RAPID EARNINGS GROWTH IN FINANCE CONCENTRATES TOP EARNINGS IN A FEW LARGE CITIES

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Rapid earnings growth in finance concentrates top earnings in a few large cities[#]

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Abstract

Since the 1980s, disproportionate top earnings growth in large cities has fueled a resurgence in the spatial concentration of top earnings across countries in the global North. Research attributes this trend to national top earnings growth or globalization but has left unanswered how national growth translates into local gains and why this phenomenon occurs in cities less central to the global economy. In this article, we show that dramatic earnings growth in finance since the 1980s has concentrated top earnings in the few cities where financial sector jobs cluster. Using administrative linked employer-employee data for 10 countries in the Global North from 1989 to 2019, we show that this pattern extends beyond major global cities to smaller financial cities. A comparison of financial cities with similar domestic cities shows that this effect is not just a byproduct of urban growth. We thus highlight the independent role of urban sectoral specialization and sectors' labor markets in shaping the spatial concentration of top earnings.

1. Introduction

Since about 1980, disproportionate earnings growth for the highest-paid individuals in the most affluent cities has led to a spatial concentration of top earnings in countries of the Global North.[1–5] As top earnings grew disproportionately in large cities, the increasingly heavy tails of their earnings distributions reinforced the superlinear relationship between the scale of cities and both earnings levels and inequality.[6,7] This period of rising spatial concentration of top earnings in large cities contrasts sharply with the post-war period, when broadly shared earnings growth led to a convergence of earnings levels across regions and a decline in both national and urban inequality.[8–10] The implications of this trend are profound. Mobility scholars provide compelling evidence that the concentration of top earnings undermines equality of opportunity, as the economic conditions of communities shape the life chances of children.[11,12] Political scientists worry that the spatial concentration of advantages fosters political fragmentation and disenfranchisement, fueling the rise of reactionary populist movements.[13,14]

Existing research explains the increasing concentration of top earnings in large cities as a spatial articulation of national or global trends. One explanation emphasizes national trends: because earnings groups are unevenly distributed across locations, rising national top earnings lead to spatially uneven growth in local top earnings.[1,4] However, this statistical explanation does not address the social processes driving disproportionate top earnings growth in large cities. Skill-biased technical change explanations of inequality could suggest one such process, predicting that the increasing skill bias of large agglomeration economies increases the urban wage premium for high-skilled workers in large cities while reducing urban wage premia for middle- and low-skilled workers.[3,15–17] A complementary perspective would suggest sorting: highly educated individuals and productive firms increasingly cluster in amenity-rich "superstar cities," where rising housing costs displace low-skilled workers.[18–22] However, these perspectives do not explain differences in the evolution of top earnings across large metropolitan areas. Research in economic geography suggests that differences in the economic specialization of cities, such as in information technology, drive divergence across metropolitan areas of similar size.[23–25]

A second explanation for the increasing spatial concentration of top earnings emphasizes the sectoral specialization of "global cities" that emerges in the most recent cycle of capitalist globalization. Saskia Sassen[26,27] argues that global cities specialize as centers of advanced producer services - such as consulting, legal services, and finance - that perform the key coordinating functions of global capitalism. This process attracts high-wage professionals while expanding low-wage service jobs, deepening earnings polarization within these cities and widening the gap with deindustrializing cities and rural areas. Recent empirical research, however, shows that the occupational structure of global cities such as New York, Paris, and Tokyo is becoming increasingly professionalized, with high-skilled roles gaining in importance, rather than increasing polarization between high- and low-wage occupations.[28,29] Moreover, if globalization is driving the concentration of top earnings in global cities, it remains unclear why similar patterns are emerging in cities and countries that are less central to the global economy.[30]

In this article, we propose an alternative explanation for the resurgence of the spatial concentration of top earnings in countries of the global North. Bridging the literature on financialization and spatial inequality, we show that dramatic earnings growth in finance has concentrated top earnings in the few cities where financial sector jobs are clustered. While earnings growth in finance is widely recognized as a driver of national earnings concentration,[31–34] we show that it is also an important mechanism explaining the confluence of rising national top earnings and spatially concentrated local top earnings growth. Complementing existing frameworks of spatial inequality focused on skill-based sorting and the skill bias of agglomeration economies, these results point to the importance of cities' sectoral specialization and the labor market dynamics within these sectors in explaining the resurgence of the spatial concentration of top earnings.

We demonstrate this using a unique collection of administrative linked employer-employee earnings records with over one billion employer-employee year observations. Spanning ten countries (Canada, Denmark, Sweden, Norway, France, Germany, the Netherlands, Spain, the United States, and Japan), these data cover the entire labor force in most countries and representative samples of 4-8% in Germany, Spain, and Japan. To isolate the

effect of growth in financial sector earnings, we follow the spirit of difference-in-differences analysis to compare trends in financial cities to those in the most similar cities in the same country. Our results show that the effect of financial sector earnings growth on the spatial concentration of top earnings is not limited to major global cities such as New York, Paris, and Tokyo, but also applies to cities that are less central to the global economy such as Frankfurt, Toronto, Stockholm, Oslo, Amsterdam, Madrid, and Copenhagen.

2. Financial cities and the rise in the spatial concentration of top earnings

In this section, we document trends in the spatial concentration of top earnings in financial cities - a term we use as a shorthand for the cities that host a country's main stock exchange and a relative majority of financial sector jobs. Building on research that has documented the increasing dispersion of top incomes between states, commuting zones, and counties, as well as rapidly rising income inequality within large cities,[1–5,16] we focus on three dimensions. First, we examine how much of the increase in national earnings concentration has occurred in financial cities; second, we measure how much national top earnings have become concentrated in financial cities; and third, we document increases in urban earnings concentration within financial cities. The central question is not so much whether top earnings concentration has increased along these dimensions, but rather by how much, especially relative to comparison cities, which we identify as those cities in the same country that are most similar to financial cities in terms of GDP and employment share. Because the trends we document in this section reflect both financial and non-financial factors, we assess the contribution of financial sector jobs in section 3.

Table 1. Absolute contribution of financial and comparison cities to growth in national top 1% earnings shares

Country	Year top 1% min	Year top 1% max	Annual growth of the national top 1% earnings shares, %	Financial cities				Comparison cities			
				City	Contribution to top 1% growth	Contribution rescaled, %	Employment share (start), %	City	Contribution to top 1% growth	Contribution rescaled, %	Employment share (start), %
Sweden	1990	2007	+0.07 [0.07,0.07]	Stockholm	103 [99,107]	85 [82,89]	12.1	Gothenburg	9.2 [8.4,10]	15 [13.7,16.3]	6.1
Spain	2006	2015	+0.08 [0.05,0.12]	Madrid	120 [75,219]	66 [41,121]	18.1	Barcelona	33.5 [15.8,66.4]	22.7 [10.7,45]	14.8
Japan	1997	2009	+0.06 [0.06,0.06]	Tokyo	87 [83,91]	58 [56,61]	14.9	Osaka	-18 [-18.9,-17.2]	-22 [-23,-21]	8.2
Denmark	1994	2018	+0.05 [0.05,0.05]	Copenhagen	62 [58,66]	49 [46,53]	12.5	Aarhus	5.1 [4.3,6]	8.4 [7.1,9.7]	6.1
Netherlands	2009	2015	+0.18 [0.17,0.19]	Amsterdam	31 [27,35]	43 [38,49]	7.2	Rotterdam	10.5 [9.2,12]	26.1 [22.7,29.8]	4
France	1993	2018	+0.08 [0.08,0.08]	Paris	107 [104,109]	41 [40,42]	25.8	Lyon	1.4 [1.1,1.7]	4.1 [3.3,4.9]	3.4
Norway	1996	2007	+0.11 [0.1,0.11]	Oslo	62 [57,68]	35 [32,38]	17.7	Bergen	3.4 [2.1,4.6]	5.6 [3.6,7.8]	6
Germany	1992	1998	+0.33 [0.32,0.34]	Frankfurt	5 [5,5]	33 [31,34]	1.5	Hamburg	4.7 [4.4,5]	19.7 [18.4,21]	2.4
Canada	1992	2006	+0.31 [0.3,0.32]	Toronto	30 [28,32]	20 [19,21]	15.2	Montréal	3.8 [3.3,4.4]	3.3 [2.8,3.7]	11.7
United States	1989	2012	+0.46 [0.46,0.47]	New York	10 [10,11]	15 [15,16]	6.7	Los Angeles	3.4 [3.1,3.6]	7.7 [7.1,8.3]	4.4
Weighted mean	1994	2011	+0.17 [0.17,0.17]		65 [62,71]	44 [42,48]	14.3		4.6 [3.4,6.7]	7.3 [5.5,10.7]	6.4

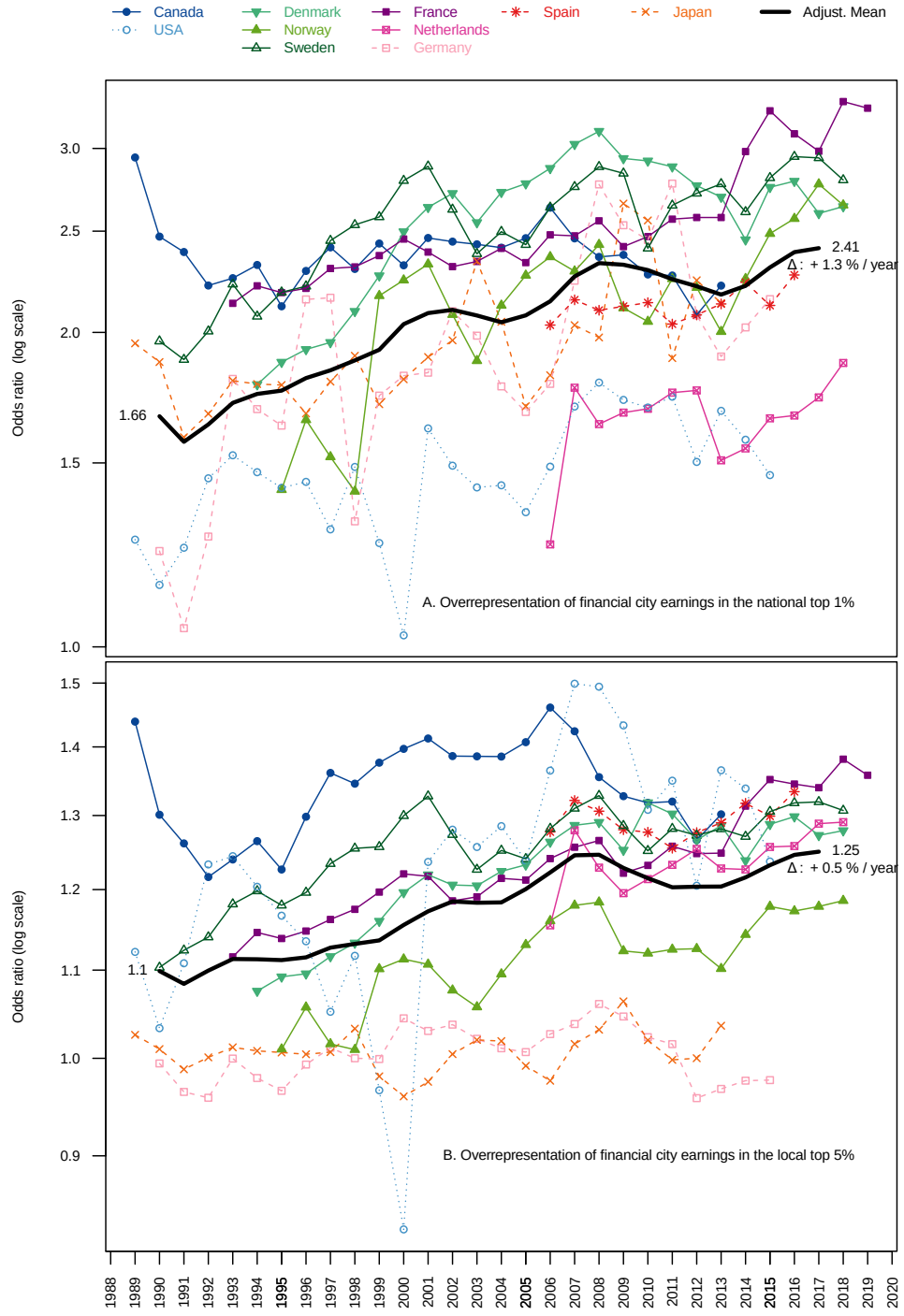
Note: We measure the absolute contribution of the two cities during the period of maximum growth in the national top 1% earnings share, e.g., between the year when the top 1% is at its minimum and the year when it is at its maximum. In Sweden between 1990 and 2007, a period in which the national top 1% earnings share increased by 0.07 percentage points per year, 103% of this increase is accounted for by the top 1% earners working in Stockholm. If we rescale the contribution of the financial city so that Stockholm accounts for 10% of the workforce, Stockholm accounts for 85% of the increase in the national top 1% earnings share. The table is ordered according to the financial city's column "Contribution rescaled". The weighted averages in the bottom row are weighted by the number of years of the period of increasing earnings concentration. 95% confidence intervals are shown in square brackets (Appendix D).

We begin by examining how much of the increase in the earnings share of the national top 1% is accounted for by the earnings of individuals working in financial cities. The period over which national top earnings shares increased in each country is easily identified by taking the year of the national minimum of the top 1% earnings share as the first year and the year of the maximum as the last year. During these periods, as shown in Table 1, national top 1% earnings shares increased significantly in all countries, with increases ranging from 0.06 percentage points per year in Japan to 0.46 percentage points per year in the United States. We calculate the contribution of financial cities to the increase in national earnings concentration as the share of the total increase in the national top 1% earnings share that is explained by the increase in the earnings of individuals in the financial city who are in the national top 1% (see equations 1-3).

The column "Contribution to top 1% growth" shows that individuals working in financial cities account for major shares of the increases in national earnings concentration. On average, national top 1% earners working in financial cities account for 65% of the increase in national top 1% earnings shares. While the positive contribution is unsurprising, the magnitude is remarkable: in some countries, financial cities account for up to 100% of the increase in top earnings shares, implying a net zero or minimal contribution from individuals elsewhere.

To adjust for differences in city size when comparing the contributions of financial and comparison cities, we rescale the contributions of each city by its employment share and estimate its contribution as if it represented 10% of the employed population at the beginning of the period. Even with this rescaling, individuals in financial cities contribute significantly to the growth of top 1% earnings shares, with their contributions consistently exceeding the scaling factor (i.e., 10%). On average, individuals in financial cities contribute six times more to the growth of top earnings shares than individuals in comparison cities. While these decomposition results also reflect changes in city size and the rescaling does not capture the superlinear relationship between population size and earnings levels, the results show that financial cities account for a much larger share of the rise in national earnings concentration than their population size would suggest.

Figure 1. Overrepresentation of financial cities in national and local top earnings share



Note: Panel A shows the overrepresentation of financial city earnings relative to comparison city earnings in the national top 1% of earnings share. It is the odds ratio of two local earnings shares: the share of the financial city's earnings above the national top 1% threshold, and the share of the comparison city's earnings above the same threshold (see Measures and Methods, equation 5). In 1990, earnings in financial cities were on average 1.7 times more likely to be in the national top 1% than those in comparison cities. In 2017, this average odds ratio increases to 2.4 at a growth rate of 1.3% per year.

Panel B shows the overrepresentation of financial city earnings relative to comparison city earnings in local top 5% earnings shares. It is computed similarly to the previous one, replacing the national top 1% threshold with city-specific local top 5% thresholds. It shows that the

overrepresentation of the top 5% in urban earnings in financial cities over comparison cities increased from 1.10 in 1990 to 1.3 in 2017, a growth rate of 0.5% per year.

To measure the relative concentration of national top earnings in financial cities compared to comparison cities, as well as compare urban earnings concentration of cities, Figure 1 presents measures that we call the *overrepresentation of financial cities' earnings* in national (Panel A) and urban (Panel B) top earnings shares.

Figure 1A measures the overrepresentation of financial cities' earnings in national top 1% earnings shares (see Measures and Methods, equation 5). This measure is the odds ratio of two proportions: the share of total local earnings in the financial city earned by workers in the national top 1% earnings bracket, relative to the corresponding share in the comparison city. Figure G1 shows time trends of the two local earnings shares. In all countries, national top earnings are more concentrated in financial cities than in comparison cities, with odds ratios ranging from 1 to 3.6. In 1990, the earnings of the national top 1% were on average 1.7 times overrepresented in financial cities compared to comparison cities. By 2017, this overrepresentation had increased significantly to an average odds ratio of 2.4, representing an annual growth rate of about 1.3%. We observe a significant upward trend in all countries except Canada (see Table F1). Here too, the magnitude of the increase is substantial, demonstrating a substantial rise in the spatial concentration of national top earnings in financial cities relative to comparison cities, accounting for differences in total earnings between the two areas.

Figure 1B measures the over-representation of financial cities in urban top 5% earnings shares. Analogous to the national-level measure, we compute an odds ratio comparing two local earnings shares: the share of total local earnings earned by individuals in the urban top 5% in the financial city relative to the corresponding share in the comparison city (see Measures and Methods, equation 5). Figure G2 shows time trends of urban top 5% earnings shares. This measure compares urban earnings concentration between the financial and comparison cities, accounting for differences in total local earnings. It shows that in almost all countries, urban earnings concentration is significantly higher in financial cities. Only in Japan and Germany are the levels of urban earnings concentration similar in the two cities, with odds ratios ranging from

0.96 to 1.04. Moreover, the magnitude of the divergence in urban earnings concentration between financial and comparison cities increases substantially over time, with linear trends positive for all countries and statistically significant for more than half (see Table F1). These findings are broadly consistent with previous research showing that larger cities tend to have higher levels and faster increases in urban inequality.[35] However, we provide new evidence by measuring urban earnings concentration rather than urban inequality in general. More importantly, we show that the growing divergence in urban earnings concentration between financial and comparison cities is not simply a reflection of changes in their relative size - Figure G8 shows that the employment shares of cities have remained remarkably stable over this period. In sum, financial cities account for large increases in national earnings concentration, increasingly concentrate an outsized share of national top earnings and exhibit much faster growth in urban earnings concentration relative to the city in the same country that is most similar in terms of employment and GDP share, net of differences in total earnings.

3. Earnings growth of financial sector jobs and the rise in the spatial concentration of top earnings in financial cities

Research shows that earnings growth of financial sector jobs is a key driver of national earnings concentration and thus likely of top earnings concentrations in financial cities,[33,34] but to what extent does it explain the trend of increasing spatial concentration of top earnings in financial cities that we documented in the previous section?

Using our linked employer-employee data, we first conduct a decomposition of the rise in the national top 1% and urban top 5% earnings share to identify the contribution of financial sector jobs in financial and comparison cities (Equations 8 and 9).

Table 2. Absolute contribution of finance earnings to urban and national earnings concentration

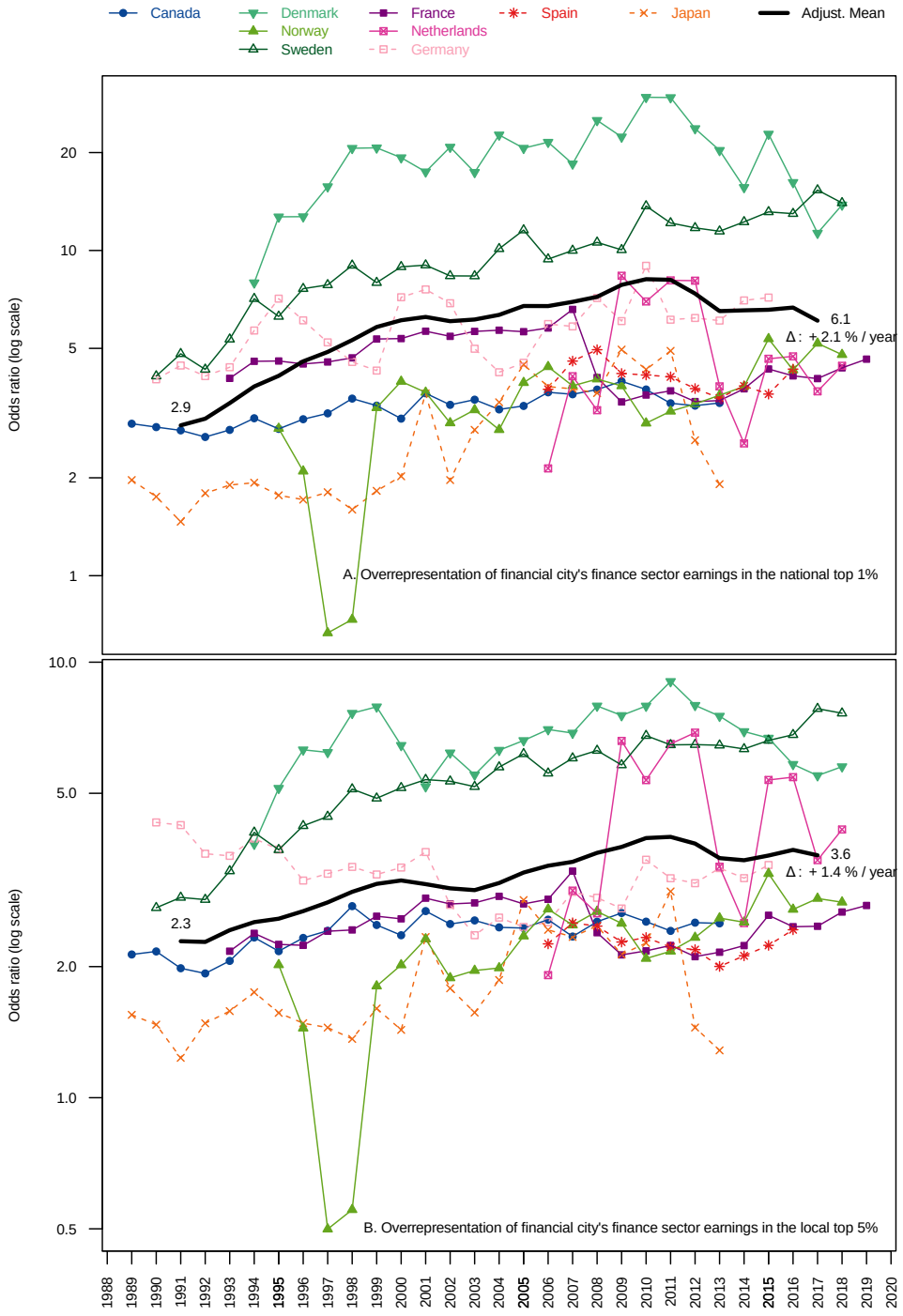
			Financial cities					Comparison cities				
			Finance earnings' contribution to the:			Annual growth of top 5% earnings shares, %		Finance earnings' contribution to the			Annual growth of top 5% earnings shares, %	
Country	Period	City	increase in national top 1%, %	increase in national top 1% rescaled, %	increase in local top 5%, %		City	increase in national top 1%, %	increase in national top 1% rescaled, %	increase in local top 5%, %		
Sweden	1990-2007	Stockholm	46 [44,48]	38 [37,40]	69 [66,72]	+ 0.25 [0.24,0.26]	Gothenburg	1 [0.7,1.2]	2 [1,2]	9 [8,10]	+ 0.1 [0.1,0.11]	
Spain	2006-2015	Madrid	47 [23,92]	26 [13,51]	63 [37,137]	+ 0.23 [0.11,0.35]	Barcelona	9.7 [5.5,18.2]	7 [4,12]	41 [27,86]	+ 0.17 [0.08,0.25]	
Japan	1997-2009	Tokyo	6 [4,7]	4 [3,5]	4 [2,6]	+ 0.14 [0.13,0.15]	Osaka	-10.1 [-10.5,-9.7]	-12 [-13,-12]	-55 [-65,-48]	+ 0.08 [0.07,0.1]	
Denmark	1994-2018	Copenhagen	21 [20,23]	17 [16,18]	48 [45,51]	+ 0.14 [0.13,0.15]	Aarhus	0.5 [0.3,0.6]	1 [1,1]	15 [13,18]	+ 0.05 [0.04,0.06]	
Netherlands	2009-2015	Amsterdam	13 [11,15]	18 [16,21]	78 [68,92]	+ 0.47 [0.41,0.54]	Rotterdam	2.8 [2.4,3.3]	7 [6,8]	35 [30,43]	+ 0.3 [0.24,0.35]	
France	1993-2018	Paris	44 [43,45]	17 [17,18]	60 [58,61]	+ 0.2 [0.19,0.2]	Lyon	1.2 [1.1,1.2]	3 [3,4]	69 [61,80]	+ 0.06 [0.05,0.06]	
Norway	1996-2007	Oslo	32 [30,36]	18 [17,20]	62 [57,68]	+ 0.29 [0.26,0.31]	Bergen	1.3 [0.9,1.6]	2 [1,3]	17 [14,20]	+ 0.15 [0.13,0.18]	
Germany	1992-1998	Frankfurt	2 [1,2]	11 [10,11]	39 [36,42]	+ 0.75 [0.7,0.8]	Hamburg	0.4 [0.4,0.4]	2 [2,2]	15 [14,16]	+ 0.68 [0.63,0.73]	
Canada	1992-2006	Toronto	17 [15,18]	11 [10,12]	51 [47,54]	+ 0.55 [0.52,0.58]	Montréal	1.8 [1.4,2.1]	1 [1,2]	31 [29,34]	+ 0.27 [0.25,0.29]	
1995-2012	1995-2012	Weighted mean	29 [27,32]	19 [17,21]	53 [50,58]	+ 0.28 [0.27,0.29]		0.7 [0.3,1.3]	1 [1,3]	23 [21,27]	+ 0.15 [0.14,0.16]	

Note: Stockholm's financial sector employees in the national top 1% contributed 46% of the national top 1% earnings increase (see Table 1 for the size of this increase). Rescaling the size of Stockholm so that it represents 10% of the workforce at the beginning of the period yields a contribution of 38%. Stockholm's financial sector employees in the local top 5% also accounted for 69% of the increase in the urban top 5% earnings share, an increase which amounts to 0.25 percentage points per year between 1990 and 2007. The table is ordered according to Table 1. The weighted averages in the bottom row are weighted by the number of years in the growth period of national earnings concentration, as in Table 1. 95% confidence intervals are shown in square brackets (Appendix D).

Table 2 shows that, on average, financial sector jobs in financial cities account for 29% of the increase in national top 1% earnings shares, with contributions ranging from 2% in Frankfurt to 47% in Madrid. The magnitude of this effect is substantial—had earnings in financial-sector jobs within financial cities not increased (assuming no second-order effects), the increase in national top 1% earnings shares would have been about one-third smaller on average. In comparison cities, the financial sector contributes much less to the growth of the national top 1% than in financial cities. Their contribution is only 0.7% on average. After rescaling the two cities to a 10% employment share at the beginning of the period, the contrast between the contribution of financial sector jobs in the financial cities (19%) and in the comparison cities (1%) remains very large.

Financial sector jobs in the financial cities also account for a staggering 52% of the increase in the urban top 5% earnings share on average, with the absolute contribution of financial sector jobs ranging from 4% in Tokyo to 78% in Amsterdam. In the comparison cities financial sector jobs account for a much smaller share of the increase in the urban top 5% earnings share, 23% on average. In all but one country (France), the earnings of financial sector employees account for a larger absolute share of the increase in urban earnings concentration in the financial city than in the comparison city. Like in Table 1, the measures in Table 2 are limited to the period of top earnings growth and are sensitive to population size change.

Figure 2. Overrepresentation of financial cities' finance sector in national and local top earnings share



Note: Figure 2 shows the overrepresentation of financial sector earnings from financial city over those from comparison cities in national top 1% and urban top 5% earnings. Figure 2A is the odds ratio of two local earnings shares: the earnings share of finance sector employees above the national top 1% threshold in financial cities and that in comparison cities. Figure 2B shows a similar ratio using the local top 5% threshold instead.

We show in Figure 2 indicators of the relative over-representation of financial sector jobs from financial cities in national and urban top earnings shares (equation 10). Figure 2A shows that the earnings of financial sector jobs

from financial cities are significantly overrepresented in the national top 1% compared to those from comparison cities, with odds ratios ranging from 1 to 20. This over-representation is increasing rapidly everywhere, with an average annual rate of increase of 2.1% per year, which is higher than the 1.3% observed in Figure 1A, indicating the large contribution of financial sector jobs to the growing gap between the two types of cities. The picture is similar when we look at urban earnings concentration (Figure 2B). The earnings of financial sector jobs are significantly overrepresented in the urban top 5% of financial cities compared to comparison cities, with odds ratios ranging from 1 to 10, and the average annual rate of increase is 1.4% per year, again a significantly higher rate than in Figure 1B (+0.5%).

Finally, we identify the share of the increase in the concentration of national top earnings in financial cities and the increase in urban earnings concentration in financial cities relative to comparison cities that is attributable to financial sector jobs. We calculate the difference between two versions of our measures of the overrepresentation of financial city earnings in national and urban top earnings shares: one version includes earnings from financial sector jobs, while the other excludes them. In Figures G3A and G3B, and in the third and fourth columns of Table G1, we replot the relative overrepresentation of financial city earnings in the national top 1% and in the urban top 5% as in Figure 1 excluding financial sector jobs from the sample. These graphs show that when excluding financial sector jobs, the increase in the concentration of national top 1% earnings in financial cities, as well as urban earnings concentration relative to the comparison cities is significantly reduced. Comparing the first and last two columns of Table A2, Panel A shows that financial sector earnings account for 29% (e.g., 1 - 0.93 / 1.31) of the increase in the concentration of national top 1% earnings in financial centers and 28% (e.g., 1 - 0.29 / 0.40) of the increase in urban top 5% earnings shares relative to comparison cities.

4. Assessing the association with financial market activities

A simple explanation for why the financial sector contributes more to the spatial concentration of top earnings in financial cities than in comparison cities is that the financial sector is larger and generates a larger financial wage

premium in financial cities. In both types of cities, the financial sector provides local banking and credit services to households and firms, but in financial cities it also performs national and international functions, such as coordinating financial market transactions. This leads to a concentration of financial market workers, including traders and investment bankers, whose bonuses rose sharply, especially in the 1990s. Unfortunately, our occupational data are not detailed enough to separate financial market functions from those in banking and insurance more generally, except in France, where financial market occupations are highly concentrated in the Paris region and hardly present in Lyon (Figure G4). In France 85% of the French financial market managers work in Paris and only 1.5% in the comparison city Lyon, a contrast much sharper than for commercial banking managers (40% vs 4.5%) or all financial sector jobs (22% vs 3.3%). Thus, financial cities are more likely than comparison cities to be shaped by the dramatic growth in financial market activities as shown by the sharp +6.5% yearly increase in stock market total value traded to GDP during the period (Figure G5). We would therefore expect the concentration of top earnings in financial cities relative to comparison cities to be associated with indicators of financial market activity within countries.

To identify the association between the evolution of the spatial concentration of top earnings in financial cities relative to comparison cities and financial market activity, we extend our structured city comparison with country-level panel regressions controlling for time-varying confounders (equation 11). In Table 3, we present country-level panel regressions with country and year fixed effects with two main dependent variables, the overrepresentation of financial cities in national and urban top earnings share, as measured by the top 1%, 5%, and 10% thresholds (Figures 1, G6 and G7). All models in Panels A and B of Table 3 include control variables for the log of national population size, the log of GDP per capita, the difference in employment share in financial and comparison cities, and foreign direct investment (FDI) outflows to GDP as a measure of a country's involvement in the coordination of the global economy.

Table 3. The effect of financial market activity indicators on financial city earnings overrepresentation in national and local top earnings share

	Overrepresentation of financial city earnings in national top shares (log)			Overrepresentation of financial city earnings in local top shares (log)		
	Top 10%	Top 5%	Top 1%	Top 10%	Top 5%	Top 1%
Panel A (n=214, 31 years, 10 countries)						
Population (log)	-0.52***	-0.65***	-0.42**	0.22**	0.18	0.04
	(0.12)	(0.13)	(0.20)	(0.10)	(0.12)	(0.18)
GDP per capita (log)	-0.06	-0.07	0.28*	0.009	0.04	0.23
	(0.06)	(0.08)	(0.16)	(0.13)	(0.16)	(0.19)
Difference between employment shares in financial and comparison cities	-0.07	-0.09**	-0.13**	-0.06**	-0.08**	-0.13*
	(0.04)	(0.04)	(0.06)	(0.03)	(0.03)	(0.07)
FDI outflow (stock) to GDP	-0.12*	-0.08	-0.03	0.02	0.08	0.05
	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)
Stock-market volume to GDP	0.38**	0.25*	-0.03	0.39***	0.24	0.13
	(0.15)	(0.13)	(0.19)	(0.14)	(0.16)	(0.19)
Panel B (n=203, 31 years, 9 countries)						
Population (log)	-0.66***	-0.69***	-0.41**	0.08	0.12	-0.006
	(0.14)	(0.13)	(0.17)	(0.12)	(0.14)	(0.17)
GDP per capita (log)	-0.05	-0.09	-0.13***	-0.06	-0.08	-0.11
	(0.06)	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)
Difference between employment shares in financial cities and comparison cities	-0.22**	-0.19**	0.23	-0.09	0.03	0.23
	(0.08)	(0.07)	(0.14)	(0.13)	(0.15)	(0.18)
FDI outflow (stock) to GDP	-0.14**	-0.11**	-0.05	0.11	0.08	-0.01
	(0.05)	(0.05)	(0.04)	(0.07)	(0.06)	(0.04)
Difference between urban earnings share of financiers in financial and comparison cities	0.14***	0.13***	0.14***	0.20***	0.19***	0.18***
	(0.04)	(0.04)	(0.04)	(0.06)	(0.05)	(0.05)

Note: We estimate the following models $log(y_{ct}) = \delta.financial\_market\_activity_{ct} + X_{ct}.\beta + c + t + u$ using OLS with c country and t year fixed effects. All variables are country-standardized with a country-demeaned standard deviation. All independent variables are lagged, except for earnings shares. For Panel B, we do not include the United States because the US data do not disaggregate between financial and non-financial earnings. A 1 standard deviation increase in stock market volume to GDP is associated with a 0.38 standard deviation increase in the overrepresentation of financial city earnings relative to comparison cities in top 10% earnings share. Driscoll-Kraay robust standard errors in parentheses. ***$p < .01$, **$p < .05$, *$p < .1$.

In Panel A, we first use the indicator stock market volume to GDP as a measure of the centrality of the trade in financial instruments on financial markets in the domestic economy. Previous literature identifying the effect of financialization on inequality has found this variable to be a key predictor of national income concentration.[31,33] Panel A shows that our measure of financial

market activity does contribute positively and significantly to both national and local inequality, but the association becomes weaker for higher earnings groups and is not significant for the top 1% nationally and the top 5 and 1% locally. A one standard deviation increase in the ratio of stocks traded to GDP is associated with a 0.4 standard deviation increase in the overrepresentation of financial cities earnings in both the national and urban top 10% shares, and a 0.25 standard deviation increase in the top 5% shares.

In Panel B, we estimate the same model as in Panel A, but we replace the stock market volume to GDP indicator with an indicator that captures the difference between the local earnings share of financial sector jobs in financial cities and in comparison cities. This measure captures the difference in the earnings levels and size of the financial sector in the two metro areas and is a proxy for the extent to which the financial sector in the financial city exceeds the local banking activities found in many places. This measure is positive and highly significant for both national and local inequality at all three included earnings thresholds. An increase of one standard deviation in the difference of the financial earnings share between financial and comparison cities is associated with an increase in the overrepresentation of financial cities earnings by 0.1 standard deviations in national top earnings shares and by 0.2 standard deviations in urban top earnings shares. The positive association of financial market activity is particularly noteworthy because the variables proxying scale and the involvement of countries in the coordination of the global economy yield either negative or insignificant estimates. In Table F2, we present additional models with different specifications, different proxies for financial activity and globalization, and obtain similar results. We discuss these results in more detail in Section A4.

5. Discussion

Using administrative linked employer-employee data from 10 countries, we document that rapid earnings growth in the financial sector is driving an increasing spatial concentration of top earnings in financial cities. While these cities are among the largest and most economically important in the global North, their employment shares remain remarkably stable over the period we study (Figure G8), and differences in employment shares do not explain the

differences in the concentration of national top earnings and urban earnings concentration between the two types of cities (Table 3). Our research thus suggests that the disproportionate growth of top earnings in large cities is explained to a large extent by the sectoral specialization of cities and the labor market dynamics of the sectors in which they specialize.

Our findings are consistent with some key predictions from the literature on global cities and spatial inequality but diverge in important ways. First, consistent with recent studies of spatial inequality, we show that national top earnings growth exacerbates the spatial concentration of top earnings when earnings groups are unevenly distributed across space.[1,3,4] However, by showing that earnings growth in finance is a key mechanism relating national top earnings growth to uneven local top earnings growth, we highlight the importance of studying the social processes underlying this relationship. While earnings growth in finance is one, it is not the only mechanism linking national top earnings growth to uneven local top earnings growth. Other industries that are spatially concentrated and have experienced disproportionate earnings growth are likely to contribute to the increasing spatial concentration of top earnings, suggesting that a similar framework could be applied to these cases.[24]

Second, consistent with the global cities literature, we emphasize that capital concentration and the economic specialization of cities in advanced producer services are important drivers of spatial concentration of top earnings. However, by focusing on financial firms we draw attention to the special role of a particular type of advanced producer services firm. Moreover, we shift the focus from globalization to financialization, as the process that we document also occurs in countries where the financial city would not qualify as a major global city, such as Oslo, Stockholm, Copenhagen, or Madrid.

Several sectoral mechanisms may explain the concentrated earnings growth in finance: the expansion of the financial sector or rising financial wage premia due to either increased rent extraction or the sorting of high-skilled workers into financial sector jobs within major financial cities. Research has highlighted the importance of the first two factors, showing that the financial sector has grown substantially[36] and that financial wage premia are driven by firm dynamics and rent extraction rather than human capital.[37,38] We invite future research to investigate the relative importance of these mechanisms in

explaining the contribution of finance to the spatial concentration of top earnings.

Limitations

Our analysis does not directly account for differences in the cost of living across locations, but prior research has identified mixed effects of inflation heterogeneity on regional inequality in real earnings. Moretti[39] finds that college graduates living in expensive cities faced higher cost-of-living increases, suggesting that their real earnings growth relative to non-urban workers may have lagged behind nominal growth since 1980. In contrast, Diamond[18] finds that improved amenities in high-skill cities have offset increases in the cost of living, resulting in a real college wage premium that exceeds the nominal premium. Similarly, Diamond and Moretti's[40] study of U.S. commuting zones finds that geographic cost-of-living differences primarily affect low-income households, while high-skilled workers maintain comparable living standards across locations. Crucially, our research design focuses on comparing cities within countries which often have similar costs of living, minimizing the influence of regional cost-of-living differences on our results.

We measure earnings as annual pre-tax earnings, which may introduce bias in the estimation of national and local disposable earnings concentration due to progressive income taxation[1] and if the taxation of high earnings varies across places. Among the countries in our study, only Canada and the United States have significant regional tax differences due to provincial and state taxes. In Canada, high-income earners face higher taxes in Ontario than in other provinces, while in the United States, New York imposes higher taxes than most states. Consequently, post-tax measures would likely moderate our findings for earnings concentration in cities relative to the rest of the countries, but less so for the relative measures comparing cities. This limitation is less critical to our analysis because regional tax differences are relatively small compared to cross-country differences in tax rates.

Finally, our results highlight significant cross-country differences in the evolution of the spatial concentration of top earnings and the role of finance, which we do not systematically analyze. We highlight three forms of variation. First, there is a contrast in the evolution of the spatial concentration of top

earnings between countries such as Spain, Sweden, and Denmark, where financial cities and financial sector jobs contribute substantially to modest increases in the spatial concentration of top earnings, and countries such as Germany, the United States, and Canada, where financial cities play a smaller role in much larger increases in the spatial concentration of top earnings. Second, levels of the concentration of top earnings are particularly high in Stockholm, Oslo and Madrid, due to the outsized role these cities play in highly centralized national economies. In contrast, Germany, Canada, and the United States have much lower levels of spatial concentration of top earnings in financial cities, reflecting more decentralized economies shaped by histories of federalism. Third, in North America finance contributed significantly to rising inequality in the late 1980s, but as wage-setting norms from finance spread to other sectors, especially technology, the distinctive financial wage premium attenuated. Meanwhile, in Scandinavian countries finance remained a niche sector with exceptionally high wages and limited spillovers to other sectors. These patterns underscore how national institutional arrangements shape the spatial and sectoral dynamics of top earnings concentration.

6. Data, measures, and methods

We use administrative linked employer-employee data for nine countries: Canada, Denmark, Sweden, Norway, France, Germany, Spain, the Netherlands, and Japan (see Appendix A) and published estimates based on IRS data for the United States. With these data, we base our analysis on nearly one billion employee-year observations and up to 210 million employee observations per year.

Most countries – Canada, Denmark, Norway, Sweden, the Netherlands, and France – provide complete information on the labor force. This results in highly reliable earnings estimates, even for small groups that are difficult to study using common surveys. In the remaining countries – Germany, Spain, and Japan – our administrative data cover sample sizes between 4% to 8% of the labor force. With this data, we obtain reliable estimates of national and urban top earnings shares, and we can decompose urban top earnings shares by sector within cities. However, compared to countries with comprehensive labor force data, estimates of top earnings shares in smaller metropolitan areas

are less precise. This is especially so in Germany, where in addition to a smaller sample, earnings are top-coded at the top decile. We follow common practice and impute top earnings for Germany (see Table A1).

For the United States, we combine county-level IRS tables and Sommeiller and Price's estimates of state-level income concentration derived from IRS income tax returns. To compute urban income shares we first multiply the state-level income brackets and the average income per bracket by the ratio of average county income to average state income (see Appendix E). We then apply this distribution to the county and estimate the income share above the national and urban top income thresholds according to Pareto law. Finally, we aggregate county estimates to obtain the income distribution of the metropolitan areas.

In each country, we identify two cities: the financial city - the city that hosts the country's main stock exchange and the relative majority of financial market jobs - and the comparison city - the city that most closely matches the financial city in terms of employment and GDP share. Identifying financial cities is easy because secondary financial cities have tended to disappear as finance centralized in the postwar period, and where they continue to exist (e.g., Chicago), financial market employment is much smaller. For most of our countries, the financial cities are the major centers of global finance - New York, Tokyo, Paris, Frankfurt, and Toronto. Although less central in global financial markets, Stockholm serves as a financial city for Sweden, Norway and Denmark, and Copenhagen, Oslo and Madrid are national financial cities.

To identify the comparison cities, we use OECD regional statistics data to find the city that is most comparable to the financial city in terms of employment and GDP share. In practice, we compare the two largest cities in each country in terms of employment and GDP share, with the financial city as the largest. The only exception is Germany, where we compare the financial city Frankfurt, ranked fourth, with Hamburg, ranked third.

To measure the association of financial market activity we use the measure "stock market total value traded to GDP" (series GFDD.DM.02) from the World Bank Global Financial Development Database (GFDD), which is commonly used in analyses of the effect of financialization on earnings

inequality.[12,10] To measure the role of a country in coordinating global trade in goods and services, we use data on the ratio of a country's stock of FDI to its GDP published by the United Nations Conference on Trade and Development.[1]

Measures

National Earnings Concentration

To estimate the *absolute contribution* of workers in a city to the increase in national top earnings shares reported in Table 1, we first identify the national top earnings share as:

$$S_{T_n} = \frac{\sum_i w_i.(w_i > T_n)}{\sum_i w_i} \quad (1)$$

where w_i is the earnings of individual i and T_n is the threshold of the national earnings distribution (i.e., P99).

We define the national earnings share of workers who are in the national earnings bracket above the national earnings threshold T_n and who work in city k (k being either financial city or comparison city) as:

$$S_{k,T_n} = \frac{\sum_i w_{i,k}.(w_{i,k} > T_n)}{\sum_i w_i} \quad (2)$$

The absolute contribution of earners in city k to the growth of the share of total national earnings earned by earners above the national earnings threshold T_n can be rewritten as:

$$C_{\Delta_{nat}} = \frac{\Delta S_{k,T_n}}{\Delta S_{T_n}} \quad (3)$$

To estimate the *overrepresentation of financial cities' earnings in national top earnings shares* relative to comparison cities, we first calculate the proportion L of local earnings in city k that go to workers from that city who earn more than the national earnings threshold T_n (cf. Figure G1):

$$L_{k,T_n} = \frac{\sum_i w_{i,k}.(w_{i,k} > T_n)}{\sum_i w_{i,k}} \quad (4)$$

[1] See https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx. Accessed July 4, 2022.

We then calculate the odds ratio of the earnings shares for the two areas O_{nat} as follows:

$$O_{nat} = \frac{\frac{L_{f,T_n}}{1-L_{f,T_n}}}{\frac{L_{c,T_n}}{1-L_{c,T_n}}} \quad (5)$$

, where *f* represents the financial city and *c* the comparison city.

We use the 99th percentile threshold to compute our main measure of the overrepresentation of financial cities earnings in national top earnings shares. We nevertheless tried other thresholds such as the national P95 and P90 (Figure G5).

Local Earnings Concentration

To measure the *overrepresentation of financial cities' earnings in urban top earnings shares*, we first calculate the (local) top earnings share in city *k* above local threshold T_k in each of the two cities (cf. Figure G2):

$$L_{k,T_k} = \frac{\sum_i w_{i,k}.(w_{i,k} > T_k)}{\sum_j w_{j,k}} \quad (6)$$

Similarly to equation 5, we then calculate the odds ratio between these two urban top earnings share:

$$O_{loc} = \frac{\frac{L_{f,T_f}}{1-L_{f,T_f}}}{\frac{L_{c,T_c}}{1-L_{c,T_c}}} \quad (7)$$

We use the 95th percentile as the main threshold because the local 95th percentile is close to the national 99th percentile in most countries, and for countries where we use samples of the working population – Germany, Spain, Japan – estimates of local earnings share are more robust than if we used a higher threshold. We also report results for other thresholds such as local P90 and P99 in Figure G7.

Financial sector jobs' contribution

Following the logic of equations 1 to 3, we estimate the absolute contributions of financial sector jobs *b* from city *k* (e.g., financial cities or comparison cities) to the increase in national or local earnings above threshold *T* with the two following equations:

$$C^{b_k}_{\Delta_{nat}} = \frac{\Delta S_{b_k,T_n}}{\Delta S_{T_n}} \tag{8}$$

for the contribution to national earnings concentration and

$$C^{b_k}_{\Delta_{loc}} = \frac{\Delta L_{b_k,T_k}}{\Delta L_{T_k}} \tag{9}$$

for the contribution to urban earnings concentration.

To estimate the overrepresentation of financial sector jobs earnings in the local top earnings shares, we modify equations 5 and 7, and use the share of earnings of financial sector jobs *b* in the city (either financial city *f* or comparison city *c*) above threshold T (which could be either national top 1% threshold or urban top 5% threshold).

$$O^{b_f} = \frac{\frac{L_{b_f,T}}{1-L_{b_f,T}}}{\frac{L_{b_c,T}}{1-L_{b_c,T}}} \tag{10}$$

Regressions

Finally, we use OLS regression to assess the association of financial market activity with the evolution of financial cities' relative role in national and urban concentration. We include two main dependent variables: first, the overrepresentation of financial cities' earnings in national top earnings shares and second, their overrepresentation in urban top earnings shares (equations 5 and 7). Although the two indicators appear similar, they may evolve differently over the same period. For instance, the earnings share of financial city employees in the national top 1% might increase due to an aggregate rise in local earnings, while local earnings concentration might simultaneously decrease when the earnings growth at the bottom of the local distribution is higher than at the top.

In our base model we estimate a simple panel model with country *c* and year *t* fixed effects and lagged independent variables (by one year). We use Driscoll-Kraay standard errors to account for autocorrelations of residuals. To allow comparison of coefficients we use log constant dollars and country demeaned and standardized variables. We use stock exchange volume to GDP (GFDD.DM.02) as a measure for financial market activity. We control for population size, GDP per capita. To account for large metropolises' size effect

on inequality, we control for the difference in the national employment share of the financial city and the comparison city. Finally, we use FDI outflow (stock) to GDP as a measure of a country's involvement in global coordination functions.

$$log(y_{c,t}) = \delta.financial\_market\_activity_{c,t} + X_{c,t}.\beta + c + t + u. \quad (11)$$

In a subsequent model (panel B, Table 3), we use the difference between the local earnings share of financial sector jobs in financial cities and that in comparison cities as our alternative measure of financial market activity. This measure precisely targets the local dimension of financial market activity. Indeed, it proxies the specificity of the size and wage levels of financial sector in financial cities. However, our data do not allow us to measure the variable for the United States.

Data availability

This paper uses restricted-access data from 9 countries. As described in the Supplementary Information, the data can be accessed by receiving permissions from the relevant data owners, including Statistics Canada; Statistics Denmark; the French Comité du Secret Statistique; the German Institute for Employment Research; the Japanese Ministry of Health, Labour and Welfare; the Central Bureau of Statistics of the Netherlands; Statistics Norway; the Ministry of Labor, Migration and Social Security of Spain; and Statistics Sweden. For the United States,the IRS county data set can be downloaded at: https://www.irs.gov/statistics/soi-tax-stats-county-data. The Sommeiller and Price data set can be downloaded here: http://go.epi.org/unequalstates2018data.

The measure "stock market total value traded to GDP" (series GFDD.DM.02) from the World Bank Global Financial Development Database (GFDD), is available at https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database). Data on the ratio of a country's stock of FDI to its GDP is published by the United Nations Conference on Trade and Development

(https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx. Accessed July 4, 2022).

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Rapid earnings growth in finance concentrates earnings in a few large cities

Online Appendices

Table of Contents

Table of Figures and Tables

Appendix A. Comparative Organizational Inequality International Network (COIN) Data

Canada (1989–2013). The data are population-level observations of workers in all sectors working in establishments of at least two workers. Data are provided by Statistics Canada. Toronto and Montréal refer to their respective census metropolitan areas (CMAs). A CMA in Canada is a large, densely populated center consisting of adjacent municipalities that are economically and socially connected to the downtown core, as measured by commuting flows.

Denmark (1994–2018). The data are population-level observations of private and public sector workers working in establishments of at least two workers. Data are provided by the labor market statistic register (Den Registerbaserede Arbejdsmarkedsstatistik [RAS]) and wages from the job register IDAN. Demographics such as age, gender, and nativity come from the population register (Befolkningsregistret). Because of administrative variations in the recording of marginal jobs we use one-fourth of the average yearly wage reported in OECD publications as threshold (https://stats.oecd.org/, variable: AV_AN_WAGE).

The City of Copenhagen is defined to include the municipalities of Copenhagen and Frederiksberg. The Municipality of Copenhagen consists of ten administrative districts: Indre By, Vesterbro/Kongens Enghave, Nørrebro, Østerbro, Amager Øst, Amager Vest, Valby, Bispebjerg, Vanløse and Brønshøj-Husum. While Frederiksberg is part of the Capital Region and surrounded by Copenhagen districts, for historical and political reasons, it has independent municipal status. Although administratively separate, geographically and socio-economically Frederiksberg is considered part of the City of Copenhagen. For Århus, we simply follow the municipal boundaries of the city of Århus.

France (1993–2019). The data are population-level observations of private sector workers. Data are provided by the DADS social security register (Déclaration annuelle de données sociales) obtained through the CASD (Centre d'accès sécurisé aux données), dedicated to researchers authorized by the French Comité du secret statistique. State civil servants are missing before 2009 and excluded in the following years for consistency. We define Paris as the financial city and

Lyon as the comparison city, and we use the Paris region (e.g., Île-de-France) as a proxy for the Paris metropolitan area and the Rhône département as a proxy for the Lyon metropolitan area.

Germany (1990–2015). The data cover about 5% of the German labor force and about 20,000 establishments. The data are provided as a sample of the Integrated Employment Biographies Sample (IEBS) by the Federal Employment Agency. Estimates are weighted to correspond to the entire labor force. Earnings that are not subject to social security because they are below the threshold for minor employment (e.g. newspaper delivery) are excluded from the sample. To impute earnings that are top coded at the social contribution limit, we adopt the imputation strategy of Card, Heining, and Kline, [30] which considers individual and establishment wages prior to the censored period. However, instead of focusing on the average individual and establishment wage prior to the censored observation like Card, Heining, and Kline[30], we use information on lagged earnings. We include the areas defined by the municipal boundaries of Frankfurt am Main and the municipal/state boundaries of the Free and Hanseatic City of Hamburg.

Japan (1989–2013). The data covers 4% of the workforce working in an establishment with more than five workers. Data are from the Basic Survey on Wage Structure conducted by the Ministry of Health, Labor, and Welfare of Japan. The survey is a two-stage design in which a sample of private sector establishments with at least five employees are selected and then a uniform random sampling of workers among these establishments is taken. Firms' executives are not included in the data. Estimates are weighted to correspond to the complete workforce. The boundaries of the city of Osaka are defined by the limits of Osaka Prefecture, and the boundaries of Tokyo are defined by the Tokyo Prefecture, also called Tokyo Metropolis.

Netherlands (2006-2018). The data are population-level observations of workers across all sectors and industries. Data are provided by Statistics Netherlands (CBS) within the System of Social-Statistics Database (SSB). Workers with wages lower than the age-specific minimal hourly wage are excluded.

Statistics Netherlands identifies Amsterdam and Rotterdam through the municipal codes of administrative municipal units (*gemeente*).

Norway (1995–2018). The data are population-level observations of private and public sector workers working in establishments of at least two workers. Data are provided by Statistics Norway. Because of administrative variations in the recording of marginal jobs we use one-fourth of the average yearly wage reported in OECD publications as threshold (https://stats.oecd.org/, variable: AV_AN_WAGE). Oslo and Bergen are defined by the municipal boundaries of the City of Oslo and City of Bergen.

Spain (2006–2016). The data cover a 4% random sample of the population that had any connection with Spain's social security system in the given year (whether via employment, self-employment, unemployment, or retirement). Data come from the Continuous Sample of Working Histories (CSWH) (Muestra Continua de Vidas Laborales con datos fiscales) from Spain's Social Security Office. The CSWH contains matched The CSWH provides information on individuals' complete labor market histories from 1980 (or the year the individual registers with social security) to the year of data collection. Because earnings from social security records are top and bottom coded, we use matched earnings from tax records containing uncensored gross labor earnings for each job (tax records are available from 2006 onward). We use the administrative boundaries of Madrid municipality to define the financial city and the administrative boundaries of Barcelona municipality as the comparison city.

Sweden (1990–2012). The data are population-level observations covering all sectors and industries. Data are provided by Statistics Sweden (LISA database). City boundaries are defined along municipal boundaries. Stockholm is defined as both the municipality of Stockholm and the adjacent municipality of Solna. Goteborg is defined as the municipality of Goteborg.

United States (1989–2015). Data comes from a combination of estimates from Price and Sommeiller (2018; http://go.epi.org/unequalstates2018data) on income inequality per state (based on the US IRS) and US IRS files containing counties' average income between 1989 and 2015 (https://www.irs.gov/statistics/soi-tax-stats-county-data). We compute earnings shares by first multiplying

the state-level income brackets and the average earnings per bracket by the coefficient corresponding to the average county earnings divided by the average state earnings. We then apply this distribution to the county and estimate wages above the national thresholds and urban top wage shares according to Pareto law. Finally, we aggregate the county estimates to obtain the earnings distribution of the metropolitan areas. We include Los Angeles and Orange Counties for the Los Angeles urban area and the counties included in the New York–Newark–Jersey City area. After 2010, this data also contains county level income distribution, so we can estimate the quality of our state-based proxy (cf. Appendix E).

Table A1. Description of the data

Country	Start	End	Sample	Definition of threshold	Threshold earnings (last year)	Number of employees (last year)	Financial city	Comparison city	Source
USA	1989	2015	IRS	No threshold		165,033,000	New York	Los Angeles	US IRS and Price Somellier (2018)
Canada	1989	2013	Exhaustive	1/2 full-time full-year minimum	9207 Can $	13,867,085	Toronto	Montréal	Statistics Canada
Denmark	1994	2018	Exhaustive	1/4 OECD mean	109,412 Da. Kr	2,126,613	Copenhagen	Aarhus	RAS, IDAN, and BES
Norway	1995	2018	Exhaustive	1/4 OECD mean	98,905 No. Kr	1,513,442	Oslo	Bergen	Statistics Norway
Sweden	1990	2012	Exhaustive	1/3 prime age P50	100,660 Sw. Kr	4,519,342	Stockholm	Gothenburg	Statistics Sweden
France	1993	2019	Exhaustive private	1/2 full-time full-year minimum	8,024 €	20,671,976	Paris	Lyon	Base Tous Salariés (DADS)
Netherlands	2006	2018	Exhaustive	Age-specific minimum hourly wage	4 € per hour	8,867,793	Amsterdam	Rotterdam	CBS
Germany	1990	2015	Sample of employees (6%) in 20,000 establishments	1/2 full-time P10	12,871 €	1,120,354	Frankfurt	Hamburg	IEBS
Spain	2006	2016	Random sample of employees born since 1962 (4%)	1/2 full-time full-year minimum	2,799 €	380,804	Madrid	Barcelona	Continuous Sample of Working Histories (CSWH) and tax records
Japan	1989	2013	Sample of employees (4%) out of a sample of private sector est. of size >5	1/2 full-time P10	1,056,700 Yen	1,089,517	Tokyo	Osaka	Basic Survey of Wage

Appendix B. Adjusted mean in figures

Our adjusted mean is an average of within-country trends at a constant perimeter. To calculate this adjusted average, we proceed as follows.

1. For missing years between the first and last available data point, we use linear interpolation for each country series.

2. We calculate the three-year moving average for all country series to remove short-term fluctuations caused by uneven data collection.

3. We take the average:

3.1. When the number of countries is complete:

$$X_t = \Sigma_i (X_{it}/n),$$

where X_{it} represents series X for country i and year t.

3.2. When the number of countries is no longer complete:

$$X_t = X_{t-1} + \Sigma_i (\Delta X_{it}/n),$$

where $\Delta X_{it} = X_{it} - X_{it-1}$.

3.3. When the number of countries is not yet complete:

$$X_t = X_{t+1} - \Sigma_i (\Delta X_{it}/n).$$

We calculate this adjusted mean only if we can include data for at least three countries in year t.

Appendix C. Earnings concentration at the top and alternative measures of inequality

As shown in the previous literature (Piketty, Saez, 2003), the increase in earnings inequality is mainly due to a growing dispersion of earnings at the top of the earnings distribution. Panel 1 of Table C1 confirms this finding for our sample of countries. Overall, the ratio of decile 5 to decile 1 did not increase significantly (model 1). In contrast, the P99/P50 and the top 1% share of earnings grew at a yearly rate of +0.8% and +1.1%, respectively. We can proxy the financial cities overrepresentation in top earnings share by looking at the ratios of the thresholds of their respective distributions. This shows that the income distribution of two cities diverged mainly at the top (panel 2). The bottom decile threshold did not significantly diverse, while the top centile threshold diverged at a rate of +0.66%.

Finally, in Panel 3, we compare the divergence of local inequalities between the two types of cities, which increased at a rate of +0.13% at the bottom of the distribution (D1/D5) versus +0.4% at the top of the distribution. This asymmetry in the growth of national and local inequalities justifies a specific focus on top incomes.

Table C1. Yearly trends for various indicators of dispersion along the earnings distribution

Dependent variable	Year parameter
Panel 1. National measures of inequalities	
1. D5/D1	0.03
	(0.07)
2. D9/D5	0.37***
	(0.03)
3. P99/P50	0.79***
	(0.09)
4. Top 1 % share	1.1***
	(0.12)
Panel 2. Contribution to national inequalities	
5. $D1_{fc}/D1_{cc}$	-0.02
	(0.06)
6. $D5_{fc}/D5_{cc}$	0.11***
	(0.02)
7. $D9_{fc}/D9_{cc}$	0.56***
	(0.09)
8. $P99_{fc}/P99_{cc}$	0.62***
	(0.06)
9. Over representation of financial cities in top 1 % earnings	1.3***
	(0.16)
Panel 3. Contribution to local inequalities	
10. $(D5_{fc}/D1_{fc})/(D5_{cc}/D1_{cc})$	0.13**
	(0.06)
11. $(D9_{fc}/D5_{fc})/(D9_{cc}/D5_{cc})$	0.16***
	(0.02)
12. $(P99_{fc}/P50_{fc})/(P99_{cc}/P50_{cc})$	0.40***
	(0.09)
13. Over representation of financial cities in local top 5 % earnings	0.47***
	(0.07)

Note: We estimate yearly trends β using OLS models $log(y)=\beta.year + c + u$ with country c fixed effects. Linear trends are multiplied by 100 to correspond to percentage rates of increase. Each line corresponds to a different regression. Estimates are based on the Comparative Organizational Inequality International Network's national linked employer-employee. For United Samples, we use estimates based on Current Population Survey for models 1-3, 5, 6, and 10-12 and estimates from based on IRS tables for other models (see Data Description and Table A1). Driscoll-Kraay robust standard errors in parentheses. ***$p < .01$, **$p < .05$, *$p < .1$.

Appendix D. Computation of confidence intervals

This paper is based on aggregated country-level earnings statistics such as means and standard deviations for different earnings groups. From these simple statistics, we derive earnings shares, odds ratios of earnings shares, and ratios of odds ratios. These estimates are not computed with standard errors, and the size of the data makes the use of bootstrapping infeasible.

Therefore, we proxy the confidence intervals of our earnings share and odds ratio estimates by simulating one million observations in a normal distribution for each country year data point, following the mean and standard error of each mean used to estimate the indicator.

For instance, the urban top 5% earnings share (Figure 2a) can be expressed as $s_{t5} = (w_{t5} \times n_{t5}) / (w_{all} \times n_{all})$, where w is the average earning and n is the number of observations from the top 5% and the entire distribution respectively. For the two groups, we simulate one million means in the mean-standard error normal distribution $N(w_x, s_x / \sqrt{n_x})$. We generate one million earnings shares s_{t5}, to compute the 95% confidence intervals in the figures.

In Table D1, we present one example based on a 5% sample of the French data in 2006, where this method produces standard errors and confidence intervals that are close to those computed by bootstrapping.

Our US series, based on US-IRS and Sommeiller and Price estimates[2], do not report standard deviations of earnings and earnings groups. We therefore imputed the standard deviations by fitting a log-normal distribution to the earnings tranches.

Table D1. Comparison of normal distribution-based simulation and bootstrapping

	Normal distribution-based simulation estimates				1000 bootstrap estimates		
	Mean	s.e.	LCL	UCL	s.e.	LCL	UCL
1. National top 1 % earnings share	0.069	0.001	0.066	0.071	0.001	0.066	0.071
2. Earnings share in financial city of wage-earners in national top 1 %	4.272	0.286	3.769	4.888	0.198	3.858	4.651
3. Earnings share in comparison city of wage-earners in national top 1 %	0.748	0.028	0.694	0.803	0.058	0.624	0.850
4. Odds ratio of line 2 to line 3	2.927	0.108	2.727	3.150	0.228	2.455	3.342
5. Financial city local top 5 % earnings share	0.203	0.002	0.198	0.208	0.002	0.199	0.206
6. Comparison city local top 5 % earnings share	0.160	0.002	0.156	0.165	0.002	0.156	0.164
7. Odds ratio of line 5 to line 6	1.332	0.031	1.272	1.394	0.026	1.281	1.384

Note: Based on a 5% random sample of 2006 French data, we compare standard errors and 95% confidence intervals of our key estimates with normal distribution-based simulations (as described in Appendix D) on the one hand, and with 1000 bootstrapping of the sample on the other hand. This exercise shows that normal distribution-based estimates are globally in line with those based on bootstrap estimates.

Figure D1. Figure 1 with 95% confidence intervals

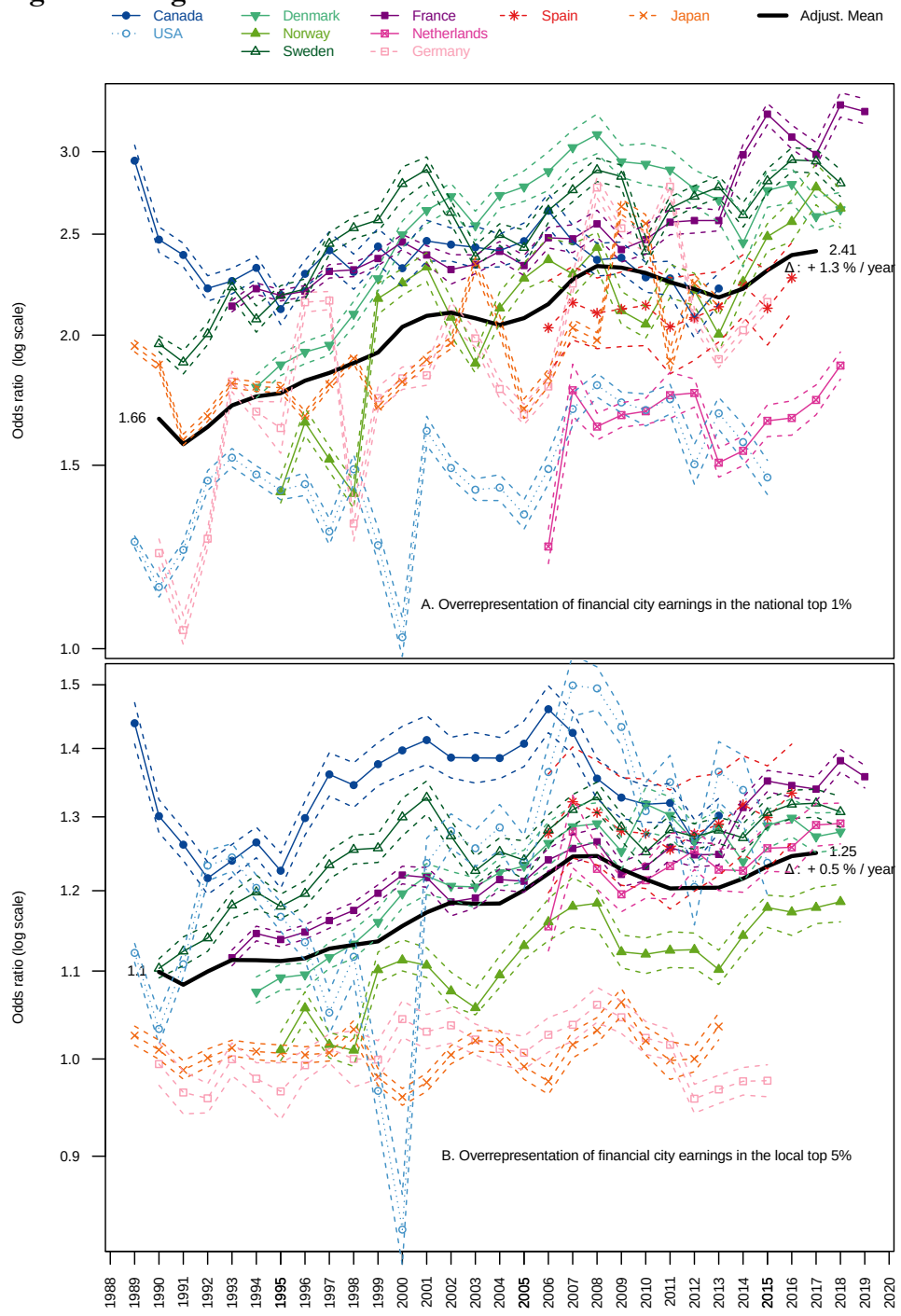
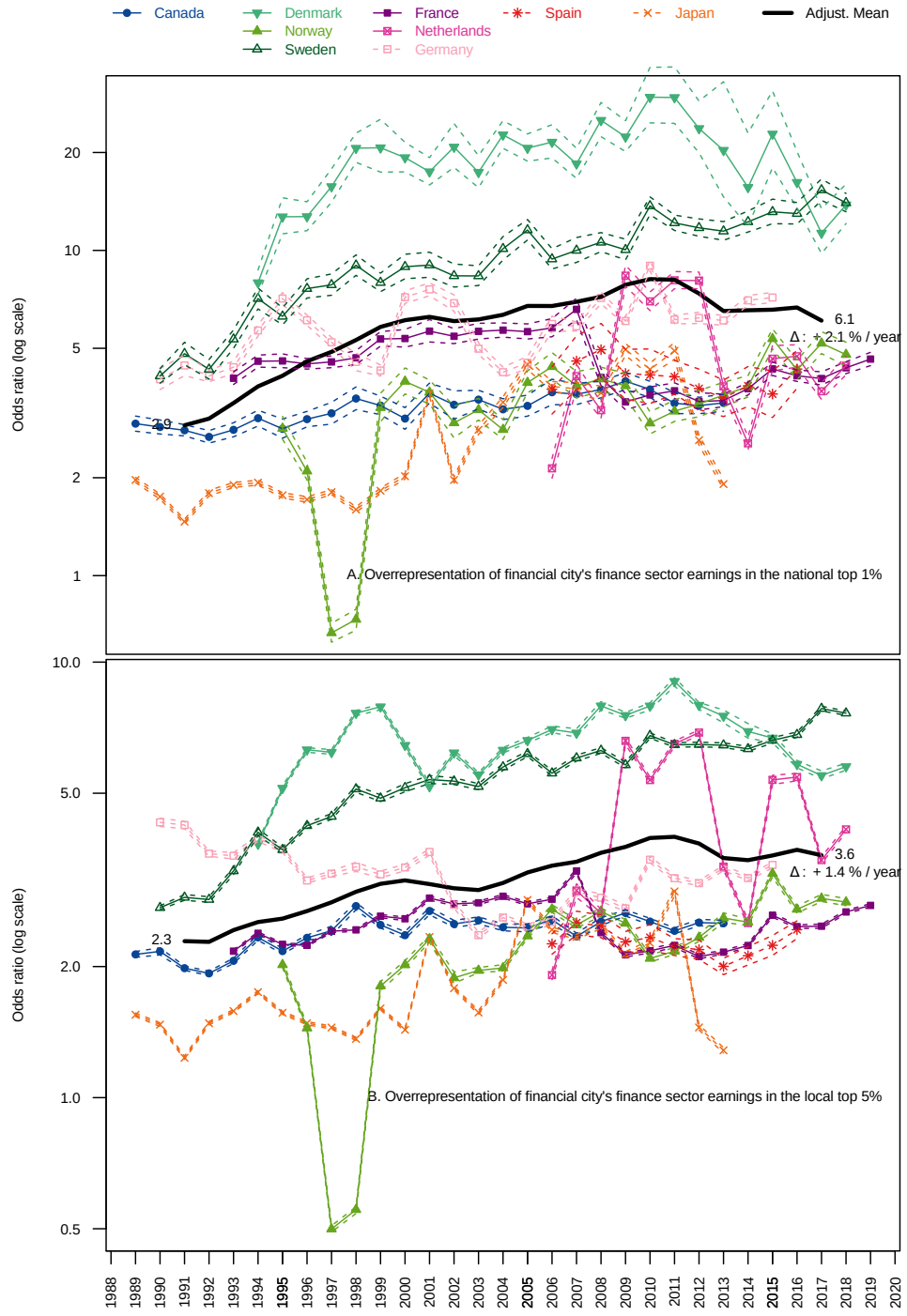


Figure D2. Figure 2 with 95% confidence intervals



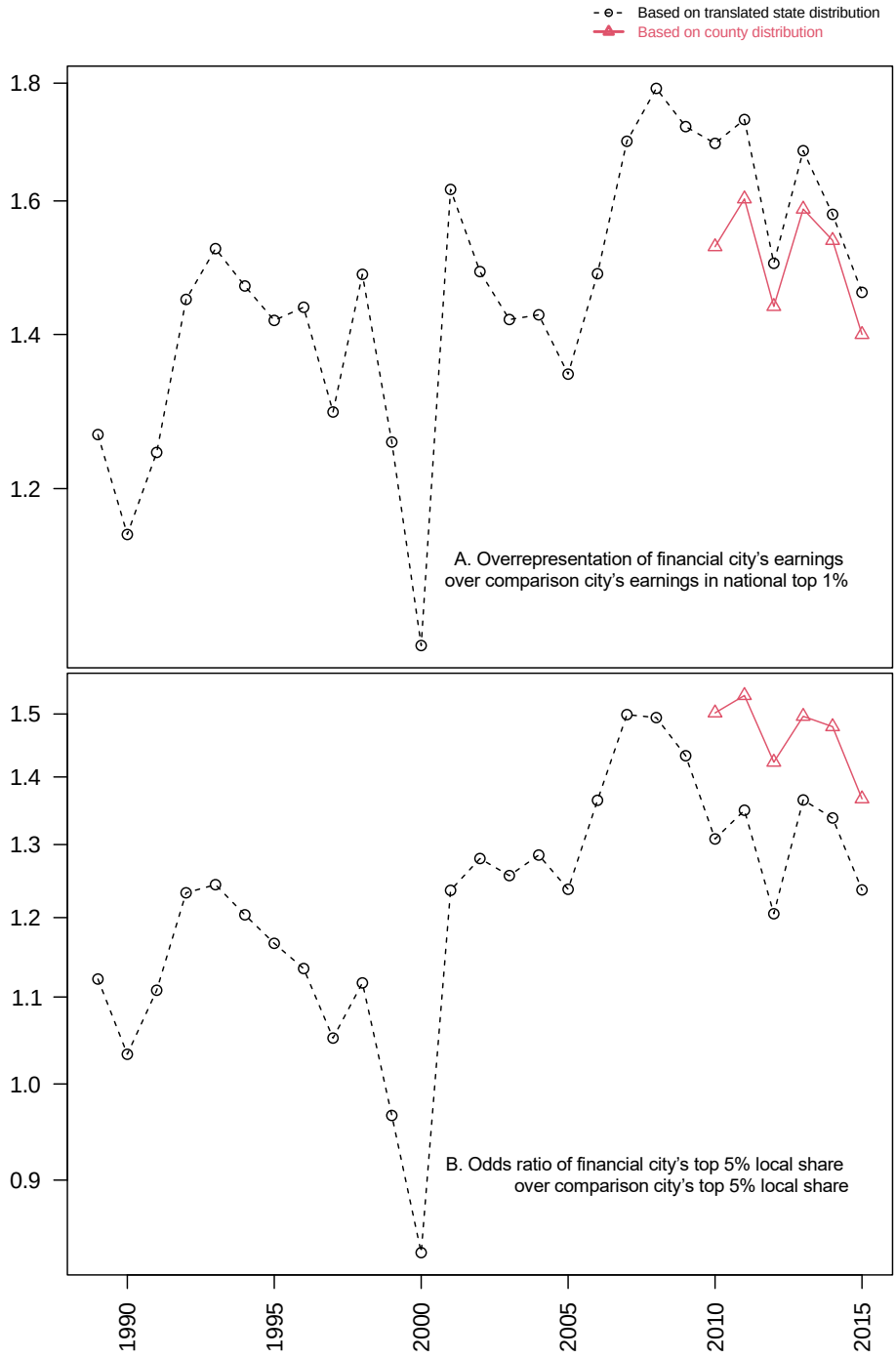
Appendix E. Quality of the State-based approximation in the US.

To construct consistent series for the U.S., we combine state-level information on income distribution and county average income, two sets of information that are consistently available throughout the period. To proxy a county's income distribution, we multiply its state income bracket threshold (e.g., P90) and the state average income within the brackets (e.g. F90-95) by the ratio of the county average income divided by the state average income. Thus, if the county average income is twice the state average income, we consider the county P90 to be twice the state P90, and the average income between P90 and P95 to be twice the state level.

Beginning in 2010, our data includes information on the income distribution of each county. Since this information is only available for the last six years, we do not use it to produce our main US estimates. However, we can use this more detailed information to assess the quality of our imputation.

We do this in Figure E1 for our two main estimates. It shows that our proxy slightly overestimates the level of our indicator of the financial city's overrepresentation in national top income share, by a magnitude ranging from +3 to +11%. Similarly, our proxy underestimates our indicator of the financial city's overrepresentation in urban top income share by a magnitude ranging from -9 to -15%. However, our figures show that the county- and state-based estimates follow very similar paths.

Figure E1. Comparison of State-based approximation with county-based estimates.



Appendix F. Alternative estimates of Table 3

To test the robustness of the estimates in Table 3, we run alternative estimates with alternative functional forms and alternative proxies for our key variables.

In variant 1, we use a linear trend instead of year fixed effects. In variant 2, we use country random effects instead of country fixed effects (with a yearly linear trend effect). These two variants lead to similar qualitative conclusions as our two-way fixed effects estimations.

In variant 3, we replace FDI outflow (stock) to GDP by a trade to GDP variable. In contrast to Table 3, Trade to GDP has a positive (but unstable) effect on our dependent variables. Nevertheless, we believe that FDI outflow (stock) to GDP better captures the importance of global coordination functions that are at the heart of the global city concept[3]. The positive effect of trade openness may be due more to the downward pressure it exerts on earnings at the bottom of the local earnings distribution than to its positive effect at the top. Future research could explore this further. In any case, this specification does not change the effect of financial market activity on our two measures of earnings concentration.

In variant 4, we use national and local financial employment shares as indicators of financial activity. The results are slightly attenuated and lose significance compared to our main estimates. We believe that the number of employees in the financial sector and the difference in the number of employees are not good proxies for the role of financial market professionals, which we believe is key to the growing gap between financial and comparison cities.

Therefore, in Variant 5, we base our indicators on the national and local shares within the top 10% of financial sector employees. This more restrictive definition is more likely to proxy for financial market professionals and, as a result, generally produces stronger and more significant estimates.

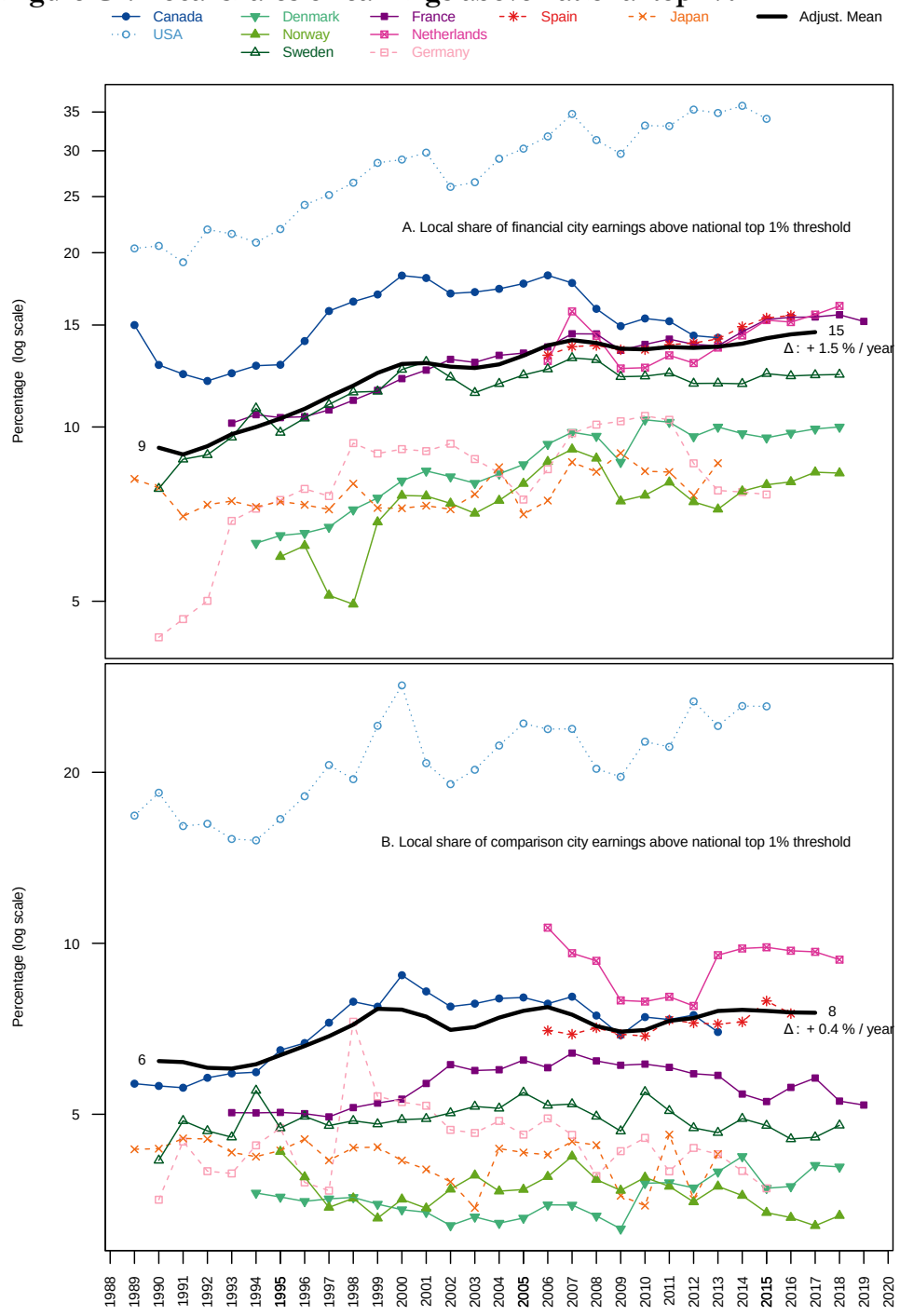
Table F1. Alternative estimates of Table 3

Variant	Panel	Variables	Overrepresentation of financial city earnings in national top shares (log)			Overrepresentation of financial city earnings in local top shares (log)		
			Top 10%	Top 5%	Top 1%	Top 10%	Top 5%	Top 1%
1	A	Stock-market volume to GDP	0.27***	0.22**	0.13	0.29***	0.28***	0.23**
			(0.09)	(0.09)	(0.14)	(0.06)	(0.08)	(0.10)
	B	Difference between urban earnings share of financiers in financial and comparison cities	0.14**	0.13*	0.14*	0.20***	0.19***	0.18***
			(0.06)	(0.06)	(0.06)	(0.05)	(0.04)	(0.04)
2	A	Stock-market volume to GDP	0.17**	0.12*	0.06	0.36***	0.31***	0.23***
			(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)
	B	Difference between urban earnings share of financiers in financial and comparison cities	0.10*	0.08	0.11*	0.10***	0.13***	0.14**
			(0.06)	(0.06)	(0.06)	(0.03)	(0.05)	(0.06)
3	A	Trade to GDP	0.12*	0.12*	0.12	0.30***	0.33***	0.15
			(0.06)	(0.06)	(0.07)	(0.08)	(0.08)	(0.10)
		Stock-market volume to GDP	0.39**	0.25*	-0.05	0.33**	0.16	0.09
			(0.15)	(0.14)	(0.19)	(0.14)	(0.17)	(0.20)
	B	Trade to GDP	0.03	0.01	0.02	0.50***	0.41***	0.11
			(0.08)	(0.08)	(0.09)	(0.09)	(0.10)	(0.12)
		Difference between urban earnings share of financiers in financial and comparison cities	0.12**	0.11***	0.13***	0.18***	0.17***	0.17***
			(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
4	A	Finance employment share	0.05	0.12**	0.09	0.17***	0.18***	0.05
			(0.05)	(0.04)	(0.07)	(0.06)	(0.06)	(0.08)
	B	Difference between urban financial employment share in financial and comparison cities	0.10	0.08	0.08	0.12**	0.13***	0.15***
			(0.06)	(0.05)	(0.06)	(0.05)	(0.04)	(0.05)
5	A	Finance employment share in the national 10%	0.13***	0.20***	0.17***	0.24***	0.28***	0.18***
			(0.04)	(0.04)	(0.05)	(0.04)	(0.03)	(0.04)
	B	Difference between financial and comparison cities' financial employment share in the national top 10%	0.30*	0.33**	0.31**	0.08	0.02	-0.03
			(0.16)	(0.15)	(0.13)	(0.09)	(0.09)	(0.13)

Note: All estimates (except variant 2) come with Driscoll-Kraay robust standard errors.

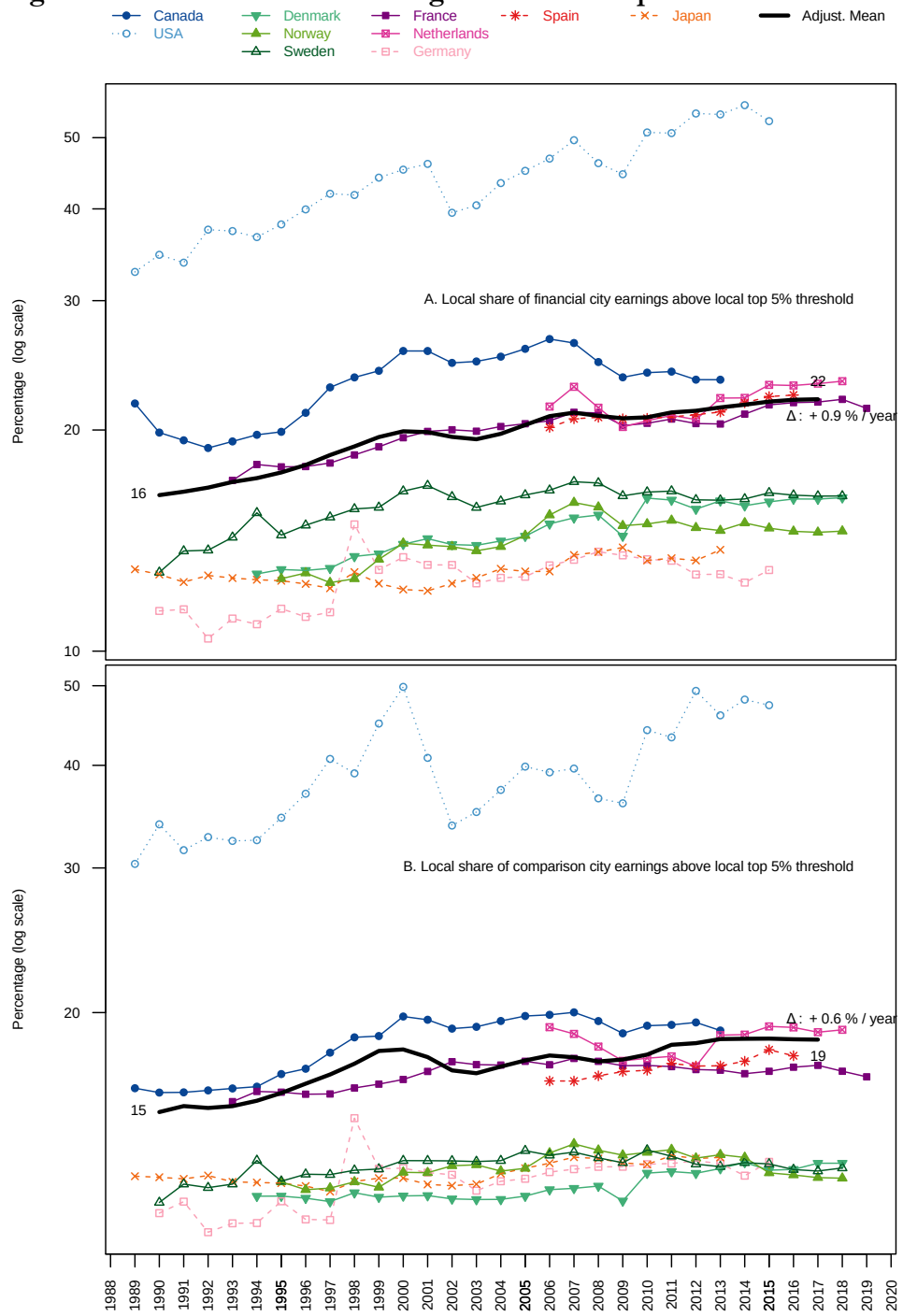
Appendix G. Other supplementary Figures and Tables

Figure G1. Local shares of earnings above national top 1%



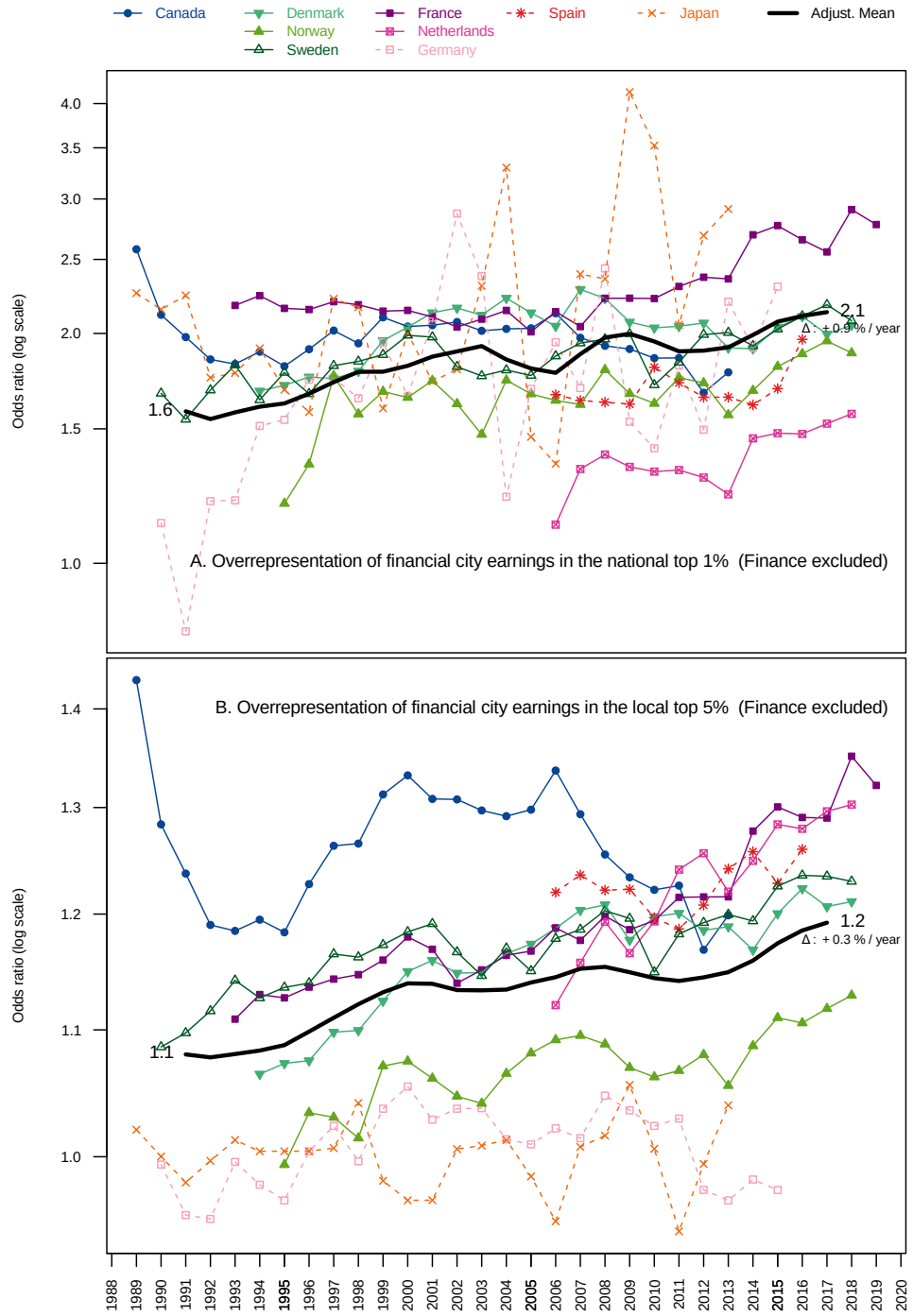
Note: Earnings above the national top 1% earnings threshold account on average for 9% of financial city earnings at the beginning of the period and increase to 15% at the end of the period.

Figure G2. Local shares of earnings above local top 5%



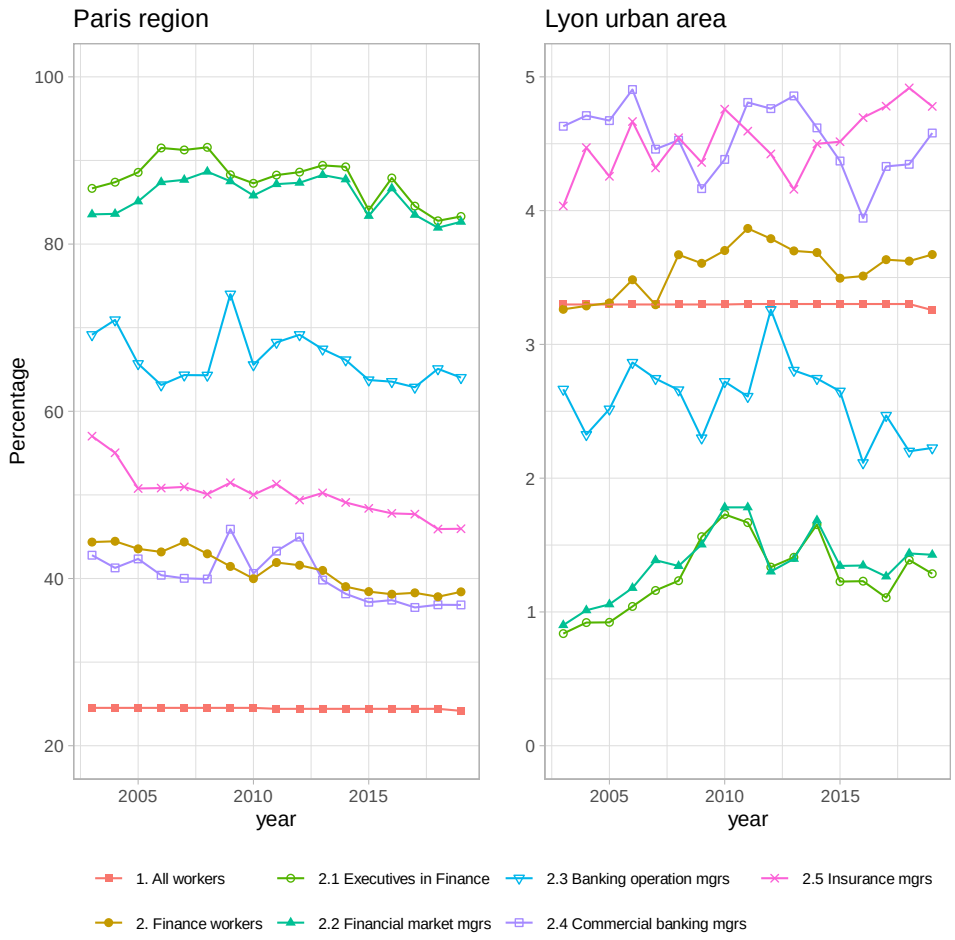
Note: Earnings above the local top 5% earnings threshold account on average for 16% of financial city earnings at the beginning of the period and increase to 22% at the end of the period.

Figure G3. Figure 1 excluding finance



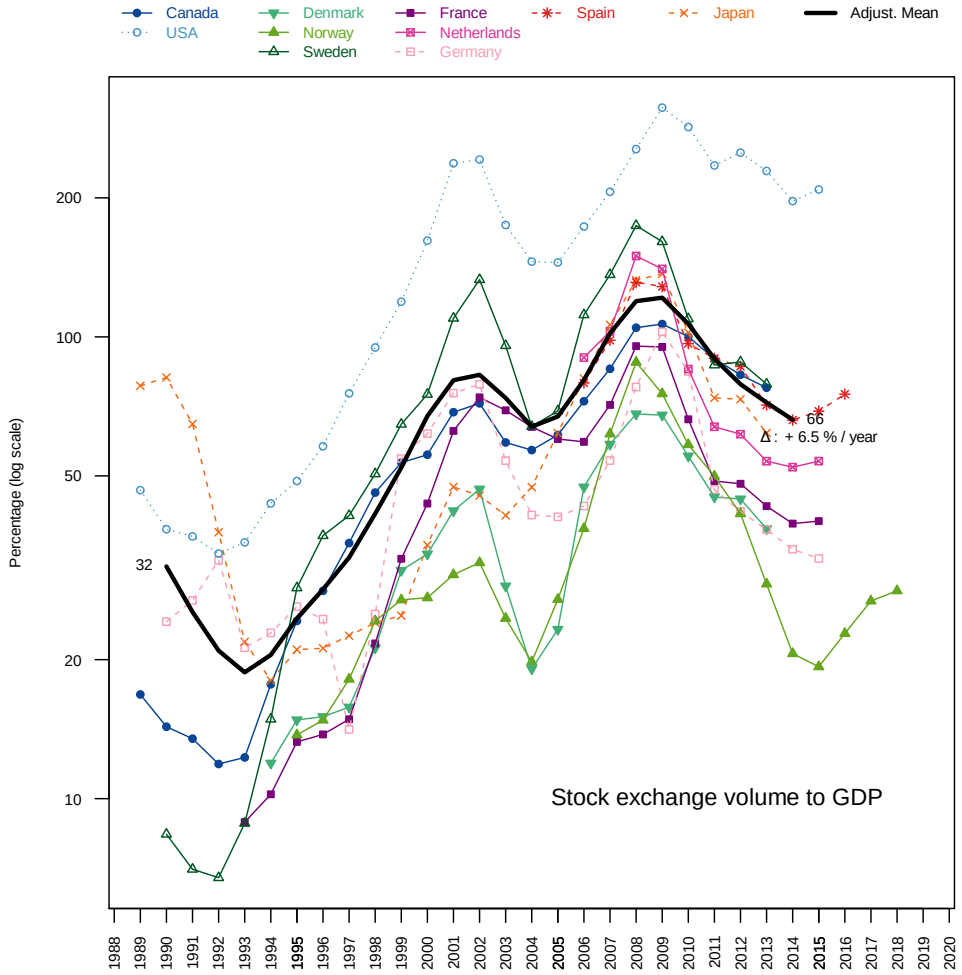
Note: We exclude financial sector employees from the earnings distribution to recalculate Figure 1.

Figure G4. The concentration of financial market occupations in Paris



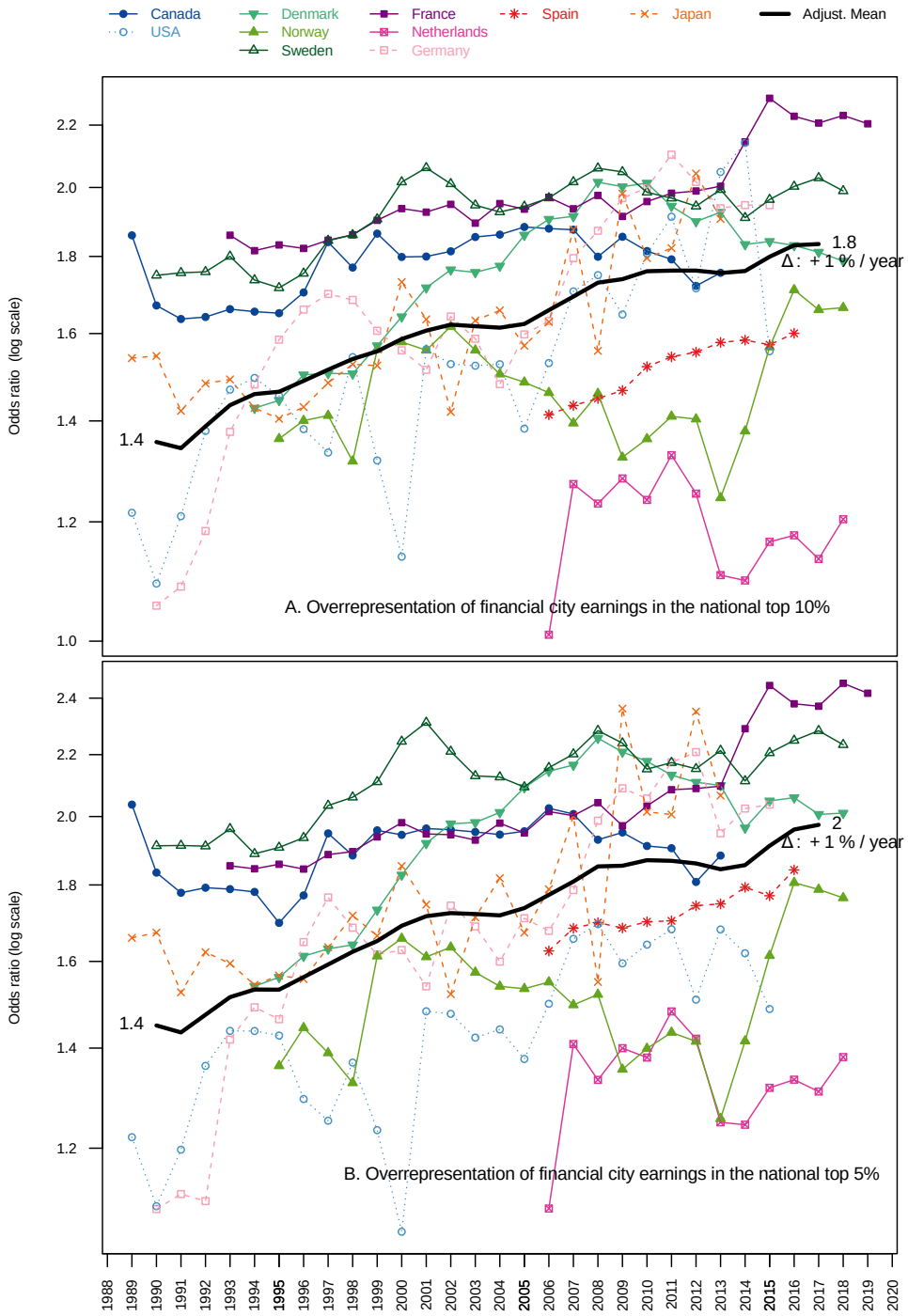
Note: In 2003, 84% of the financial market managers (Occupation 376A "Cadre des marchés financiers") were working in the Paris region and 1% in Lyon's urban area.

Figure G5. Stock market total value traded to GDP



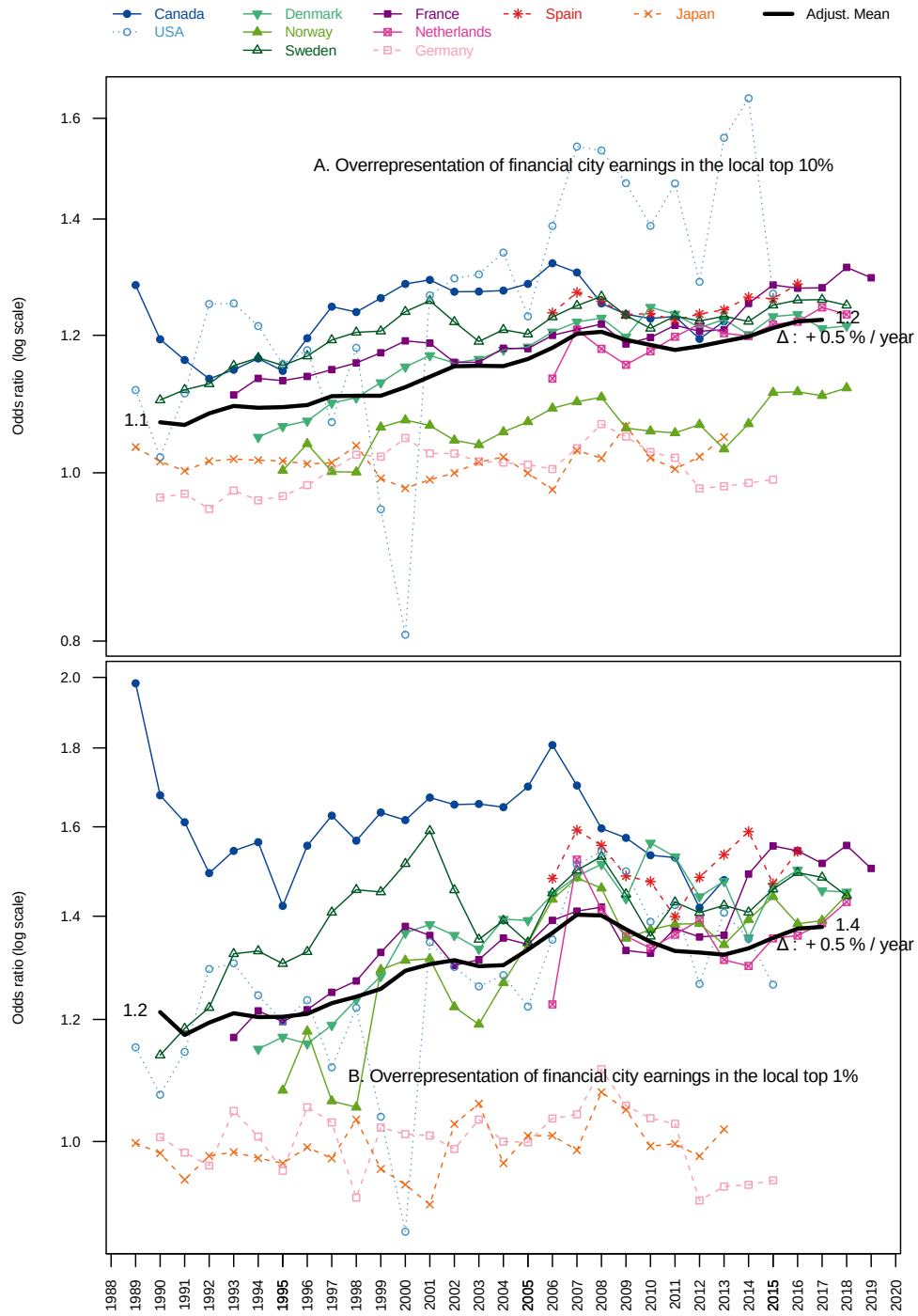
Note: The average ratio of stock exchange to GDP amounted to 32% in 1989 and increased to 66% in 2014. We use the "stock market total value traded to GDP" (GFDD.DM.02) series from the World Bank Global Financial Development Database (GFDD).

Figure G6. Figure 1A using national top 10% and top 5% earnings shares instead of top 1%



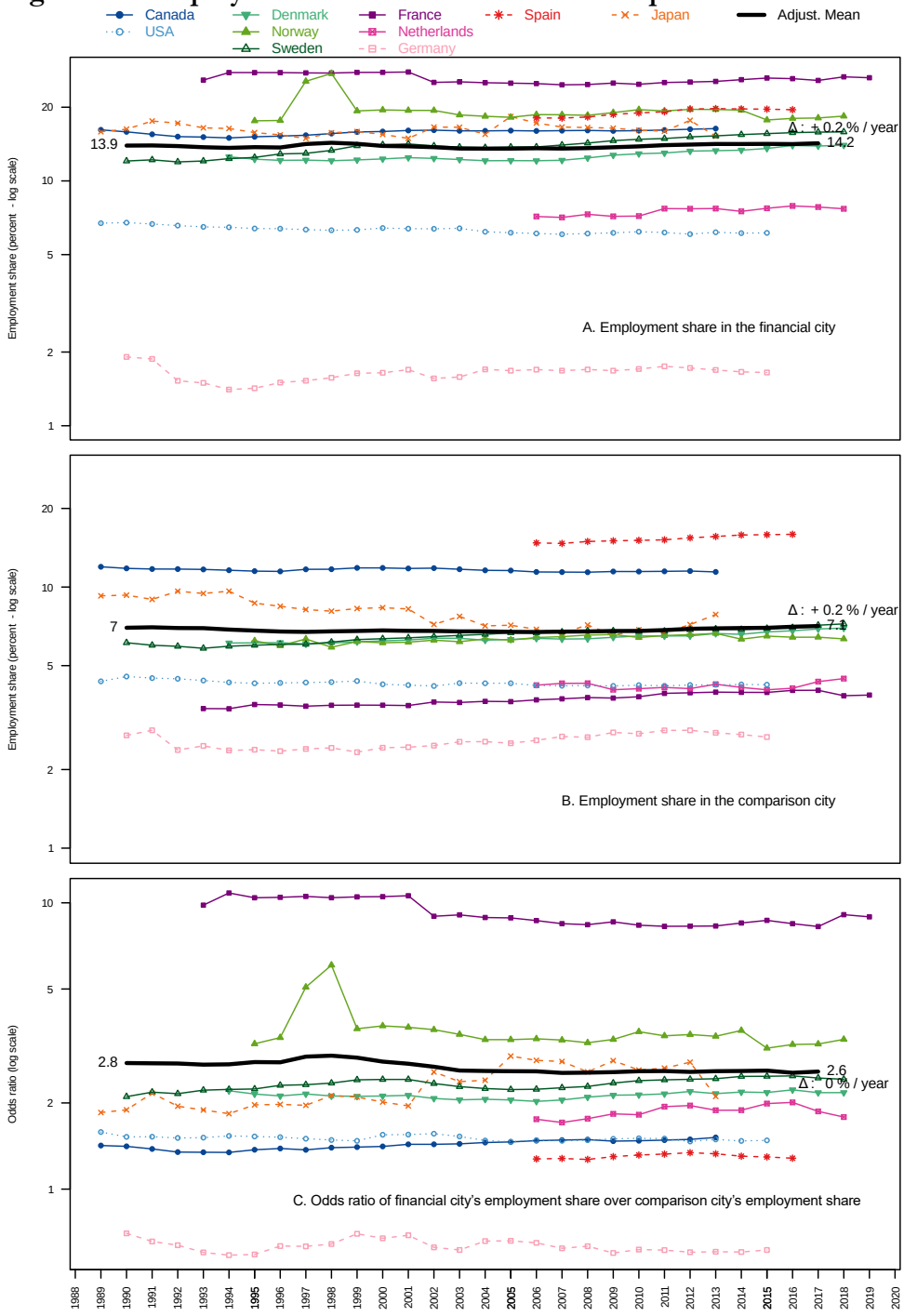
Note: Cf. Figure 1.

Figure G7. Figure 1B using local top 10% and top 1% earnings shares instead of top 5%



Note: Cf. Figure 1.

Figure G8. Employment share in financial and comparison cities



Note: cf. Figure 2.

Table G1. Annual linear trends.

	Overrepresentation of …					
	... financial city earnings in the national top 1%	... financial city earnings in the local top 5%	... financial city's finance sector earnings in the national top 1%	... financial city's finance sector earnings in the local top 5%	... financial city earnings in the national top 1% (excluding finance)	... financial city earnings in the local top 5% (excluding finance)
Figures	1A	1B	2A	2B	A1A	A1B
Panel A						
Year (US included)	1.27***	0.47***				
	(0.16)	(0.07)				
R^2 (full model)	0.78	0.80				
Year (US excluded)	1.31***	0.40***	2.09***	1.43***	0.93***	0.29***
	(0.18)	(0.08)	(0.42)	(0.23)	(0.15)	(0.08)
R^2 (full model)	0.69	0.90	0.84	0.79	0.54	0.88
Panel B						
Canada × year	-0.24	0.19	1.16***	0.88***	-0.46	-0.10
	(0.29)	(0.22)	(0.27)	(0.24)	(0.34)	(0.21)
Denmark × year	1.52***	0.73***	1.15	0.84	0.56*	0.50***
	(0.53)	(0.13)	(1.46)	(0.83)	(0.31)	(0.08)
France × year	1.48***	0.69***	-0.90*	0.05	1.00***	0.63***
	(0.20)	(0.06)	(0.48)	(0.33)	(0.26)	(0.07)
Germany × year	2.19***	0.07	1.65***	-1.02**	1.93**	0.07
	(0.67)	(0.13)	(0.45)	(0.47)	(0.75)	(0.12)
Japan × year	1.11***	0.06	3.95***	1.83**	1.59**	0.00
	(0.30)	(0.06)	(1.11)	(0.82)	(0.76)	(0.06)
Netherlands × year	1.10	0.53***	0.45	3.04	1.85***	1.16***
	(0.67)	(0.15)	(3.47)	(3.10)	(0.39)	(0.08)
Norway × year	1.95***	0.57***	4.43**	4.17***	0.98***	0.35***
	(0.48)	(0.09)	(1.61)	(1.45)	(0.34)	(0.06)
Spain × year	0.61***	0.17	-1.30	-0.81	0.82	0.24*
	(0.19)	(0.17)	(0.93)	(0.69)	(0.52)	(0.14)
Sweden × year	1.22***	0.47***	3.84***	3.19***	0.76***	0.34***
	(0.22)	(0.10)	(0.46)	(0.42)	(0.11)	(0.04)
USA × year	1.00***	0.92***				
	(0.28)	(0.25)				
N	232	232	205	205	205	205
R^2 (full model)	0.82	0.84	0.87	0.85	0.59	0.92

Note: In panel A, we estimate yearly trends β using OLS models $log(y)=\beta.year + c + u$ with country c fixed effects. In panel B, we add an interaction between the yearly trend and country fixed effects: $log(y)=\sum_c \beta_c\, year \times c + c + u$. Linear trends are multiplied by 100 to correspond to percentage rates of increase. Thus, the overrepresentation of financial city earnings relative to comparison city earnings in the national top 1% earnings share increases at a rate of +1.27% per year on average and by +1.48% per year in France. Estimates are based on the Comparative Organizational Inequality International Network's national linked employer-employee data and IRS tables for the United States (see Data Description and Table A1). We exclude the United States in models 2A, 2B, A1A, and A1B because we cannot disaggregate by sector with IRS data. Driscoll-Kraay robust standard errors in parentheses. ***$p < .01$, **$p < .05$, *$p < .1$.

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