of the financial sector at the country-year level compiled in the *World Bank Global Financial Database* (version June 2016). To measure the riskiness of the financial sector, we consider the aggregate amount of provisions by banks over the overall value of non-performing loans in the economy, the aggregate amount of regulatory capital in the economy on the aggregate amount of bank-level assets, and the Bank Z-score, which proxies for the probability of default of the country's commercial banking system. The first three columns of Table X reveal no significant association between the AGFW and any of these proxies. In columns (4) to (6), we focus on the efficiency of the banking system, measured using the average lending-to-

deposit spread, the share of overhead costs over bank-level assets, and the share of all bank costs to the aggregate income reported by banks in the country. Again, we find no association between the AGFW and these outcomes.

Finally, we consider the competitiveness of the banking sector, because a less competitive banking sector might increase the rents in finance and reduce the efficiency of the allocation of factors of production in the economy. We measure competitiveness using the asset concentration in the banking sector (the sum of the assets of the three largest commercial banks of the country divided by the total assets of the banking system), the Lerner Index (the markup the banking sector charges to companies and households), and the 5-Bank concentration ratio (the sum of the assets of the five largest commercial banks in the country divided by the total assets of the banking system). Columns (7) to (9) indicate again no association between the AGFW and measures of the concentration of the banking system. If anything, using the five-year-horizon version of the AGFW, the growth of finance wages is related to a lower asset concentration (Panel A, column (7) of Table X), and hence to a *more* competitive banking sector.

V Conclusions

Using detailed sectoral data for 24 countries over 35 years, we find evidence that growing finance wages are associated with a modest reallocation of skilled workers from non-finance sectors to finance, and no evidence that they predict lower subsequent economic growth. An innovation of our approach is to adjust the growth of finance wages – which is commonly interpreted as reflecting rents in finance – by the contribution of finance to the economy. This adjustment is important, because the finance compensation and the contribution of finance are positively correlated in our sample. Our results contribute to the debate on the social value of finance, but our analysis focuses solely on talent allocation across sectors. Thus, our findings cannot directly speak to whether finance is ultimately beneficial or detrimental to other sectors.

Several questions deserve further investigation. Growing finance wages are often proposed as evidence of increasing rents in the financial sector. However, higher finance wages might at times

reflect a higher contribution of finance to the rest of the economy. Further theoretical and empirical research should dig deeper in understanding the sources and magnitude of rents in finance. We also find the financial sector is unique in attracting talent from other sectors when compensation is generous. Future research should investigate what makes finance so special.

Our results also point to the importance of cross-country sectoral data and long time series to assess questions on economy-wide factor reallocation and growth. Focusing on policy experiments limited in space and time is crucial to pinpoint causal relationships, but assessing external validity and overall magnitudes using broader and more representative settings also provides relevant insights.

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Figure 1: Adjusted Growth of Finance Wages: Aggregate Evolution

This figure plots the annual average value of the adjusted growth of finance wages (AGFW) and its two components over the period 1970-2005 across all country-years in our sample. The sample includes 24 countries. The AGFW for a given country-year observation is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value-added premium is defined as the value added per skilled worker in finance relative to the average value added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value-added premia are computed over five-year horizons (from year $t-5$ to year t).

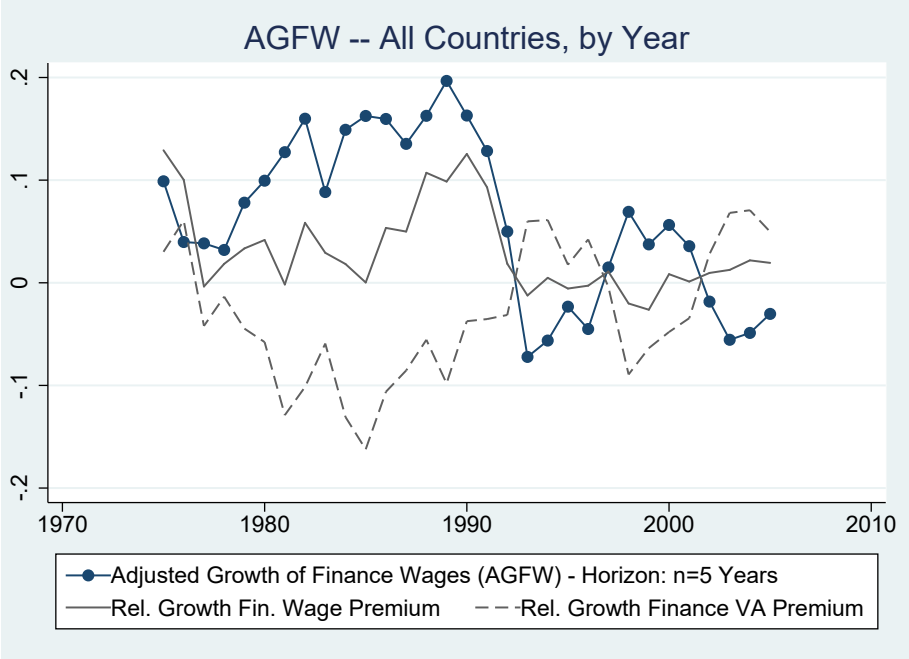


Figure 2: Adjusted Growth of Finance Wages: Notable Countries

This figure plots the annual average value of the adjusted growth of finance wages (AGFW) over the period 1970-2005 for six countries: the United States, the United Kingdom, Germany, Italy, South Korea, and Japan. The AGFW for a given country-year observation is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value added premium is defined as the value added per skilled worker in finance relative to the average value-added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value-added premia are computed over five-year horizon (from year $t-5$ to year t).

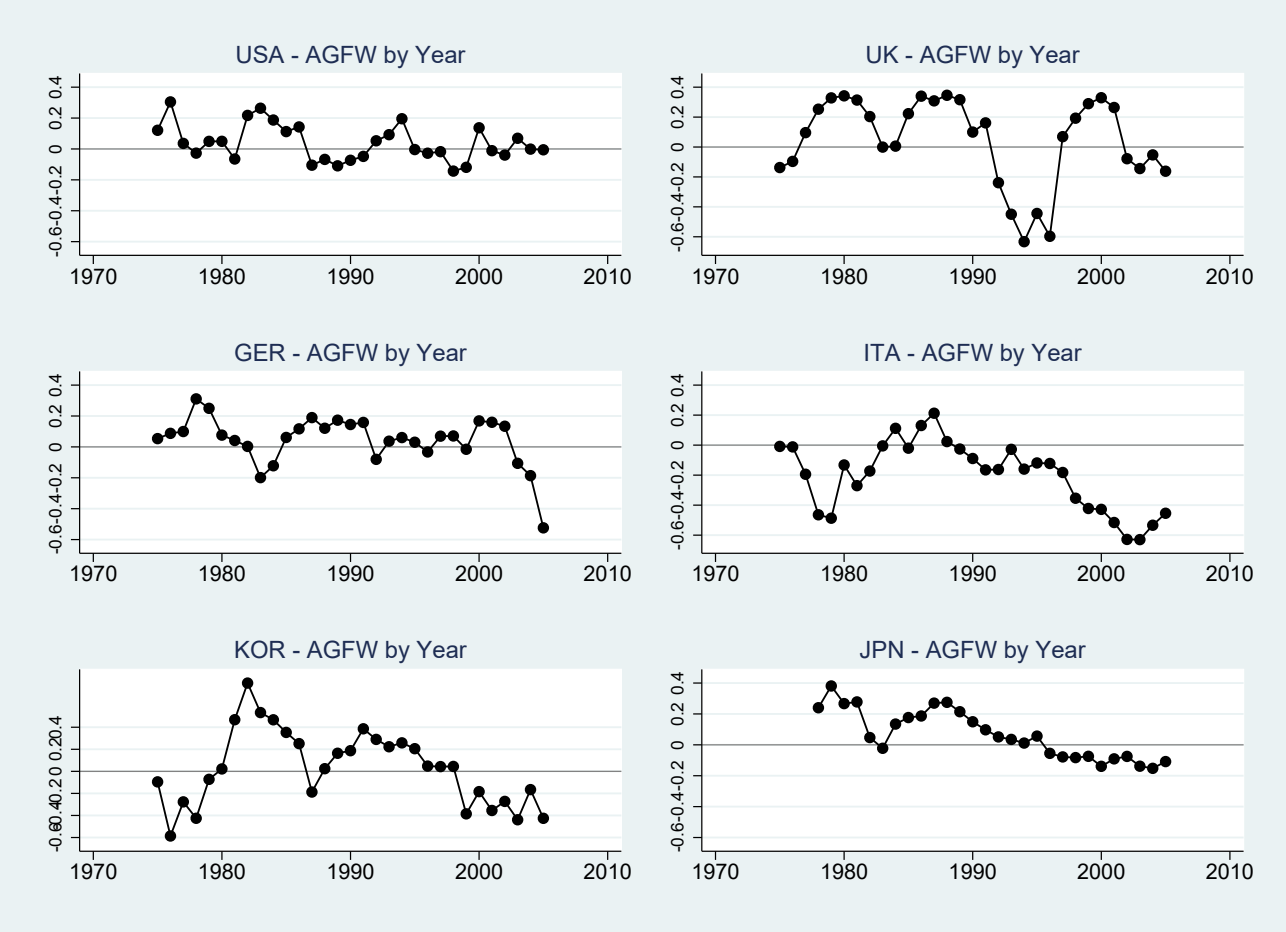
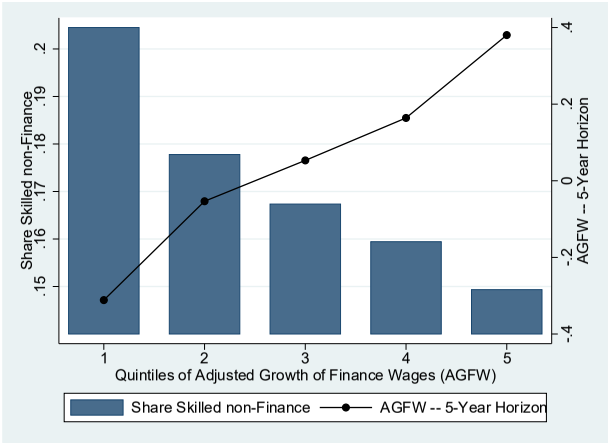


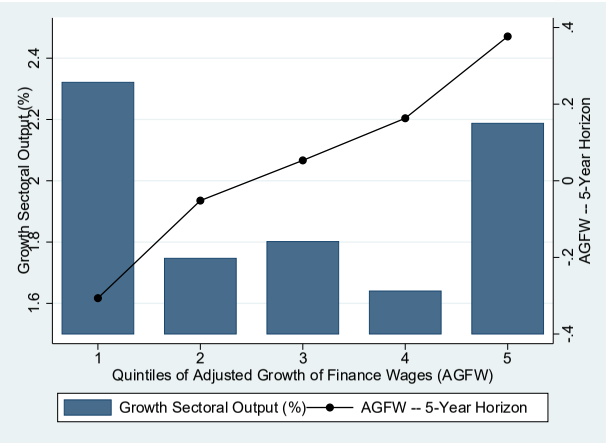
Figure 3: Adjusted Growth of Finance Wages and Outcomes: Raw Data

This figure plots the average of a set of sectoral and country-level outcomes (raw data) averaged by quintiles of the adjusted growth of finance wages (AGFW). Panel A refers to the share of skilled workers (university-level degree or higher) over the total number of workers in non-finance sectors, Panel B refers to the growth of the industry-level output of non-finance sectors (3 years ahead), Panel C refers to the logarithm of the number of patents filed at the county level, and Panel D refers to the share of university-level students that are enrolled in STEM-related disciplines, which include engineering, computer science, hard sciences, and biotechnology. The AGFW for a given country-year observation is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value added premium is defined as the value added per skilled worker in finance relative to the average value-added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value-added premia are computed over five-year horizon (from year $t-5$ to year t).

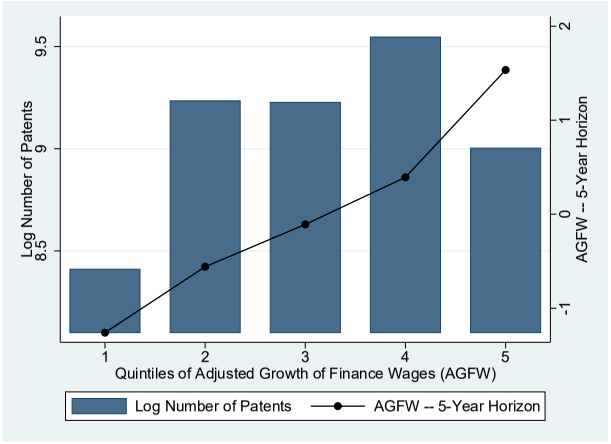
Panel A. AGFW and Share Skilled non-Finance Sectors



Panel B. AGFW and Growth Sectoral Output



Panel C. AGFW and Log Country-level Patents



Panel D. AGFW and Share STEM-Enrolled Students

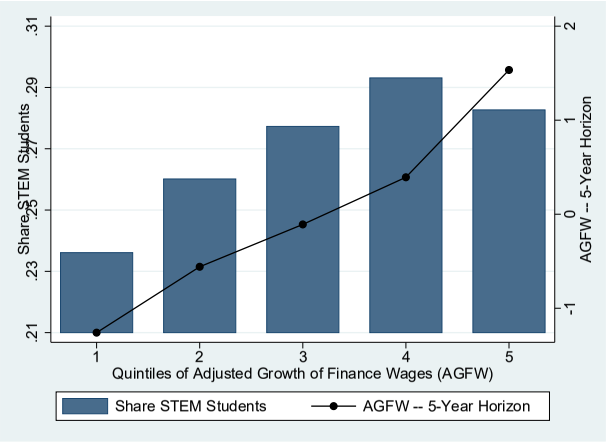
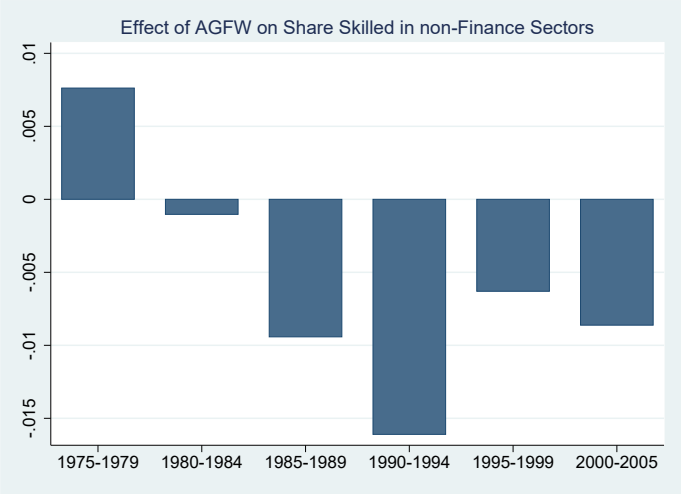


Figure 4: Adjusted Growth of Finance Wages and Skilled Labor in Non-finance Sectors: Heterogeneity

This figure plots estimates from regressions of the share of skilled workers in a given country-sector-year on the adjusted growth of finance wages (AGFW) in that country-year, similar to the baseline specification (3). The share of skilled workers in a given country-sector-year corresponds to the fraction of workers holding a university degree (or equivalent). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value-added premium is defined as the value added per skilled worker in finance relative to the average value added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value-added premiums are computed over five-year horizons (from year $t-5$ to year t). The sample period is 1970-2005 and includes 24 countries. All specifications include country×sector and year fixed effects. In Panel A, we estimate separate regressions for each adjacent five-year periods. In Panel B, we estimate separate regressions across quartiles of countries' GDPs.

Panel A. Variation over Time



Panel B. Variation over GDP quartiles

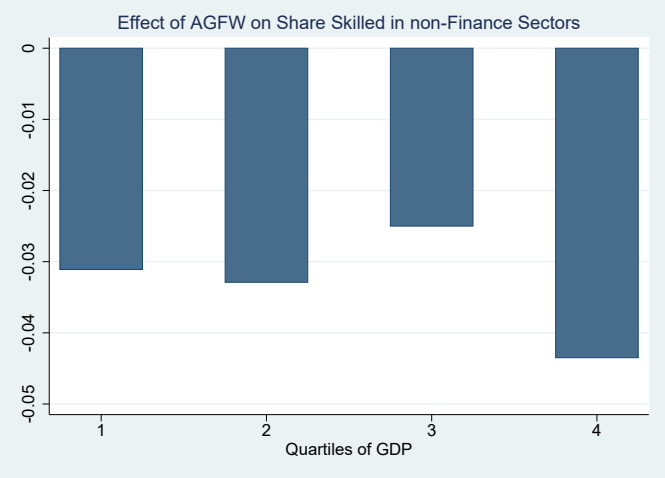


Table I: Finance Value Added Growth Correlates with the Social Returns of Finance

This table reports estimates from regressing three outcomes capturing the efficiency and inefficiency of capital and labor allocation in the economy on the growth of finance value added premium over the prior 5 years (Panel A) and 3 years (Panel B). In columns (1)-(3), the outcome variable is the investment-Q sensitivity at the country-year level from weighted-least-squares regressions using firm-year observations from Worldscope. Investment-Q sensitivities are the coefficients obtained when regressing the capital expenditures at the country-year level on Tobin's Q also measured at the country-year level. Investment-Q sensitivities are measured at the country-year level from weighted-least-squares regressions using firm-year observations from Worldscope. Regressions are weighted using the absolute value of the t-statistics attached to the estimated coefficients, which capture the precision of the estimated investment-Q sensitivities. Higher investment-Q sensitivities aim to capture a more efficient allocation of capital in the economy, because capital expenditures are produced by firms with better investment opportunities. In columns (4)-(6), the outcome variable is the share of household-level total debt over a country's GDP. Mian, Sufi, and Verner (2018) show that periods of high share of household debt cycles (credit booms in the household segment) predict low future GDP growth and might represent periods of misallocation of capital in the economy. In columns (7)-(9), the outcome variable is the share of high-skilled workers (college degrees or higher levels of education) over the total worker of each country-sector-year in our sample. We interpret a higher share of high-skilled workers in productive non-finance sector as a proxy for the efficient allocation of labor toward productive sectors. The units of observations are country-years in columns (1)-(6), and country-sector-years in columns (7)-(9). Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007) and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Investment-Q Sensitivity (Efficiency Cap. Allocation)			HH Debt/GDP (Inefficiency Cap. Allocation)			Skilled Non-Finance (Efficiency Lab. Allocation)		
	Horizon: n=5 Years								
Finance VA Premium Growth	0.201***	0.176***	0.179**	−0.954*	−0.804**	−1.148***	0.130**	0.082**	0.028**
	(2.76)	(2.86)	(1.98)	(−1.95)	(−2.28)	(−3.32)	(2.63)	(3.40)	(2.32)
Observations	295	295	295	378	378	378	5,827	5,827	5,827
Adjusted R^2	0.03	0.14	0.23	0.03	0.33	0.49	0.02	0.29	0.97
	Horizon: n=3 Years								
Finance VA Premium Growth	0.166***	0.105**	0.094*	−0.753	−0.430	−0.837**	0.087**	0.017*	0.017*
	(3.39)	(2.10)	(1.74)	(−1.71)	(−1.33)	(−2.42)	(2.32)	(1.80)	(1.76)
Observations	303	303	303	404	404	404	6,445	6,445	6,445
Adjusted R^2	0.02	0.13	0.22	0.02	0.31	0.47	0.01	0.28	0.97
Year FE		X	X		X	X		X	X
Country FE			X			X		X	
Country×Sector FE									X

Table II: Adjusted Growth of Finance Wages: Summary Statistics

The table displays summary statistics for the adjusted growth of finance wages (AGFW). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value-added premium is defined as the value added per skilled worker in finance relative to the average value added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value added premiums are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. We present statistics for the whole sample (i.e., all country-sector-year) and by sub-periods.

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A. Adjusted Growth of Finance Wages, n=5 Years					
	N.obs.	Mean	St.dev.	p.25	p.50	p.75
Full Sample	5,827	0.043	0.238	−0.084	0.053	0.192
1975-1985	1,061	0.101	0.232	−0.013	0.095	0.253
1986-1995	1,967	0.071	0.245	−0.063	0.076	0.201
1996-2005	2,799	0.001	0.227	−0.133	0.014	0.164
	Panel B. Adjusted Growth of Finance Wages, n=3 Years					
	N.obs.	Mean	St.dev.	p.25	p.50	p.75
Full Sample	6,445	0.029	0.181	−0.064	0.030	0.138
1973-1985	1,281	0.066	0.168	−0.038	0.051	0.194
1986-1995	2,044	0.031	0.187	−0.054	0.031	0.125
1996-2005	2,964	0.009	0.177	−0.077	0.020	0.124

Table III: Adjusted Growth of Finance Wages and Talent Allocation: Baseline

This table reports estimates from various regressions of the share of skilled workers in a given country-sector-year on the adjusted growth of finance wages (AGFW) in that country-year, or its component. The share of skilled workers in a given country-sector-year corresponds to the fraction of workers holding a university degree (or equivalent). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium ($\triangle(\overline{wage}^{skill}_{c,fin})$) and the growth of the finance value-added premium ($\triangle(\overline{va}^{skill}_{c,fin})$), where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value-added premium is defined as the value added per skilled worker in finance relative to the average value added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value-added premia are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. In column (1), the dependent variable is the share of skilled workers in the financial sector. In columns (2) to (6), the dependent variable is the share of skilled workers in each of the 13 non-finance sectors. Specifications include country×sector, year, or country fixed effects, as noted at the bottom of the table. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007), and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$.

	(1) Skilled Finance	(2) Skilled Non-finance	(3) Skilled Non-finance	(4) Skilled Non-finance	(5) Skilled non-Finance	(6) Skilled Non-finance
			Panel A. Horizon: n=5 Years			
AGFW	0.036***	−0.035***	−0.122**	−0.035***		
	(4.92)	(−3.13)	(−2.07)	(−3.21)		
Finance Wage Premium Growth					-0.015*	
					(-1.90)	
Finance VA Premium Growth						0.028**
						(2.38)
Observations	450	5,827	5,827	5,827	5,827	5,827
Adjusted R^2	0.95	0.97	0.01	0.29	0.97	0.97
			Panel B. Horizon: n=3 Years			
AGFW	0.025***	−0.022**	−0.083**	−0.022**		
	(3.94)	(−2.26)	(−2.00)	(−2.21)		
Finance Wage Premium Growth					-0.007	
					(-1.27)	
Finance VA Premium Growth						0.017*
						(1.80)
Observations	498	6,445	6,445	6,445	6,445	6,445
Adjusted R^2	0.94	0.93	0.01	0.28	0.97	0.97
Country FE	X	X			X	X
Year FE	X	X		X	X	X
Country×Sector FE				X		

Table IV: Adjusted Growth of Finance Wages and Talent Allocation: Robustness

This table reports estimates from various regressions of the share of skilled workers in a given country-sector-year on the adjusted growth of finance wages (AGFW) in that country-year (specification (3)). The share of skilled workers in a given country-sector-year corresponds to the fraction of workers holding a university degree (or equivalent). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value-added premium is defined as the value added per skilled worker in finance relative to the average value added per skilled worker in the economy (as defined in Section II). The growth rates of the finance wage and value added premiums are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. In column (1), we use a weighted least-squares (WLS) approach, with weights defined using country-year GDP. In column (2), we consider the one-year-ahead ($t+1$) share of skilled workers as the dependent variable. In column (3), we consider the share of sectors' skilled workers defined as the number of skilled workers employed in a sector divided by the total number of skilled workers. In column (4), we modify the definition of the AGFW and use the growth of the share of the finance wage bill in countries' total wage bill and the growth of the share of value added of the financial sector in countries' GDP. In column (5), we further control for sectors, employment ($\triangle(emp^n)$) and value-added growth ($\triangle(va^n)$). In column (6), we control directly for the 10-year rolling window standard deviation of the relative finance wage premium across countries, which captures the riskiness of finance wages with respect to wages in other sectors. In column (7), we further control for variables related to countries' financial development using data from the *World Bank Global Financial Development Database*. Column (8) uses the difference between the average finance wage premium and the average finance value-added premium as main covariate instead of the difference in the growth of these two variables (AGFW) computed over the same horizon. Column (9) replaces the outcome variable with the growth of the share of skilled workers in non-finance sectors. All specifications include country×sector and year fixed effects, as noted at the bottom of the table. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007) and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$.

	(1) WLS (w=GDP)	(2) Lead Skilled Non-finance	(3) Rel. Skilled Non-finance	(4) Aggregate AGFW	(5) Skilled Non-finance	(6) Skilled Non-finance	(7) Skilled Non-finance	(8) Skilled Non-finance	(9) Growth Skilled Non-finance
Panel A. Horizon: n=5 Years									
AGFW	−0.113***	−0.034***	−0.003***	−0.035***	−0.032***	−0.036***	−0.035**		−0.008
	(−11.17)	(−2.90)	(−5.46)	(−3.44)	(−2.96)	(−3.12)	(−2.29)		(−0.37)
$\triangle(va)$					−0.060**				
					(−2.42)				
$\triangle(emp)$					−0.009				
					(−1.10)				
σFin. Rel. Wage (10 yrs)						0.192			
						(0.38)			
Rel. Size Fin. Sector							1.447		
							(0.79)		
Bank Private Credit/GDP							−0.122		
							(−0.59)		
Mkt Capitalization/GDP							0.031		
							(0.48)		
Bank Assets/GDP							0.112		
							(0.54)		
Bank Deposits/GDP							0.002		
							(1.32)		
GDP per capita							−0.000		
							(−1.02)		
Bank Crisis 5 years							0.047		
							(0.95)		
Avg. Diff. Finance Premia Q2								-0.078	
								(-0.98)	
Avg. Diff. Finance Premia Q3								-0.095	
								(-1.57)	
Avg. Diff. Finance Premia Q4								-0.082	
								(-1.09)	
Avg. Diff. Finance Premia Q5								-0.084	
								(-0.93)	
Observations	5,827	5,518	5,827	5,827	5,827	5,827	4,833	5,827	5,827
Adjusted R^2	0.98	0.97	0.96	0.97	0.97	0.97	0.98	0.97	0.27
Country×Sector FE	X	X	X	X	X	X	X	X	X
Year FE	X	X	X	X	X	X	X	X	X

	(1) WLS (w=GDP)	(2) Lead Skilled Non-finance	(3) Rel. Skilled Non-finance	(4) Aggregate AGFW	(5) Skilled Non-finance	(6) Skilled Non-finance	(7) Skilled Non-finance	(8) Skilled Non-finance	(9) Growth Skilled Non-finance
Panel B. Horizon: n=3 Years									
AGFW	−0.082***	−0.025***	−0.002***	−0.022**	−0.020**	−0.022**	−0.021		−0.012
	(−10.72)	(−2.63)	(−4.11)	(−2.51)	(−2.14)	(−2.20)	(−1.57)		(−0.97)
$\triangle(va)$					−0.041*				
					(−1.97)				
$\triangle(emp)$					−0.008				
					(−1.19)				
σFin. Rel. Wage (10 yrs)						0.078			
						(0.14)			
Rel. Size Fin. Sector							0.494		
							(0.34)		
Bank Private Credit/GDP							−0.097		
							(−0.48)		
Mkt Capitalization/GDP							0.043		
							(0.67)		
Bank Assets/GDP							0.064		
							(0.34)		
Bank Deposits/GDP							0.002		
							(1.37)		
GDP per capita							−0.000		
							(−1.13)		
Bank Crisis 5 years							0.062		
							(1.25)		
Avg. Diff. Finance Premia Q2								-0.125**	
								(-2.31)	
Avg. Diff. Finance Premia Q3								-0.114**	
								(-2.09)	
Avg. Diff. Finance Premia Q4								-0.123*	
								(-1.72)	
Avg. Diff. Finance Premia Q5								-0.087	
								(-1.01)	
Observations	6,445	6,136	6,445	6,445	6,445	6,445	5,269	6,445	6,445
Adjusted R^2	0.98	0.97	0.95	0.97	0.97	0.97	0.98	0.97	0.17
Country×Sector FE	X	X	X	X	X	X	X	X	X
Year FE	X	X	X	X	X	X	X	X	X

Table V: Is Finance Special? Placebo Tests

This table reports estimates from regressions of the share of skilled workers in a given country-sector-year on adjusted growth measures in non-finance sectors. The share of skilled workers in a given country-sector-year corresponds to the fraction of workers holding a university degree (or equivalent). For a given country-year, the adjusted growth of a given sector k is defined as the difference between the growth of that sector's wage premium (or discount) and the growth of that sector's value-added premium (or discount), where the wage premium is computed as the average wage of skilled workers in sector k relative to the average wage of skilled workers in the economy (including or excluding finance), and the value-added premium is defined as the value added per skilled worker in sector k relative to the average value added per skilled worker in the economy (similar to how we define the AGFW in section II). The growth rates of the wage and value-added premiums are computed over five-year horizon (from year $t-5$ to year t). The sample period is 1970-2005 and includes 24 countries. We report the coefficient estimates corresponding to each measure of the adjusted growth. All specifications include country×sector and year fixed effects. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007), and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$.

Sector:	(1)	(2)
	Including Finance	**Excluding Finance**
Finance	$-0.035 * **$	
	(-3.44)	
Mining and Quarrying	0.015	0.015
	(1.59)	(1.52)
Manufacturing	0.019	0.016
	(1.05)	(0.95)
Utilities	0.007	0.008
	(0.67)	(0.76)
Construction	-0.009	-0.009
	(-1.18)	(-1.27)
Wholesale and Retail Trade	0.011	0.013
	(0.82)	(0.94)
Hotels and Restaurants	0.023	0.024
	(1.41)	(1.37)
Transport and Storage	0.033	0.034
	(1.55)	(1.50)
Real Estate	$-0.024*$	$-0.022*$
	(-1.83)	(-1.89)
Public Administration	0.009	0.011
	(0.39)	(0.49)
Education	0.010	0.013
	(0.60)	(0.69)
Health Services	-0.009	-0.012
	(-0.37)	(-0.46)
Community and Social Services	0.013	0.012
	(0.93)	(0.96)

Table VI: Adjusted Growth of Finance Wages and Talent Allocation: Cross-sectional Tests

This table reports estimates from various regressions of the share of skilled workers on the interaction between the adjusted growth of finance wages (AGFW) in that country-year and a sector's characteristic Ψ (specification (4)). The share of skilled workers in a given country-sector-year corresponds to the fraction of workers holding a university degree (or equivalent). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, as defined in section II. The growth rates of the finance wage and value-added premiums are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. Sectors' characteristics include (1) input similarity to finance, (2) the intensity of supplies to finance, (3) R&D intensity, (4) scientists' intensity, (5) leverage ratio, (6) investment in communication and technology, (7) high-skilled wage premium, and (8) ratio of value added per hour worked in the sector. All specifications include country×sector, and country×year fixed effects, as noted at the bottom of the table. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007) and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p<0.10,^{**}p<0.05,^{***}p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Transitioning Costs		Innovativeness		Need of Finance		Returns Skilled	
Ψ:	Input Sim.	Fin. Uses	R&D Intensity	Scientist	Leverage	ICT	Wages	VA/hour
Panel A. Horizon: n=5 Years								
AGFW× Ψ	-0.037***	−0.130***	−0.315***	−0.411*	0.002	0.097*	−0.024**	0.017***
	(-3.39)	(−3.66)	(−2.78)	(−1.71)	(0.03)	(1.77)	(−2.28)	(4.59)
Observations	5,827	5,827	5,009	5,009	5,009	5,400	5,827	5,827
Adjusted R^2	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.99
Panel B. Horizon: n=3 Years								
AGFW× Ψ	-0.029***	−0.084***	−0.202**	−0.271***	0.015	0.068*	−0.019**	0.011***
	(-3.00)	(−3.66)	(−2.10)	(−3.04)	(0.33)	(1.75)	(−2.29)	(3.53)
Observations	6,445	6,445	5,541	5,541	5,541	5,976	6,439	6,439
Adjusted R^2	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Country×Sector FE	X	X	X	X	X	X	X	X
Country×Year FE	X	X	X	X	X	X	X	X

Table VII: Adjusted Growth of Finance Wages and Real Outcomes: Sector Level

This table reports estimates from regressions of various measures of sectors' and countries' economic performance on the adjusted growth of finance wages (AGFW) (specification (5)). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, as defined in section II. The growth rates of the finance wage and value-added premiums are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. In columns (1)-(3) and (6)-(8), we consider three measures of sectors' performance based on the KLEMS data: output, value added, and total factor productivity (TFP). For each measure, we consider both values in levels (logs), and three-year-ahead growth rates (from year t to year $t+3$). In columns (4)-(5), we consider two measures of sectoral performance based on data from Worldscope: M/B Ratio is the average market-to-book ratio in a sector; Sales Growth is the average sales growth at a one-year horizon. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007) and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$.

Dep. Variable:	(1) Log Output	(2) Log VA	(3) TFP	(4) M/B Ratio	(5) Sales Growth	(6) ΔLog Output	(7) ΔLog VA	(8) ΔTFP
Panel A. Horizon: n=5 Years								
AGFW	0.004	0.006	0.012	−0.005	0.008	−0.000	0.003	−0.004
	(0.81)	(0.94)	(0.79)	(−0.17)	(0.31)	(−0.01)	(0.14)	(−0.15)
Observations	5,827	5,827	3,428	3,111	3,040	4,900	4,890	2,912
Adjusted R^2	0.99	0.99	0.42	0.45	0.16	0.52	0.51	0.23
Panel B. Horizon: n=3 Years								
AGFW	0.002	0.004	-0.005	−0.022	0.037	0.026	0.018	0.003
	(0.56)	(0.80)	(-0.32)	(−0.60)	(1.70)	(1.42)	(1.08)	(0.12)
Observations	6,445	6,445	3,724	3,222	3,147	5,518	5,518	3,208
Adjusted R^2	0.99	0.99	0.42	0.45	0.16	0.55	0.52	0.21
Country×Sector FE	X	X	X	X	X	X	X	X
Year FE	X	X	X	X	X	X	X	X

Table VIII: Adjusted Growth of Finance Wages and Real Outcomes: Cross-sectional Tests

This table reports estimates from various regressions of the 3-year growth of industry-level output (Panel A) and 3-year growth of industry-level value added (Panel B) on the interaction between the adjusted growth of finance wages (AGFW) in that country-year and a sector's characteristic Ψ (specification (4)). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, as defined in section II. In this table, AGFW is always measured at the 5-year horizon. The growth rates of the finance wage and value-added premiums are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. Sectors' characteristics include (1) input similarity to finance, (2) the intensity of supplies to finance, (3) R&D intensity, (4) scientists' intensity, (5) leverage ratio, (6) investment in communication and technology, (7) high-skilled wage premium, and (8) ratio of value added per hour worked in the sector. All specifications include country×sector, and country×year fixed effects, as noted at the bottom of the table. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007) and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p<0.10,^{**}p<0.05,^{***}p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Transitioning Costs		Innovativeness		Need of Finance		Returns Skilled	
Ψ:	Input Sim.	Fin. Uses	R&D Intensity	Scientist	Leverage	ICT	Wages	VA/hour
Panel A. Δ Log Industry Output								
AGFW× Ψ	0.001*	0.001	0.007	0.011	0.002	-0.003	−0.000	−0.003**
	(1.89)	(0.86)	(0.91)	(0.86)	(0.80)	(-1.44)	(−0.14)	(−2.14)
Observations	4,900	4,900	4,211	4,211	4,211	4,536	4,900	4,900
Adjusted R^2	0.51	0.51	0.53	0.49	0.53	0.54	0.54	0.54
Panel B. Δ Log Industry Value Added								
AGFW× Ψ	0.000	0.001	−0.002	−0.006	0.002	-0.002	0.000	−0.002
	(0.59)	(0.11)	(−0.20)	(−0.44)	(0.73)	(-0.64)	(0.03)	(−1.36)
Observations	4,900	4,900	4,211	4,211	4,211	4,536	4,900	4,900
Adjusted R^2	0.49	0.48	0.49	0.49	0.50	0.51	0.53	0.54
Country×Sector FE	X	X	X	X	X	X	X	X
Country×Year FE	X	X	X	X	X	X	X	X

Table IX: Adjusted Growth of Finance Wages and Real Outcomes: Country Level

This table reports estimates from regressions of various measures of sectors' and countries' economic performance on the adjusted growth of finance wages (AGFW) (specification (5)). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, as defined in section II. The growth rates of the finance wage and value-added premia are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. In columns (1) and (2), we consider countries' performance, measured using nominal GDP, both in logs and with three-year-ahead growth rates; *R&D Exp. over GDP* is the share between total R&D expenditures and GDP; *Share STEM* and *Share Business/Law* are the shares of country-year graduates in STEM fields and with business/law degrees, using data from Unesco. *Log Patents* and *Log Trademarks* are the log of patent applications and trademark applications in each country-year; *Log. Sci. Articles* is the logarithm of the number of scientific articles published by authors affiliated with institutions in the country; $High-Tech\ Export$ is the share of high-tech manufacturing exports over the total value of manufacturing exports in the country-year. These last four variables are from the World Development Indicators tables compiled by the World Bank. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007), and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p<0.10,^{**}p<0.05,^{***}p<0.01$.

Dep. Variable:	(1) Log GDP	(2) ΔLog GDP	(3) Share STEM	(4) Share Business/Law	(5) R&D Exp. over GDP	(6) Log Patents	(7) Log Trademks.	(8) Log Sci. Articles	(9) High-Tech Export
Panel A. Horizon: n=5 Years									
AGFW	0.004	0.036	0.001	−0.002	0.042*	0.035	0.032	0.013	−0.007
	(0.40)	(0.07)	(0.30)	(−0.87)	(1.85)	(0.99)	(1.52)	(0.75)	(−0.02)
Observations	450	426	107	107	199	398	396	144	326
Adjusted R^2	0.89	0.07	0.94	0.91	0.98	0.94	0.94	0.99	0.92
Panel B. Horizon: n=3 Years									
AGFW	0.000	0.050	0.003	−0.002	0.033**	0.002	0.025	0.011	0.039
	(0.05)	(1.17)	(0.96)	(−0.93)	(2.46)	(0.08)	(1.66)	(1.00)	(0.14)
Observations	498	426	111	111	210	442	438	144	342
Adjusted R^2	0.88	0.06	0.93	0.90	0.98	0.94	0.96	0.99	0.93
Country FE	X	X	X	X	X	X	X	X	X
Year FE	X	X	X	X	X	X	X	X	X

Table X: Adjusted Growth of Finance Wages and the Banking System

This table reports estimates from regressions of various measures of the riskiness, efficiency, and competitiveness of the banking sector at the country-year level on the adjusted growth of finance wages (AGFW) (specification (5)). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, as defined in section II. The growth rates of the finance wage and value-added premia are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. All outcome variables are measured at the country-year level in the *Global Financial Development Database* (version June 2016). *Provision N.P. Loans* is the total amount of provisions divided by the overall value of non-performing loans ; *Regulatory Cap/Assets* is the total amount of regulatory capital over the total amount of assets by banks operating in the country; $Bank\ Z-Score$ is the Z-Score – a proxy for the probability of default of the country's commercial banking system; $Lend-Dep.\ Spread$ is the average spread between lending interest rates and deposit interest rates; *Overhead/Assets* is the total amount of overhead expenses of banks in the country scaled by total assets; *All Costs/Income* is the share between the total costs and the net income of banks in the country; *Asset Concentration* is the sum of the assets of the three largest commercial banks in the country divided by the total assets of the banking system; *Lerner Index* is a proxy for the markup of the banking industry; $5-Bank\ Concentration$ is the sum of the assets of the five largest commercial banks in the country divided by the total assets of the banking system. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007) and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p<0.10,^{**}p<0.05,^{***}p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Riskiness			Efficiency			Competitiveness	
Dep. Variable:	Provisions N.P. Loans	Regulatory Cap./Assets	Bank Z-score	Lend-Dep. Spread	Overhead/ Assets	All Costs/ Income	Asset Concentration	Lerner Index	5-Bank Concentration
Panel A. Horizon: n=5 Years									
AGFW	0.163	0.478	0.540	−0.141	0.191	2.069	−3.893 ∗ ∗	−0.015	−1.941
	(0.02)	(0.25)	(1.45)	(−0.77)	(1.08)	(0.99)	(−2.37)	(−0.83)	(−1.62)
Observations	144	216	216	322	215	215	210	214	195
Adjusted R^2	0.57	0.56	0.72	0.54	0.59	0.77	0.94	0.19	0.83
Panel B. Horizon: n=3 Years									
AGFW	2.774	0.200	0.499	0.036	0.286	−0.022	−0.886	−0.021	−0.414
	(0.67)	(0.12)	(1.43)	(0.32)	(1.51)	(−0.02)	(−0.96)	(−0.85)	(−0.61)
Observations	150	229	229	354	228	228	223	227	208
Adjusted R^2	0.57	0.56	0.74	0.55	0.63	0.54	0.75	0.21	0.82
Country FE	X	X	X	X	X	X	X	X	X
Year FE	X	X	X	X	X	X	X	X	X

Online Appendix:
Finance, Talent Allocation, and Growth

Francesco D'Acunto and Laurent Frésard

Not for Publication

Figure A.1: AGFW and Skilled Labor in Non-finance Sectors: Non-linearity

This figure plots estimates from a regression of the share of skilled workers in a given country-sector-year on five variables delineating the quintiles of the adjusted growth of finance wages (AGFW) in that country-year, similar to the baseline specification (3). The share of skilled workers in a given country-sector-year corresponds to the fraction of workers holding a university degree (or equivalent). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value added premium is defined as the value added per skilled worker in finance relative to the average value added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value-added premia are computed over five-year horizons (from year $t-5$ to year t). The sample period is 1970-2005 and includes 24 countries. All specifications include country×sector and year fixed effects.

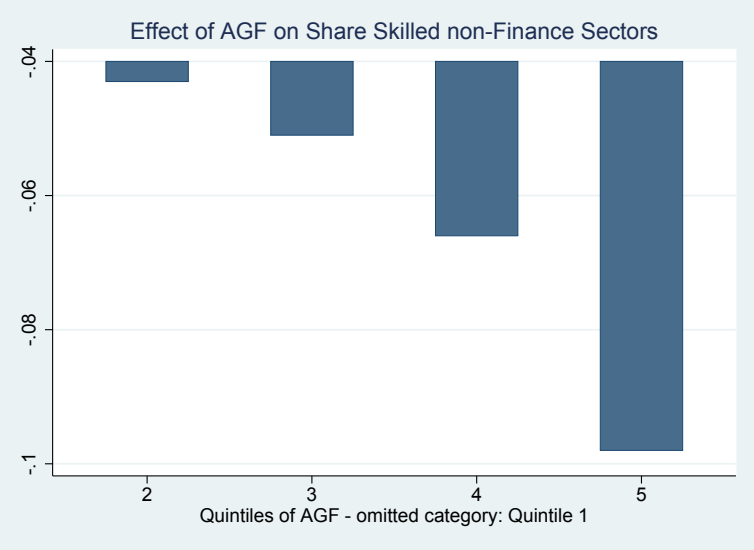


Table A.1: Adjusted Growth of Finance Wages by Country

The table displays summary statistics for the adjusted growth of finance wages (AGFW) for each country separately. The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, where the finance wage premium is computed as the average wage of skilled workers in finance relative to the average wage of skilled workers in the economy, and the finance value-added premium is defined as the value added per skilled worker in finance relative to the average value added per skilled worker in the economy (as defined in section II). The growth rates of the finance wage and value added premiums are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries.

	(1)	(2)	(3)	(4)	(5)	(6)
	n=5 Years			**n=3 Years**		
	N.obs.	Mean	St.dev.	N.obs.	Mean	St.dev.
Australia	323	0.082	0.358	357	0.046	0.254
Austria	357	0.027	0.173	391	0.018	0.167
Belgium	357	0.091	0.072	391	0.050	0.061
Czech Republic	102	0.076	0.285	136	0.058	0.222
Denmark	357	0.225	0.274	391	0.142	0.214
Spain	357	0.016	0.204	391	0.014	0.161
Finland	527	−0.047	0.312	561	−0.003	0.236
France	357	0.068	0.090	391	0.039	0.068
Germany	527	0.044	0.155	561	0.007	0.160
Greece	153	−0.008	0.077	187	0.013	0.077
Hungary	102	−0.064	0.114	136	−0.014	0.124
Ireland	221	0.126	0.249	255	0.068	0.187
Italy	527	−0.195	0.222	561	−0.112	0.161
Japan	476	0.065	0.150	510	0.039	0.116
South Korea	527	0.022	0.320	561	0.016	0.219
Luxembourg	153	−0.018	0.106	187	−0.048	0.149
Netherlands	374	0.104	0.153	408	0.062	0.145
Poland	102	0.304	0.133	136	0.213	0.160
Portugal	153	0.223	0.120	187	0.176	0.093
Slovakia	102	−0.352	0.220	136	−0.201	0.227
Slovenia	102	0.190	0.137	136	0.124	0.121
Sweden	340	0.164	0.145	374	0.093	0.130
United Kingdom	527	0.044	0.278	561	0.022	0.219
United States	527	0.037	0.112	561	0.023	0.099

Table A.2: Skilled Workers, Skilled Wage Premium, and Labor Productivity: Summary Statistics

The table displays summary statistics for the share of skilled workers and the wage premium at the country-industry-year level. The wage premium is defined as the share between the average wage of a skilled full-time employee (FTE) divided by the average wage of a full-time employee of medium or low skills. The sample period is 1970-2005 and includes 24 countries. We present statistics for the whole sample (i.e., all country-sector-year) and by subperiods.

	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Share of Skilled Workers			
	N.obs.	Mean	St.dev.	p.25	p.50	p.75
Full Sample	5,827	0.166	0.157	0.055	0.112	0.232
1975-1985	1,061	0.145	0.145	0.040	0.094	0.207
1986-1995	1,967	0.147	0.146	0.045	0.099	0.207
1996-2005	2,799	0.188	0.163	0.070	0.133	0.260
			Panel B. Wage Premium of Skilled Workers			
	N.obs.	Mean	St.dev.	p.25	p.50	p.75
Full Sample	5,827	1.740	0.366	1.551	1.724	1.869
1975-1985	1,061	1.742	0.608	1.531	1.738	1.826
1986-1995	1,967	1.709	0.266	1.562	1.713	1.849
1996-2005	2,799	1.761	0.298	1.541	1.724	1.932
			Panel C. Finance Wage Premium			
	N.obs.	Mean	St.dev.	p.25	p.50	p.75
Full Sample	358	1.576	0.322	1.350	1.506	1.719
1975-1985	67	1.572	0.454	1.230	1.373	1.845
1986-1995	122	1.536	0.286	1.323	1.407	1.719
1996-2005	169	1.606	0.279	1.428	1.534	1.699

Table A.3: **Adjusted Growth of Finance Wages and Real Outcomes: Country Level (2)**

This table reports estimates from regressions of various measures of sectors' and countries' economic performance on the adjusted growth of finance wages (AGFW) (specification (5)). The AGFW for a given country-year is defined as the difference between the growth of the finance wage premium and the growth of the finance value-added premium, as defined in section II. The growth rates of the finance wage and value-added premia are computed over five-year horizons (from year $t-5$ to year t) or over three-year horizons (from year $t-3$ to year t). The sample period is 1970-2005 and includes 24 countries. In columns (1) and (2), we consider countries' performance, measured using nominal GDP, both in logs and with three-year-ahead growth rates. In columns (3), (4), and (5), we consider the share of country-year graduates in STEM fields, services fields, and business and law degrees, using data from Unesco. In columns (6) and (7), we consider the log of patent applications and trademark applications in each country-year, and in column (8), the logarithm of the number of scientific articles published by authors affiliated with institutions in the country. The last three variables are from the World Development Indicators tables compiled by the World Bank. Across all specifications, standard errors are clustered at the country level, and the corresponding t-statistics are reported in parentheses below the coefficients. We follow Donald and Lang (2007), and assess statistical significance using the critical values from a t(24) distribution to account for the small number of clusters. Statistical significance is reported as follows: $^{*}p<0.10,^{**}p<0.05,^{***}p<0.01$.

Dep. Variable:	(1) Share Services	(2) R&D Technicians p.c.	(3) R&D Researchers p.c.	(4) Patents p.c. Residents	(5) Patents p.c. Non-residents	(6) Patents p.c. All	(7) Sci. Articles p.c.	(8) GDP p.c.
				Panel A. Horizon: n=5 Years				
AGFW	0.009	−0.009	0.007	−0.126	0.025	−0.034	−0.034∗	208.2
	(1.11)	(−0.61)	(1.44)	(−1.44)	(0.94)	(−0.69)	(−1.75)	(0.80)
Observations	107	117	188	419	420	419	398	450
Adjusted R^2	0.88	0.99	0.99	0.87	0.53	0.78	0.98	0.92
				Panel B. Horizon: n=3 Years				
AGFW	0.003	0.008	0.006∗	−0.092	0.002	−0.037	−0.015	42.36
	(0.96)	(0.94)	(1.72)	(−1.55)	(0.09)	(−1.06)	(−1.12)	(0.25)
Observations	111	128	199	465	466	465	410	498
Adjusted R^2	0.86	0.99	0.99	0.85	0.47	0.74	0.98	0.93
Country FE	X	X	X	X	X	X	X	X
Year FE	X	X	X	X	X	X	X	X