World Inequality Lab – Working Paper N° 2022/11

# Worker Power, Rent-Seeking and Income Inequality in Canada: A Sector-Level Analysis

Silas Xuereb

September 2022


# Worker power, rent-seeking and income inequality in Canada: A sector-level analysis *

Silas Xuereb

September 4, 2022

**Abstract**

Neoclassical economics' explanations of the income distribution typically ignore the role of various forms of power. This paper explores the relationships between worker power, market power, rent-seeking and the income distribution using a novel panel dataset on sector-level income distributions in Canada from 2000-2019. Levels of within-sector inequality were relatively stable throughout this time period but there is significant between-sector variation. Finance and insurance contributes disproportionately to top-end income inequality. Workers' bargaining power explains a significant portion of between-sector variation in inequality. Increases in market power and decreases in unionization are related to increases in sector-level income inequality. Increases in real average incomes at the sector level are associated with increases in top shares three years later and this effect is mitigated by high unionization. Results are discussed within the broader context of Canadian income inequality and the relationship between power and wage-setting.

**JEL:** B52, D31, J30, J51

*This paper was written in partial fulfillment of the requirements for a Master's in Analysis and Policy in Economics from the Paris School of Economics (contact: silasxuereb@gmail.com). The author thanks Facundo Alvaredo for his guidance and supervision, and Marc Morgan and Matthew Fisher-Post for helpful comments on earlier drafts.

# 1 Introduction

Although income inequality has been a growing phenomenon of concern in rich countries for several decades, conventional economic models still struggle to explain the vast increases in inequality that have been observed. Recently, economic literature has begun to acknowledge the insufficiency of individual-level explanations of the income distribution. Systemic explanations such as workers' bargaining power, firms' monopoly and monopsony power (Stansbury & Summers, 2020), institutions and regulations (N. M. Fortin & Lemieux, 1997) have been incorporated into models of the income distribution. These models relax the assumption that markets are perfectly competitive and turn attention to the role of rent-sharing in the distribution of income. Furthermore, it has been acknowledged that income can give one power over others (Atkinson, 2007). In sociology the role of power in the income distribution has long been acknowledged (e.g., Kalleberg, Wallace, & Althauser, 1981) and financial research has also emphasized the role of social norms and regulations in compensation (e.g., Park, Nelson, & Huson, 2001).

This paper contributes to the literature on systemic explanations of the income distribution by examining whether differences in Canadian income inequality across sectors and trends in national-level inequality can be explained by worker power and market power. Previous research has focused on the relationships between power and the income distribution in the United States. For example, Stansbury and Summers (2020) argue that declining worker power can explain several macroeconomic trends in the United States, including the declining labour share of income, increased income inequality and increased profitability. In their view, worker power, which arises from unionization, the threat of strikes and efficiency wage effects, leads to an increased share of rents being distributed to labour rather than capital (or the top 1% of labour earners).

Others have argued that increasing market power can explain rising inequality (Cairó & Sim, 2020; Ennis, Gonzaga, & Pike, 2019). Market power is conceptualized as the ability of firms to set prices above marginal costs (or, for the labour market, to set wages below the value of the worker's marginal product) and is often measured either by price markups or firms' market share. There is

considerable evidence that price markups have increased drastically over the past 40 years in the US (De Loecker, Eeckhout, & Unger, 2020; Bajgar, Berlingieri, Calligaris, Criscuolo, & Timmis, 2019). While empirical evidence linking price markups and income inequality is scarce, macroeconomic models suggest that increasing price markups could explain much of the rise in income inequality observed in the US.

I test these hypotheses using sector-level data in Canada. To do so, I make a novel contribution to the literature on Canadian income inequality by describing in detail the income distributions of 20 different sectors in Canada for the years 2000-2019 using income tax tabulations. I find that finance and insurance, management and real estate have the highest within-sector top shares while public administration and utilities have the lowest within-sector top shares. I also describe levels of executive compensation in key sectors and examine the income distribution of the finance and insurance, utilities, and mining, oil and gas sectors in detail.

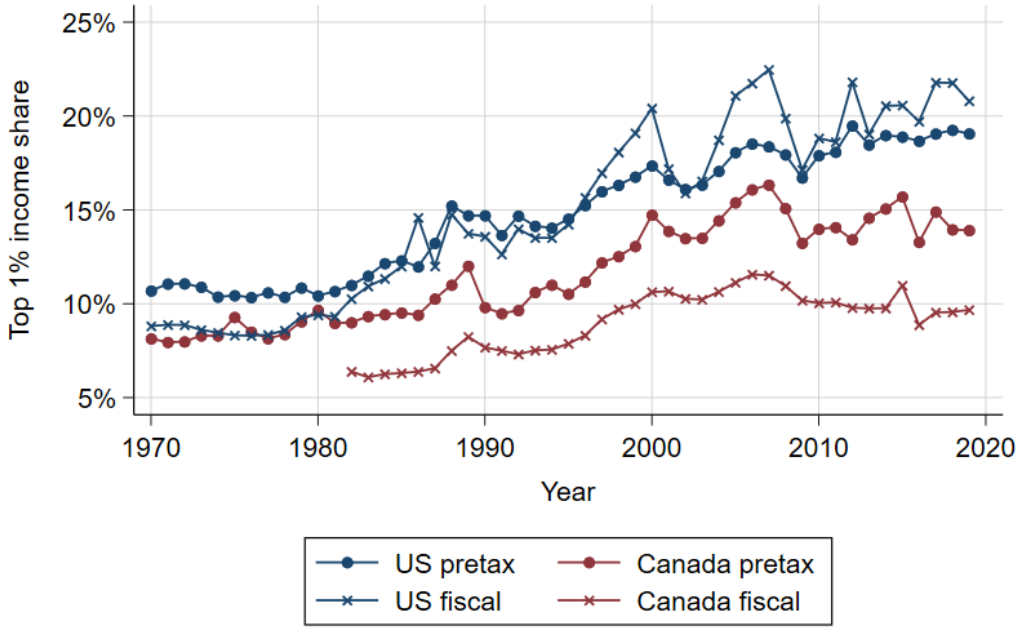
Then, using my measures of top and bottom shares at the sector-level, I examine the extent to which differences in income inequality across sectors can be explained by traditional market forces versus what can be explained by different definitions of power and by sector-specific characteristics. Specifically, I examine the relations between sector-level market power, unemployment and unionization with sector-level income inequality. I find that sector-level income inequality is associated with lower unionization rates. These differences in inequality across sectors cannot be explained by conventional explanations of income inequality such as the skill premium. At the national level, unionization declined most in Canada during the 1990s, when top income shares experienced significant growth. Changes in market concentration and unionization are associated with changes in sector-level income inequality in some specifications. I also perform an exploratory analysis of the effect of sector-level income growth on the income distribution. Results suggest that income growth is partially captured by the top 1% and has lasting effects on the sector income distribution for three years. While concurrent increases in income growth and top shares can be explained by the lumpiness of capital income, the persistent effects cannot be.

# 2 Background

## 2.1 Income inequality in Canada

Similar to the trends observed in the United States, a significant body of evidence shows that Canada's income inequality, whether measured by top income shares or the Gini coefficient, increased greatly during the 1980s and 1990s (Lemieux & Riddell, 2015; N. Fortin, Green, Lemieux, Milligan, & Riddell, 2012; Saez & Veall, 2005). However, although inequality continued increasing during the mid-2000s and fell during the financial crisis in both countries (Appendix Figure A1 shows that these trends are more pronounced in anglophone Canada than in francophone Quebec), inequality has remained relatively stable in Canada since 2009 while it has continued increasing in the United States. These trends are displayed in Figure 1 which shows top 1% pretax and fiscal income shares in Canada and the US since 1970.

**Figure 1:** Top 1% pretax and fiscal income shares in the US and Canada, 1970-2019




Pretax income refers to the distributional national accounts definition which allocates all of national income to individuals. Fiscal income includes employment income, self-employment income, dividends, rents, interest, pensions and employment insurance. Source: World Inequality Database for pretax shares and US' fiscal share, LAD tabulations for Canada's fiscal share.

Nonetheless, there remains much to be explained about the income distribution in Canada during the $21^{st}$ century. What sectors have the most unequal income distributions? Manufacturing production and unionization rates in the private sector have continued to decline and oil prices have fluctuated significantly. Why did Canadian top shares increase so much during the mid-2000s and why didn't they rebound as much as the US' top shares after the financial crisis? Has inequality increased in some sectors while declining in others? Why has inequality persisted at its relatively high level? I examine these questions by examining the distribution of top incomes across sectors and examining within-sector inequality for 20 different sectors from 2000-2019.

No previous research has examined the entire distribution of income in Canada at the sector-level. Lemieux and Riddell (2015) examined the sector of individuals within the top 1% of the income distribution. They found that people working in the finance and mining sectors are over-represented among top earners. However, they were constrained by using census data which they acknowledge underestimates incomes at the top of the distribution relative to the Longitudinal Administrative Databank (LAD; used in this paper). Furthermore, they do not examine the full distribution of income within sectors nor the composition of the bottom of the distribution by sector. Marchand et al. (2020) examine the effect of industrial workforce composition on Gini coefficients at the regional-level. They find that census divisions (roughly equivalent to municipalities) with greater concentrations of business services, utilities, arts and recreation, and finance and insurance exhibit the highest levels of regional inequality while regions with more manufacturing, transportation and public administration exhibit less inequality. By examining income shares, my measures can better identify where along the distribution income is concentrated within different sectors.

Because my measures of income exclude retained corporate profits, I underestimate the true extent of within-sector income inequality. To examine whether this changes the observed trends in income inequality, I also examine levels of executive compensation at the largest firms in select sectors for select years. Previous research has shown that stock and option compensation, which is not observed on tax returns, is over 40% of top executives' compensation (Macdonald, 2021). In

section 5, I discuss in more detail the relationship between rent-seeking and executive compensation.

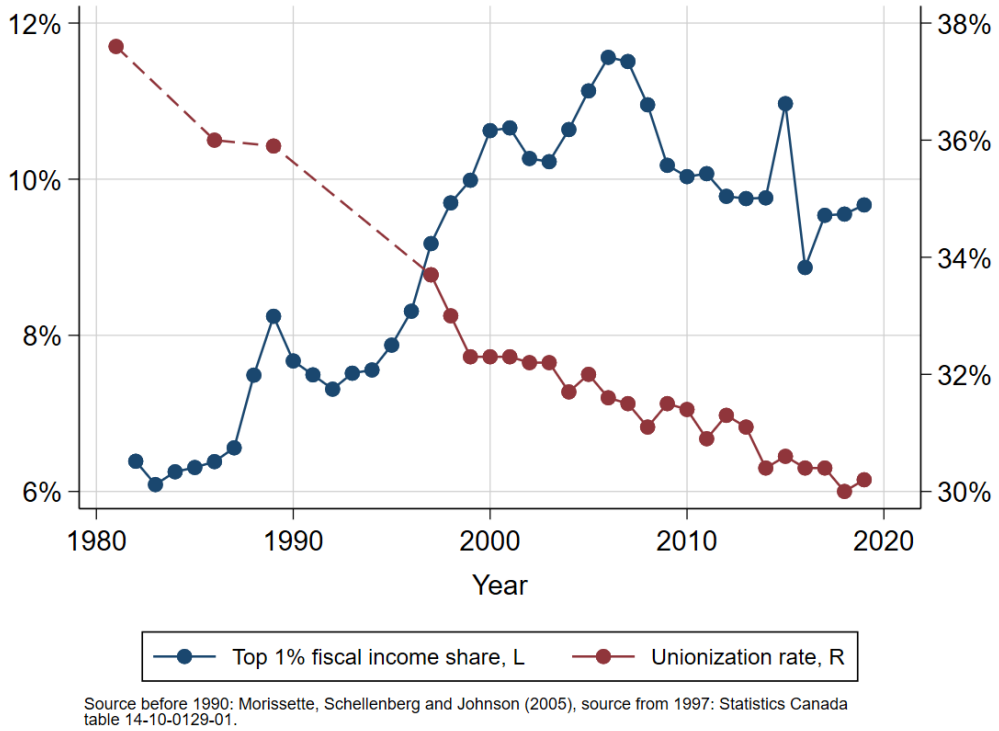
## 2.2 Worker power, market power and income inequality

There is an established literature on the effect of workers' bargaining power on the wage distribution (Lemieux, 1998; Card, Lemieux, & Riddell, 2004; Kollmeyer, 2018). Both Lemieux (1998) and Card and colleagues (2004) found unionized workers had higher wages than non-union workers and that the distribution of wages within unions was compressed compared to the distribution of wages for similar non-unionized workers. The wage compression effect was found to be strong for male workers but was not present for female workers. The negative relationship between unionization rates and income inequality has also been found at the country-level (Herzer, 2016), in time-series data in the US (Kollmeyer, 2018), and in sector-level data in the US (Lin & Tomaskovic-Devey, 2013). As shown in Figure 2, a significant fall in unionization rates coincides within increases in top fiscal income shares in Canada.

Similar to the United States, unions are mostly organized at the firm-level in Canada. In some workplaces, such as universities, multiple unions represent different types of workers within the same workplace. Collective bargaining is regulated at the provincial level for most firms. Industries deemed of federal importance, including chartered banks, broadcasting, telecommunications, and aviation, are regulated at the national level by the Canada Labour Code. Provincial and federal labour relations boards, respectively, certify unions and resolve disputes between unions and employers. Under federal legislation, strikes are legal after the expiry of a collective agreement but the federal government has ended strikes through back to work legislation on at least 32 occasions since 1950 (CBC News, 2011).

Until the late 1960s, trends in Canadian unionization rates mirrored those in the United States (Riddell, 1993). However, from the late 1960s through the early 1980s, Canadian unionization rates continued increasing while American unionization rates began decreasing. Today, the unionization rate in Canada is about triple that in the United States. This gap has been attributed to differences

**Figure 2:** Top 1% fiscal income shares and unionization rates in Canada, 1982-2019




in legal regimes between the two countries (and, to a lesser extent, greater public sector employment and unionization in Canada; Riddell, 1993). Higher levels of unionization may contribute to the lower level of inequality observed in Canada compared to the United States.

By *collectively* bargaining with firms, workers have more power in negotiation and thus are able to bargain for a greater share of a firm's rents in an imperfectly competitive market. Since unions typically do not represent managers and executives, who are concentrated at the top of the firm income distribution, collective bargaining increases the share of income going to workers at the bottom of the income distribution and reduces the income share of the top. Although all firms are not identical, and thus the distribution of unionized workers along the firm distribution of income also affects sector-level inequality, overall, I expect that sector-level unionization rates will be related to lower sector-level income inequality cross-sectionally. Spillover effects could also reduce income inequality for non-unionized workers in sectors with higher levels of unionization, further reducing sector-level inequality. Changes in unionization may not affect the income distribution immediately

but may have an effect in the long-run because collectively bargained contracts are only negotiated once every several years.

This paper is closely related to Stansbury and Summers (2020), who examined the ability of worker power and market power to explain several macroeconomic trends observed in the US over the past 40 years including the rise in income inequality, the declining labour share of income, and the rise in profitability. They argue that declining worker power is a better explanation of these phenomena than rising market power. Their analysis assumes that most markets are not perfectly competitive, and thus firms can and do earn economic rents. The degree to which firms have product market power affects the size of these rents. These rents can then be distributed to shareholders or to workers. If workers have greater bargaining power, either because they are organized through unions, they have greater regulatory support, or there are more firms competing for their labour (firms have less monopsony power), then workers will earn a greater share of a firms' rents.

Stansbury and Summers argue that a wide range of economic data suggests that declining worker power can explain the decline in the labour share, the increase in inequality, rising profitability and fall in unemployment that has occurred in the US better than an increase in market power. While they focus on the falling labour share, I argue that declining worker power also changes the distribution of income among workers. I define worker power as the power of non-managerial workers (i.e., excluding managers and executives who are not typically represented in unions and whose interests are often opposed to those of other workers). Furthermore, Stansbury and Summers find that increasing globalization cannot explain these trends because rents that accrued to labor decreased more in sectors with lower import penetration. Stiglitz summarizes this evolution of the economy, "We have become a rent-seeking society, dominated by market power of large corporations, unchecked by countervailing powers. And the power of workers has been weakened, if not eviscerated" (J. Stiglitz, 2017, p. 16).

Stansbury and Summers also highlight the role of firms' *monopsony* power, or labour market power. In neoclassical economic theory, firms compete not only in the product market, but in the

labour market. If the labour market is competitive, workers are paid the value of their marginal product, however, if there are few firms in the market, workers will be paid less than the value of their marginal product, driving down wages and increasing income inequality. With the recent rise of superstar firms and increasing product market concentration, available jobs have become increasingly concentrated among fewer firms. Autor and colleagues provide indirect support for the hypothesis that increased market power increases inequality by showing that the declining labour share in the US could be explained by the rise of superstar firms (2020). While firms' labour market power is difficult to observe, in line with Cairo and Sim (Cairó & Sim, 2020), I argue it can be proxied by sector-level unemployment. Economic theory suggests that increased monopsony power reduces firm hiring. If firms have greater monopsony power, they offer lower wages and more workers would choose to remain unemployed rather than accept a low wage offer. In this sense, I view sector-level unemployment not as a cause of sector-level inequality, but as an indicator of a lack of worker power in the labour market.

Increased sector-level unemployment increases firms' power over workers during the wage bargaining process. If there are more unemployed workers in a sector seeking work, firms could more easily replace workers who demand wage increases. This could take place on an individual level, or through a lockout and the subsequent use of scabs during collective bargaining. Moreover, new hires will have greater difficulty obtaining employment and may be forced to accept a lower wage than they otherwise would be willing to, knowing that they do not have viable alternatives. In an imperfectly competitive market, these depressed wages for workers leave a greater share of rents for managers, executives and shareholders at the top of the income distribution. In aggregate, then, sectors with greater unemployment rates should have lower bottom income shares and higher top income shares.

Firms' product market power could also affect the distribution of income. While neoclassical economic theory relies on the assumption of perfect competition and thus that there are no economic rents to be divided among workers and shareholders, mounting evidence shows that the economy

is better described by a model of monopolistic competition. Firms do, in fact, possess (product) market power, and thus they can set prices above their marginal costs and extract rents. Indeed, De Loecker and Eeckhout (2020) find that the level of price markups above marginal costs in the US increased from 18% in 1980 to 67% in 2014, implying that market power has increased throughout this period. The ability to increase price markups is theoretically tied to the amount of competition in a market. If there is less competition, then firms have more power to raise markups because they will not be undercut by other firms. Thus market power can also be measured by the concentration of firms in a market. A common measure of market concentration is the ratio of the total sales of the four (CR4) or eight (CR8) largest firms in an sector to the total sales of the sector as a whole. Bajgar and colleagues (2019) have showed that market concentration in an average sector increased by about 8 percent in North America between 2000 and 2014.

Applied research directly linking market power and the income distribution is scarce. However, theoretical research predicts a positive relationship between market power and income inequality. Ennis and colleagues (2019) build a simple model that connects price markups to incomes. Their model assumes that all income from price markups is distributed proportionally to capital owners. Using estimated average markups for eight OECD countries and income distribution data, their model predicts that market power increases the income share of the top 10% in Canada by 3-4 percentage points, with half of the effect contained within the top 1%. In practice, however, profits from markups are likely distributed to top labour income earners and possibly even lower income earners. Workers may have greater capacity to share in these rents if they have greater bargaining power. In aggregate, however, I expect that executives capture a greater share of rents than the average worker. Thus, executives in firms with large market shares should earn more relative to their employees than executives in firms with smaller market shares. This effect may be especially pronounced when worker power is low.

At the sector-level, increasing market concentration also changes the distribution of workers across firms, as workers become increasingly concentrated at the most productive firms. The effect

this has on sector-level inequality is dependent on the distribution of income between and within firms. Thus, the effect of market concentration on sector-level inequality is theoretically ambiguous. However, assuming that highest earning individuals are concentrated at the largest firms, I expect sector-level market concentration to be linked with increased income shares at the very top, reflecting the additional power of executives of large firms to capture rents.

While the empirical economics literature has only recently begun examining the links between specific forms of power and income inequality, sociology has a longer history of examining the relationship between different forms of power and the income distribution. Kalleberg and colleagues (1981) argued that worker power was central to the income distribution. In their conception, worker power involves unionization as well as tenure, class and occupation. Jacobs and Dirlam (2016) argue that income inequality can be explained by shifts in the distribution of power resources between classes. They argue that the Reagan presidency instituted a major shift in power from workers to business which contributed to the subsequent increase in inequality. Using state-level time-series data, they find evidence that income inequality is higher when Republicans have more power in state congresses. Empirically, my work is closely related to Lin and Tomaskovic-Devey (2011), who examined the impact of financialization on income inequality at the sector-level in the United States. These approaches contrast with the typical approach to understanding the income distribution in economics.

As stated previously, neoclassical economic theory posits that the remuneration of workers and capitalists is equal to the value of their marginal product. The theory then allows for wages and rents to deviate from these exact values when there are market imperfections (for example, imperfect competition). However, Sraffa (1960) proved marginal productivity theory was circular in any production system with heterogeneous capital or output goods during the Cambridge Capital Controversy. Without homogeneous capital and output goods, the rate of return to capital is not necessarily a monotonic function of the quantity of capital (all else being equal), as predicted by the theory. Although neoclassical economists swept this theoretical criticism under the rug by assum-

ing that prices can be reasonably approximated using the homogeneous model of capital (Cohen & Harcourt, 2003), empirical evidence that cannot be reconciled with this theory is mounting. Productivity growth and wages have diverged in the United States (J. E. Stiglitz, 2016; Stansbury & Summers, 2020), and Canada (Greenspon, Stansbury, & Summers, 2021) over the past 40 years. In both countries, GDP per capita growth has outpaced average and median wage growth since the 1980s and the estimated marginal effect of productivity on wages has declined over time. Nonetheless, the fundamental assumption that individuals earn what they are worth underlies economic theory and popular understanding of wages, leading to commonly head beliefs that individuals can earn more if only they work harder (Alesina, Stantcheva, & Teso, 2018).

Within this context, increasing inequality has been explained by changes in the distribution of productivity. The rise in inequality in the middle of the distribution was attributed to technological change and the increasing skill premium, that is, returns to higher education (Levy & Murnane, 1992; Krueger, 1993). Implicit in these explanations is the idea that the value of the work performed by individuals with higher education was increasing over time, perhaps due to economies of scale in digital technologies, and thus the rise in inequality simply reflected that the productivity of skilled workers was increasing relative to the productivity of less skilled workers. At the top of the distribution, the extreme rise in incomes was due to the superstar effect. With the fall in transportation costs and increased ability to reach massive audiences, the most skilled individuals in each profession would be able cheaply reach massive audiences who have a preference for higher quality goods.

All of these explanations rely on several untenable assumptions, such as that individuals maximize utility, firms have complete information about the value of the marginal product of workers and that workers choose how much labour to provide at a given wage rate. While specific instances of research may examine the impacts of relaxing one or more of these assumptions, the core theory that remuneration to labour and capital are equal to the value of their marginal product could never have arisen without these assumptions (Fine, 2019). By shifting the focus of analysis to the

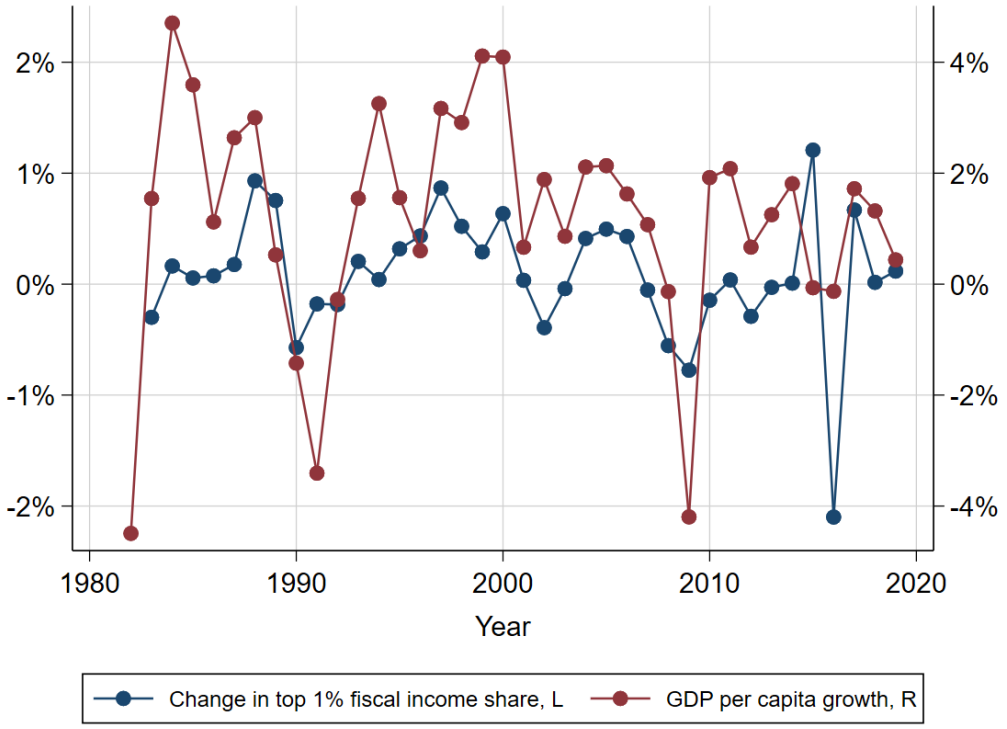
aggregate level, we can understand the role of power, institutions, regulations and social norms, rather than only individual factors, in shaping the income distribution. A complete description of the factors that shape aggregate income distributions is beyond the scope of this paper. However, my thesis is that top earners extract all the income they can from the distribution. In more competitive markets, this power is limited but when top earners have greater power over the setting of wages and prices, they will extract a greater share of income.

### 2.2.1 New rents and income inequality

Income distributions often change little from year to year, as exemplified by the economic phrase that wages are *sticky*. This is due to collective bargaining, as well as social norms, minimum wage laws and other institutional factors. However, shocks to an income distribution present additional income opportunities, the distribution of which may not be constrained by social norms and existing wage contracts. This could present opportunities for top earners to extract additional income. Indeed, Boadway argued that "when new innovations or opportunities arise, those with the financial and human wealth endowments and entrepreneurs are able to take advantage of them, increasing inequality. Over time, the economy adjusts and the benefits are passed to workers and others, reducing inequality. Thus, rents are temporarily created and then eliminated. This process repeats itself and applies at a sectoral level as well as economy-wide" (2015, p. 257). Boadway's conjecture is supported by some evidence at the national level in Canada: there is a significant correlation between changes in top 1% fiscal income shares and growth in GDP per capita, as displayed in Figure 3. While this is merely a correlation, I will argue that it is growth that leads to increases in top incomes through rent-seeking rather than increasing top incomes leading to increased growth through increased investment.

For anecdotal evidence of this phenomenon we can also examine the recent COVID-19 crisis. At the beginning of the pandemic, when there were significant shifts in consumer demand, executives and owners of large enterprises towards which demand shifted (online purchasing, grocery stores,

**Figure 3:** GDP per capita growth and top 1% fiscal income shares, 1984-2019




etc.) experienced huge increases in income and wealth. For example, Amazon's corporate profits increased by 200% during the year following the onset of the pandemic (April 2020-March 2021). At the same time, Jeff Bezos' wealth doubled while most Amazon workers' pay was increased by only $2/hour (14% of Amazon's minimum wage), and even that was reversed within six months.

The inflation experienced in 2021 also provides evidence of this behaviour. It is during this period that Canadian corporations have recorded their highest profits of all time (Statistics Canada, 2022). Investigative journalism has revealed that, in the United States, executives have been bragging about increasing prices above cost increases on earnings calls (Perkins, 2022). Enterprises have taken advantage of the inflationary period to increase output prices more than the prices of their inputs increased.

Another example of the failure of the conventional theories of income distribution is the rise of performance-based pay. At face value, performance-based pay is a perfect reflection of neoclassical

theory - pay should be dependent upon what workers (and capitalists) produce. However, there are two phenomena that this theory cannot explain. First of all, performance-based pay has become the norm for *executives* but not for the vast majority of workers. When a firm's value rises, it is not clear why all of that additional value should be attributed to the work of a few top executives, rather than shared among all workers in a firm. Second, there is evidence that performance-based pay is suddenly abandoned during economic recessions (Macdonald, 2021). Top executives are credited with rises in firm value during times of economic growth but spared of any blame for falls in firm value during times of economic decline. These two positions are clearly contradictory. If it can be acknowledged that exogenous forces affected firm value during economic recessions, it must also be acknowledged that exogenous forces affected firm value during periods of growth. Thus, vast increases in executive pay cannot be explained by an increase in the value of executives' marginal product.

Thus, I argue that shareholders and executives will capture new income available in a sector whenever it is within their power. This effect could be mitigated if workers are better organized and have greater bargaining power. In general, however, I expect a rise in average incomes in a sector to lead to an increase in the share of income going to the top 1% of earners. This argument has previously been made in the Canadian context by Lemieux and Riddell who argued that the rise in top incomes observed in the 1990s and 2000s was "more consistent with rent creation and extraction than with the competitive market view" (2015). I examine whether there is evidence of this phenomenon at the sector-level in Canada from 2000-2019.

# 3 Methods and data

This paper relies primarily on administrative tax data from Statistics Canada's Longitudinal Administrative Databank (LAD). This data source contains a 20% sample of all Canadian taxfilers from 1982-2019, weighted to represent the full population of taxfilers. We received a tabulated ver-

sion of this dataset that contains numerous demographic characteristics and a detailed breakdown of the income of each percentile of the income distribution (and the top 0.1% and top 0.01%) for each year. To construct the distribution, income is defined as individual market income (including employment income, interest, investment income and dividends but excluding capital gains) plus pension plan benefits and employment insurance benefits, to align with the World Inequality Database's definition of fiscal income. Individual income is used rather than equal-split or household income because the focus of this paper is the sector-level and individuals in a household may be employed in different sectors. Incomes derived from this data source in this paper use this definition of income. Real incomes are calculated by adjusting nominal incomes using the annual CPI published by Statistics Canada.

From 2000 onwards, we have the number of taxfilers in each income percentile by sector (2-digit NAICS codes). Taxfilers' employment income is first classified by the sector of the employer (self-employed individuals are asked to indicate their sector) and then the taxfiler is classified into the sector in which they earned the most income. Taxfilers without employment income are not assigned a sector.[1]

Counts of taxfilers were rounded to the nearest five and counts below 25 were rounded to either 0 or 25 by Statistics Canada for confidentiality reasons. This can be a problem for the estimation of top 0.01% shares in sectors with relatively few high-income taxfilers. In sectors where the observed count was 0 or 25, I estimated the number of taxfilers in the top 0.01% as a function of the size of the gap between the total number of taxfilers reported in a sector and the sum of the number of taxfilers in each other percentile in that sector.

To arrive at within-sector income shares, the income distribution within each sector was constructed based on the number of taxfilers in each sector in each percentile of the national income distribution. Then, I calculated the share of total fiscal income reported by taxfilers in an sector

[1]The allocation of an individual or a firm to a 2-digit NAICS code is far from perfect. An individual may have multiple jobs at firms in different sectors and firms are often engaged in work in several sectors. However, as a whole, the income distributions reported should closely reflect the income distribution of a given sector.

earned by the bottom 50%, upper middle 40%, top 10%, top 1% and top 0.1% of earners *within* each sector. It should be noted that this method treats all income of individuals whose primary employment is in a certain sector as deriving from that sector. Thus within-sector income shares are a share of the income earned by all taxfilers whose primary employment is in that sector. It does not measure the distribution of income generated by a sector.

Executive compensation data were manually collected from firms' financial reports hosted on SEDAR for select sectors in select years. In Canada, publicly-traded firms must disclose all compensation to the Chief Executive Officer, Chief Financial Officer and the next three highest paid executives. Since 2009, compensation has been recorded in public filings in the following categories: salary, non-equity incentive plans, pension income, shares, options and other compensation. Before 2009, compensation was categorized as salary, annual bonus, other annual compensation, options, restricted shares, long-term payouts and other compensation. To ensure comparability across these changing definitions, I classified all incomes as either cash-based (salary, non-equity incentive plans, annual bonus, pensions, other) or equity-based (shares, options, restricted shares). Unlike cash-based compensation, equity-based compensation is not included in our income definition. This data thus allows for a more complete understanding of the evolution of top incomes in select sectors.

Unionization rates, total employment, imports and value added by sector are drawn from publicly available Statistics Canada tables. Data on educational inequality by sector was obtained from census public use microdata files for 2006, 2011 and 2016. Educational inequality was calculated using the Abul Naga and Yalcin (Abul Naga & Yalcin, 2008) index, as described in (Dumas & Silber, 2021).

Market concentration was estimated using concentration ratios for the years 2004-2019 (complete sales data was not available before 2004). Publicly-traded firms' annual revenues were drawn from records of firms listed on Canadian MSCI, BBG and S&P indices, accessed through Bloomberg. Firms' NAICS codes were provided by Bloomberg. This data was supplemented using sales data on private firms collected from publicly available sources (The Globe and Mail, 2009, 2015; Financial

Post Staff, 2021). Total output by sector was drawn from the OECD STAN database. Concentration ratios were calculated as the ratio of the total sales of the four (CR4) or eight (CR8) largest firms in an sector to the total output of the sector.

This formula resulted in implausible CR8 ratios above or nearing 1 for finance and insurance and retail trade. Finance and insurance was corrected by increasing the denominator by the ratio of the total sales of all firms in the Bloomberg database in 2019 to the total output recorded by OECD STAN in 2019. Retail trade's ratio was corrected by replacing the denominator with retail sales data from Statistics Canada (the OECD subtracts costs from total output for the retail trade sector). The denominator for real estate, rental and leasing was corrected by removing the share of imputed rents in value added from total output because these do not represent real market transactions. It could be further questioned whether this measure is meaningful for the real estate market given its fundamentally different characteristics. Despite these corrections to the denominator, there is significant uncertainty in these estimates. Many firms in the numerator operate across numerous sectors. Furthermore, many of these broadly-defined sectors are certainly not a single market and so this measure may not capture variation between sectors with several medium concentration markets and sectors containing one highly concentrated market and several less concentrated markets. To address some of these concerns, I only use variation in market concentration within sectors in this analysis.

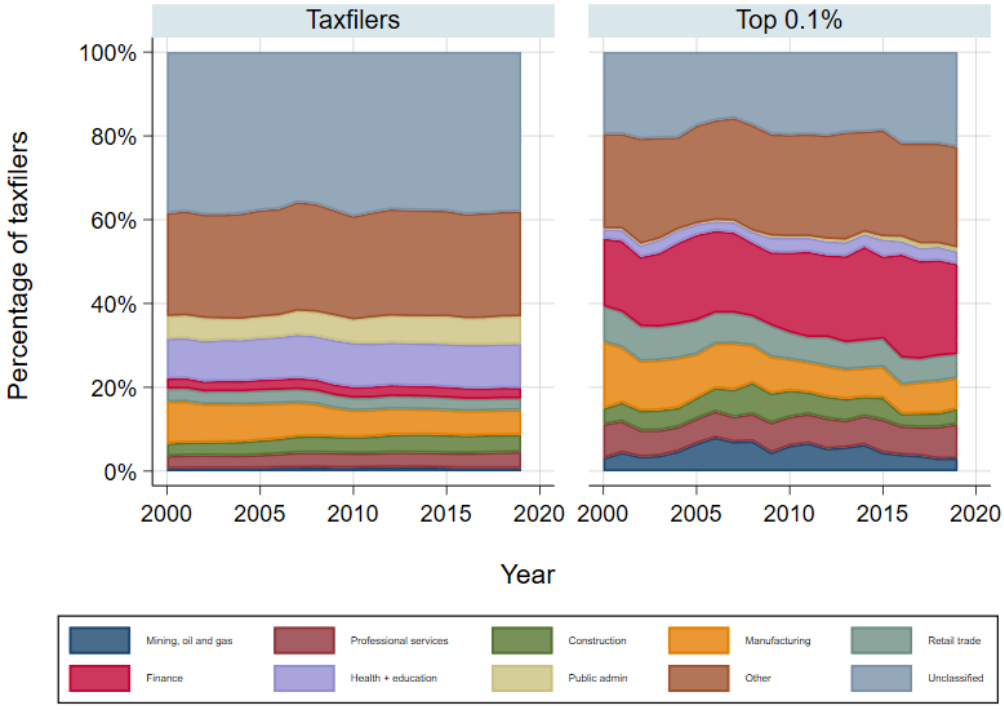
# 4 Descriptive results

I begin by presenting the composition of Canadian taxfilers and the national top 0.1% of income earners by 2-digit NAICS sector for the period 2000 to 2019 in Figure 4. The composition of the rest of the distribution is displayed in Appendix Figures A2 and A3 and fiscal income shares of each group over time are displayed in Appendix Figure A4. A separate category is included for unclassified taxfilers. This group is composed of retirees, students and others who are outside the

labour force and constitutes 36-39% of taxfilers.

Unclassified taxfilers are underrepresented in the top 0.1% and especially so during 2005-2008 when they were only 16-17% of the top 0.1%. Throughout the period, unclassified taxfilers are over half of the bottom 50%, where we expect to find the majority of students and retirees. In the middle 40%, about 20% of taxfilers are unclassified and in the next 9%, only 10-14% of taxfilers are unclassified. While these unclassified taxfilers are an important segment of the income distribution that deserve further attention, I focus primarily on differences across sectors in this paper (thus excluding unclassified taxfilers).

**Figure 4:** Percentage of Canadian taxfilers and national top 0.1% by sector, 2000-2019




The share of taxfilers in each sector remains relatively stable over time, although there is a significant decline in the share of taxfilers in manufacturing, from about 10% in 2000 to about 6% in 2019. Taxfilers in finance and insurance are significantly over-represented in the top 0.1%, consisting of 2.5% of taxfilers and 21.5% of the top 0.1% in 2019. The mining, oil and gas sector is also over-represented at the top, especially in the period 2006-2015. In the bottom 50%, work-

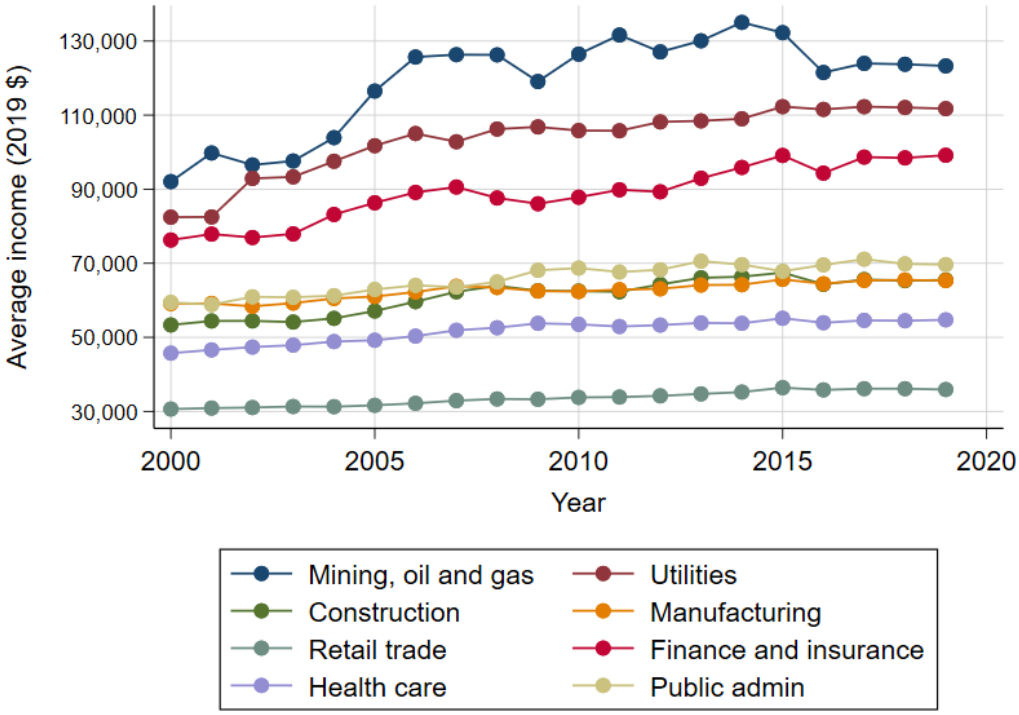
ers in retail trade, accommodation and food services, and administrative and support services are over-represented. Workers in public administration, health and education, construction and manufacturing are most over-represented in the middle 40%. Unclassified taxfilers are over half of the bottom 50% and under-represented in the middle 40% and next 9%.

## 4.1 Sector-level income inequality in Canada

In this section, I describe sector-level income distributions in Canada. Figure 5 displays the real average incomes of key sectors over time. Figures in this section display eight key sectors and remaining sectors are displayed in corresponding figures in the Appendix. There is significant variation in average incomes across sectors. Four sectors stand out as having significantly higher incomes than all the rest: mining, oil and gas, utilities, finance and insurance, and management of companies and enterprises. Average income in mining, oil and gas is highly correlated with oil prices ($r = 0.81$), which also peaked in 2008 and again in the early 2010s. Throughout the period, average incomes were low for workers in retail trade and accommodation and food services.

Next, Figures 6-9 display top 0.1%, top 1%, top 10% and bottom 50% shares over time for select sectors, respectively. There is more variation across sectors throughout this period than within sectors. With a few exceptions, fiscal income shares have been remarkably stable within sectors. Finance and insurance, management, and real estate stand out as having the highest top 10% (above 40%) and top 1% fiscal income shares (above 14%). Management's top shares are the highest today but were even higher in the early 2000s, with a top 1% share above 22% until the great financial crisis. However, the management sector is displayed in the Appendix and not highlighted in this paper given its small size (0.7% of employment in 2019) and that its distribution is sensitive to firms' decisions to keep management within the firm or to contract external managers. Classification into the management sector can change due to firms' decisions to keep management in house or pay managers as external consultants. Thus, this sector is more volatile (recorded employment fell during four separate periods within the 20-year span) and changes in top shares

**Figure 5:** Average income of taxfilers in key sectors in 2019 $, 2000-2019

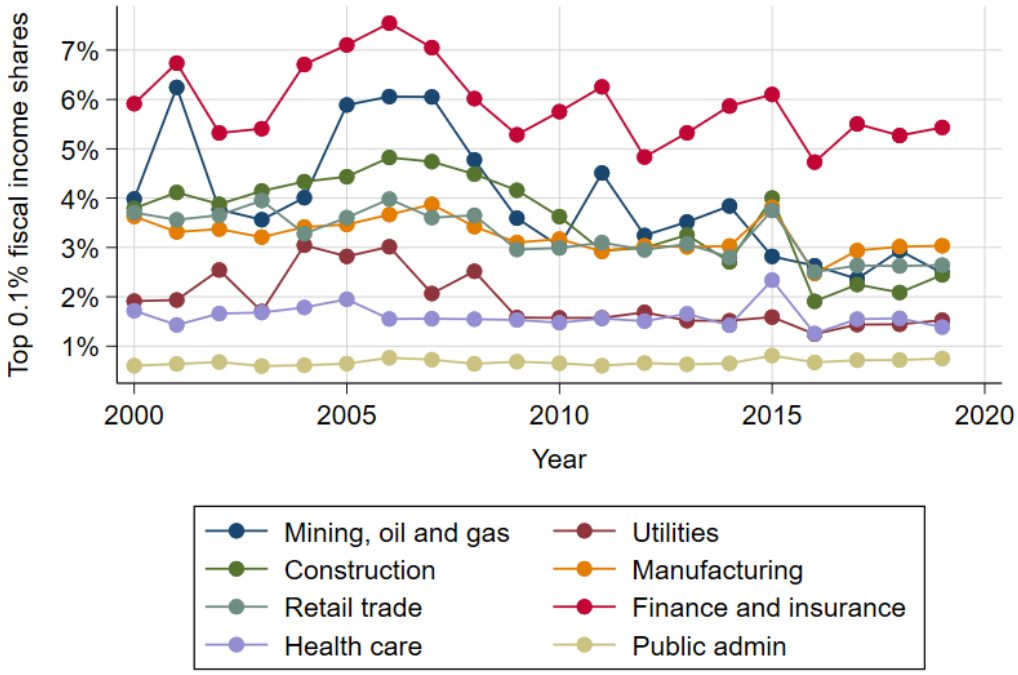



could be due to trends in firms' management decisions rather than changes in executives' incomes.

Mining, oil and gas' top shares rivalled the most unequal sectors during the oil price boom of the late 2000s but have since fallen drastically. Most sectors' top 10% shares were between 27% and 37% throughout the 2000-2019 period (nationally, the top 10% fiscal income share has been 37-39%). Utilities and public administration have the lowest top 10% shares. Focusing on the very top of the distribution, the top 0.1%, management, finance, and real estate again lead the way. However, arts, entertainment and recreation also has very large top 0.1% shares, potentially evidence of the superstar effect in the entertainment sector. Top shares exhibit a spike in 2015 in most sectors, which can be attributed to increased realization of dividends during this year in anticipation of tax increases after the election of the Trudeau government (among the national top 1%, average dividend income was $65,231 in 2014, $101,304 in 2015 and $54,449 in 2016).

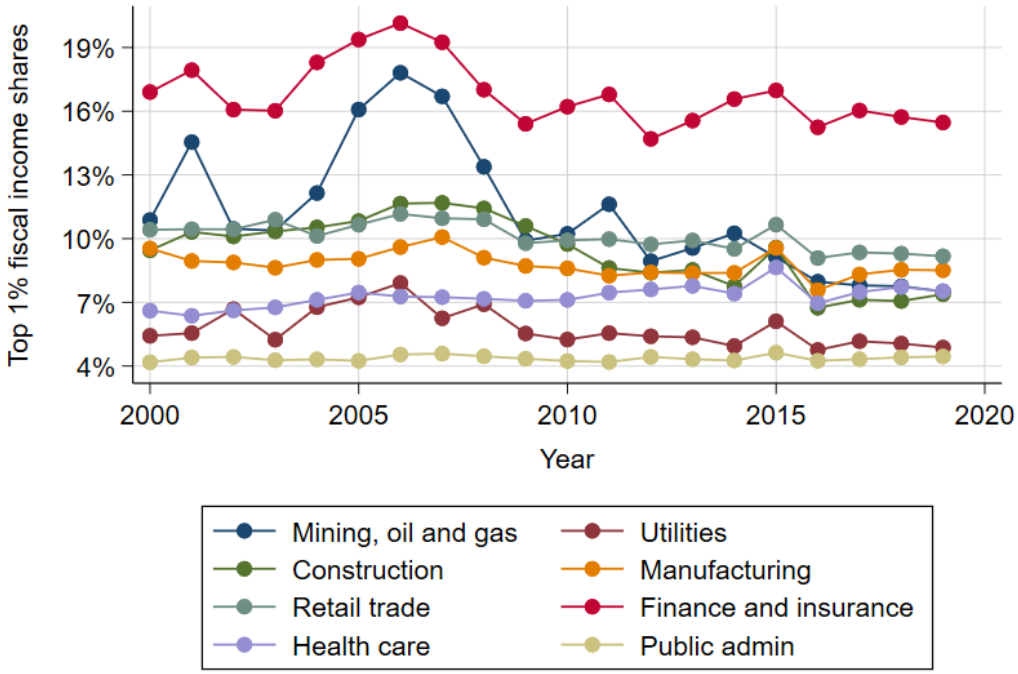
Turning to the bottom of the distribution, the bottom 50% of earners in most sectors earn between 18% and 27% of total fiscal income (nationally, the bottom 50% fiscal income share was

**Figure 6:** Top 0.1% fiscal income shares in key sectors, 2000-2019



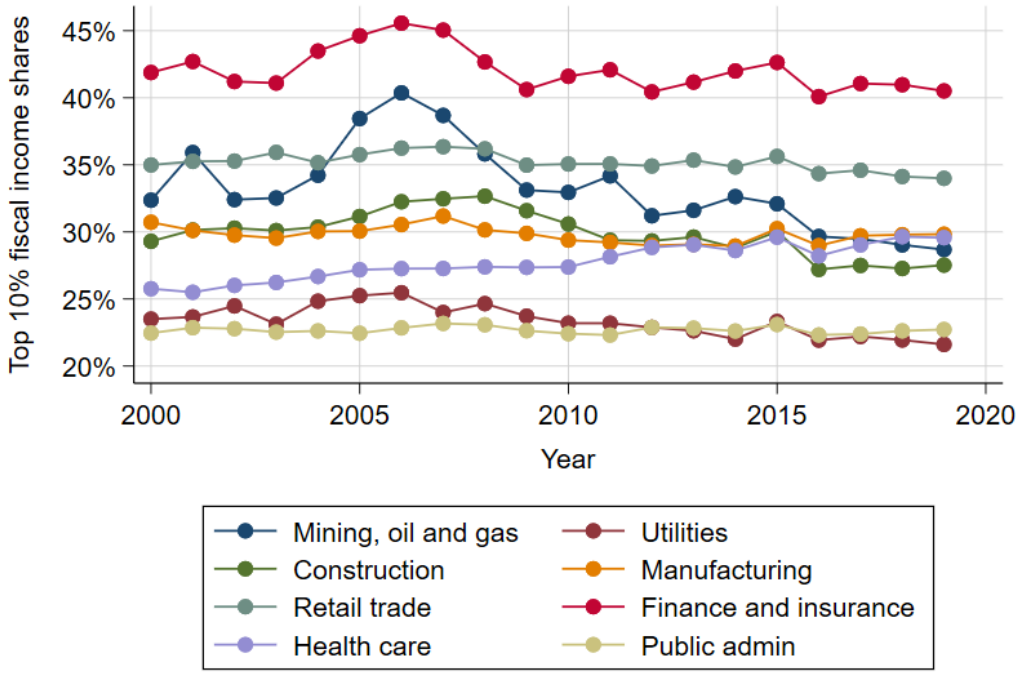

Fiscal income includes employment income, self-employment income, dividends, rents, interest, pensions and employment insurance.

**Figure 7:** Top 1% fiscal income shares in key sectors, 2000-2019



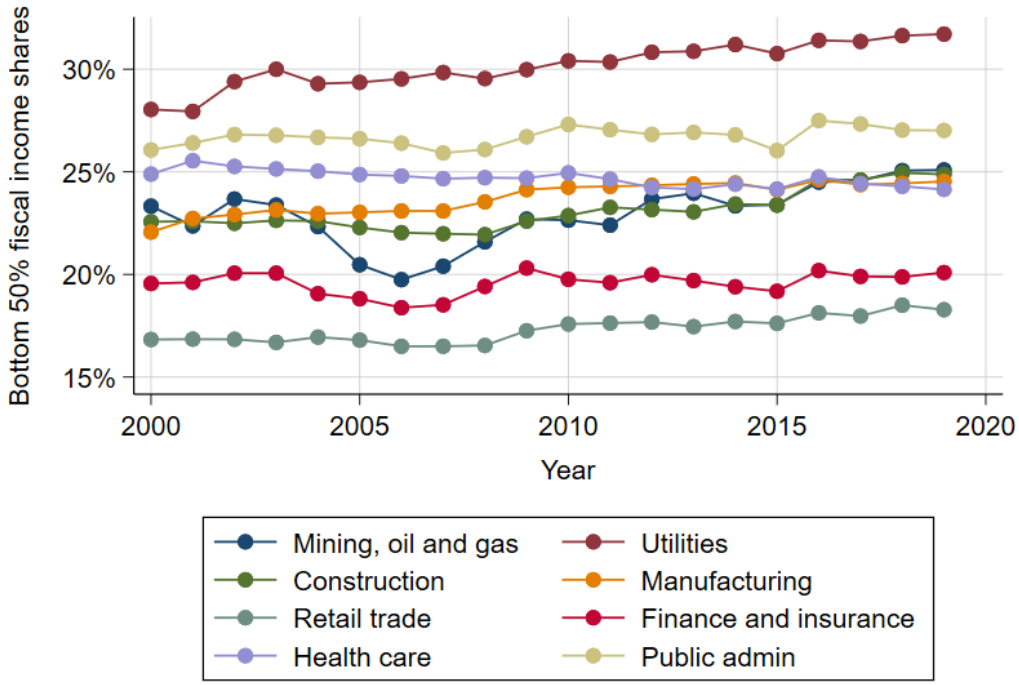

Fiscal income includes employment income, self-employment income, dividends, rents, interest, pensions and employment insurance.

**Figure 8:** Top 10% fiscal income shares in key sectors, 2000-2019




Fiscal income includes employment income, self-employment income, dividends, rents, interest, pensions and employment insurance.

**Figure 9:** Bottom 50% fiscal income shares in key sectors, 2000-2019




Fiscal income includes employment income, self-employment income, dividends, rents, interest, pensions and employment insurance.

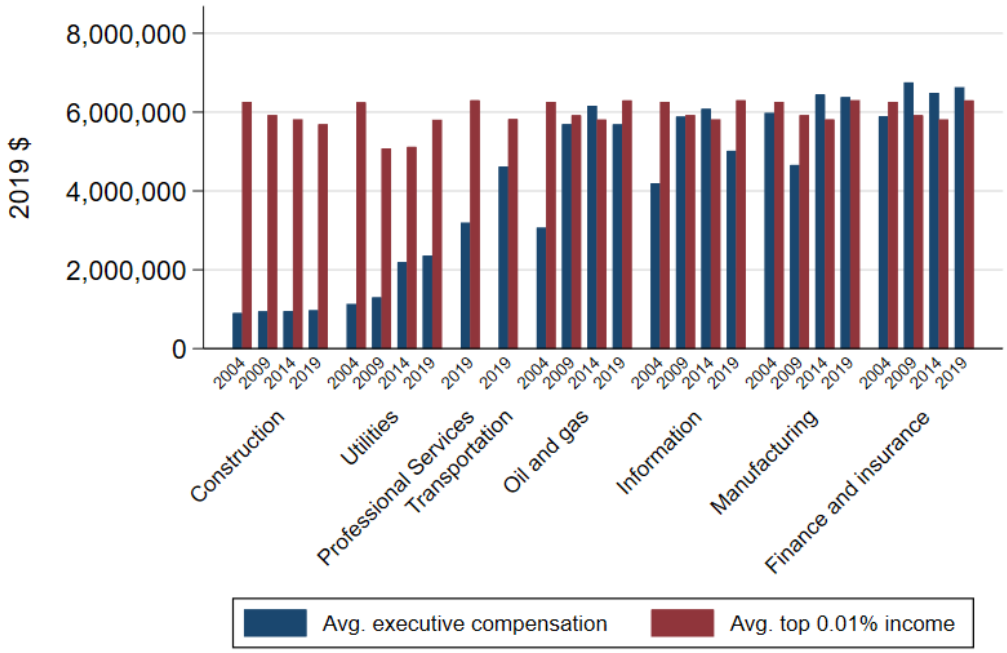
about 12%). The trends in bottom 50% shares in construction, mining, oil and gas, and management mirror the trends in the top 10% shares. Construction and mining, oil and gas's bottom 50% shares fell in the late 2000s before rising during the 2010s. Management's bottom 50% share increased from a low of 13% in 2000 to about 18% today. In 2019, arts and entertainment had the lowest bottom 50% share, at 15%. Utilities has by far the highest bottom 50% share, nearly 32% in 2019.

The significant contrast between utilities and the other high-income sectors deserves further examination. Utilities is one of the four highest-paying sectors, along with management, finance and insurance, and mining, oil and gas. However, these other three sectors also consistently rank among the most unequal sectors of the Canadian economy while utilities is the most equal. To understand this phenomenon better, we can examine average incomes by income group in each sector. The average income of the bottom 50% of earners in utilities is the highest of any sector, over $70,000 in 2019, while it is only $40,000 in finance. In contrast, the average income of the top 1% of earners is the highest in management, at $1.75 million, and second highest in finance, at over $1.5 million, and only $540,000 in utilities. As I examine the relations between different conceptions of power and the income distribution in Canada, I will examine whether they can explain the observed discrepancies between utilities and other high-earning sectors.

## 4.2 Executive compensation

I collected data on the executive compensation of the five highest paid executives at the eight largest publicly traded firms in the following sectors in 2004, 2009, 2014 and 2019: construction, utilities, mining, oil and gas, information, finance and insurance, and manufacturing. Data for professional and technical services and transportation and warehousing was also available for 2019. Because they are the highest paid employees of the largest firms, these executives are likely contained in the top 0.01% of earners in our tax data. However, this measure captures total compensation received from a single firm for these individuals rather than total income from all sources. It includes equity compensation that is not included in tax filings but excludes income from other

**Figure 10:** Top executive compensation and top 0.01% average income by sector and year




Average executive compensation refers to the average total compensation of the five highest paid officers at the eight largest publicly traded companies in each sector. Average top 0.01% income is the average income of the top 0.01% of taxfilers in each sector from the LAD tabulations.

employment, dividends, and other investment income. The executive sample would not include anyone in the top 0.01% who earned little labour income but had large capital incomes.

Nonetheless, Figure 10 shows that real average executive compensation aligns well with top 0.01% real average incomes for most sectors, with the exceptions of construction and utilities. In construction, our sample of executives excludes several of the largest Canadian companies because they are private. However, most of the largest utilities firms are public. The discrepancy could arise from firms being classified differently in the tax data than they are by Bloomberg or from a greater proportion of top earners in this sector being largely capital income earners. Unfortunately, the tax data is not suited to further breakdown income by source at the sector level.

In the manufacturing sector, I have excluded the executives from Valeant Pharmaceuticals (now Bausch Health Companies) in 2014 because three executives were awarded extremely high one-time bonus stock options ($21.4, $23.7, and $36.6 million, respectively) which lift the average top

**Table 1:** Decomposition of average real executive compensation in 2004 and 2019

| | 2004 | 2019 | % change |
|---|---|---|---|
| Total compensation | 3,805,055 | 4,410,602 | 15.9 |
| Equity-based compensation | 1,566,330 | 2,257,110 | 44.1 |
| Cash-based compensation | 2,238,725 | 2,154,103 | -3.7 |
| N | 211 | 256 | |

executive compensation in this sector-year over $8 million. Finance and insurance or manufacturing have the highest executive compensation in each year. In the mining, oil and gas sector, executive compensation peaked in 2014 during the oil price boom (see section 4.3.3).

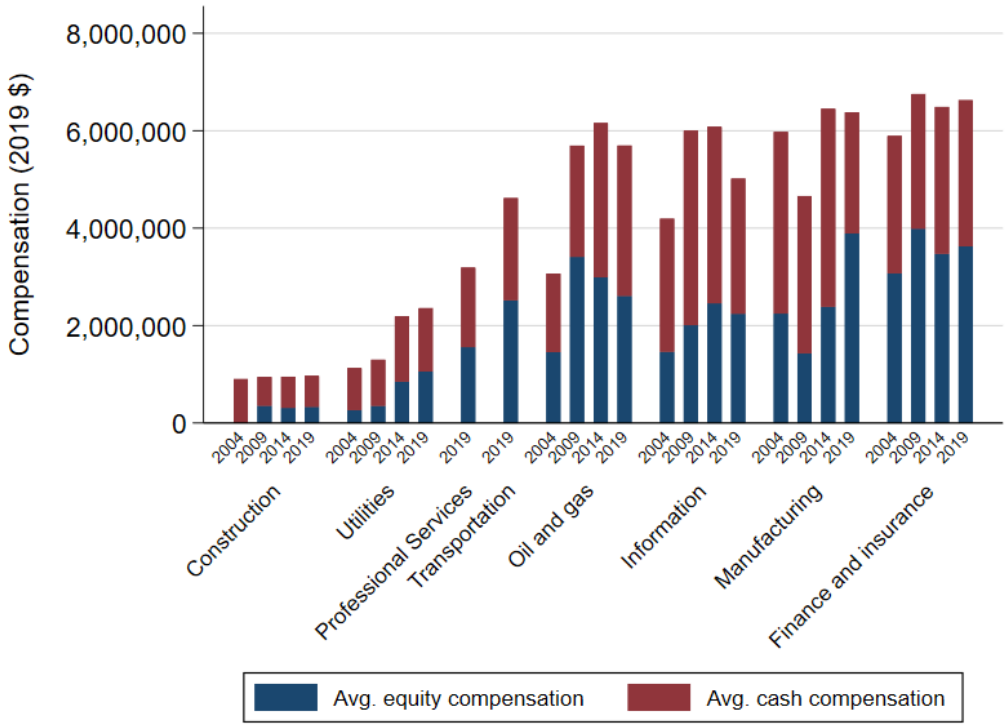
While the flat or declining nature of top 0.01% average incomes in many sectors may be surprising, two things should be noted. First, these are real average incomes and nominal top incomes have increased during this period. Second, at the national level, top 0.01% fiscal income shares have decreased slightly throughout this period (1.53% in 2004 and 1.35% in 2019).

Table 1 displays real executive composition and its components in 2004 and 2019. Across the six sectors for which data was available in 2004 and 2019, real average compensation increased by 15.9%. Equity-based compensation increased by 44.1% and cash-based compensation decreased by 3.7% during this period. Real top 0.01% average incomes from the tax data decreased by over 10% during this period in these sectors, clearly better reflecting changes in cash-based compensation. Thus, although national top 0.01% fiscal income shares have not grown over the past two decades, accounting for equity-based compensation could change this narrative.

Figure 11 displays the composition of top executive compensation in terms of cash and equity compensation by sector over time. Equity compensation increased in most sectors between 2004 and 2014. This could be driven by an increase in incentive-based pay, as well as increased awareness of the tax benefits associated with deferring realization. Top executives in finance and insurance had high levels of equity compensation even in 2004.

Given the unique characteristics of each sector, I now examine the evolution of several sectors' income distributions over time in greater detail. I focus on finance and insurance because of its

**Figure 11:** Cash-based and equity-based executive compensation by sector and year



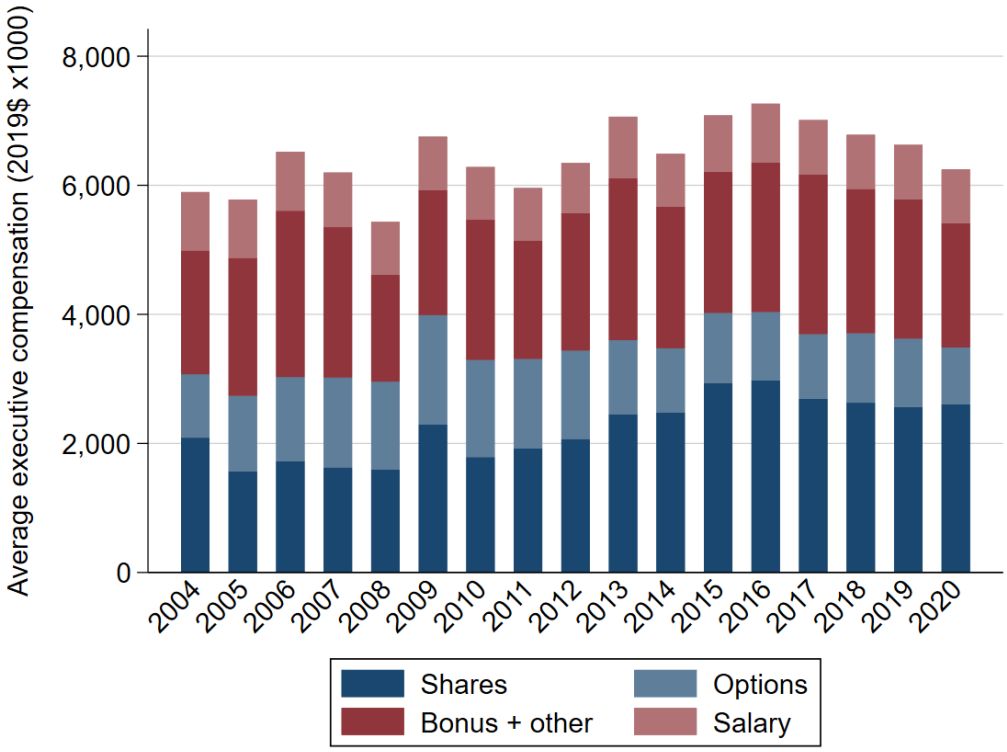

outsized contribution to top shares, utilities because of its unique combination of low inequality and high income, and mining, oil and gas because of its significant fluctuations in within-sector inequality.

## 4.3 Sector case studies

### 4.3.1 Finance and insurance

As shown in section 4.1, finance and insurance has one of the highest levels of within-sector inequality and is the largest of the four high-paying sectors, comprising over 2% of Canadian taxfilers. People employed in this sector also represent an outsized and growing proportion of the highest income taxfilers. The share of taxfilers in this sector in the national top 1% increased from 10.0% in 2000 to 12.8% in 2019 and the share in the national top 0.1% increased from 16.2% to 21.5% in 2019 (both

**Figure 12:** Decomposition of executive compensation in finance and insurance, 2004-2020




the highest of any sector in 2019; see Appendix Figure B7). Thus, understanding compensation in this sector is key to understanding top incomes in Canada.

First, I take a closer look at executive compensation in finance and insurance, for which I have annual data from 2004-2020. Figure 12 displays average annual executive compensation for the five highest paid executives at the eight largest firms broken down into shares, options, salary and other compensation. Overall, despite a significant increase in nominal incomes, real executive compensation in 2020 is only 5% higher than it was in 2004. A clear decline is observed during the financial crisis in 2008, entirely due to a decline in bonuses and other compensation (share, option and salary compensation remained stable). Stock and option compensation then increased drastically in 2009, reaching $4 million per executive, despite the fact that average real incomes in the sector declined in 2009, questioning whether executive compensation is truly tied to performance when firms perform poorly or only when they perform well. This level of equity-based compensation was not reached again until 2015 and 2016 when total compensation peaked.

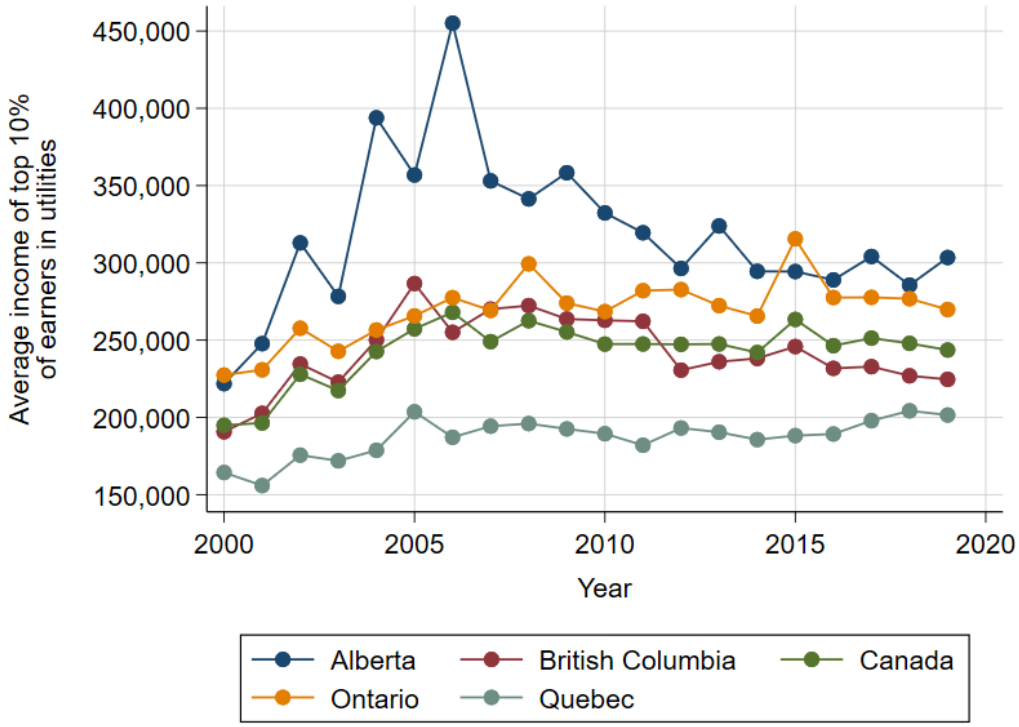
The lack of a significant increase in top executive compensation in finance is in line with the tax data which shows that top shares in the sector peaked in the late 2000s. Average real top incomes for the top 1%, top 0.1% and top 0.01% also peaked during this period. Figures 7, 8 and 9 show that top shares within the finance sector follow the same trends as those in the mining, oil and gas sector. While this could be due to national-level trends, other sectors do not display the same increases in top shares in 2001 and 2011. Furthermore, the correlation between top shares in finance and the mining, oil and gas sector is stronger than with any other sector ($r = 0.92$).

### 4.3.2 Utilities

As mentioned previously, of the highest paid sectors, utilities is by far the most equal. In Canada, utilities largely fall under provincial jurisdiction. Provinces have authority to decide how to regulate electricity, gas and water markets, whether to provide monopoly rights or allow for market competition, and whether to regulate prices. In Ontario, for example, natural gas rates are set by the Ontario Energy Board. In some provinces, such as British Columbia where BCHydro services 80% of the population with electricity, large utilities companies are directly owned by the province. Alberta has a more market-based approach, allowing private retailers to set their own prices. While some electricity providers were covered by Purchase Price Agreements, many of these agreements' expired in 2021, which coincided with a spike in electricity prices (Alberta Electric System Operator, 2022).

Figure 13 displays the average incomes of the top 10% of earners in key provinces within the utilities sector. Real average incomes were highest in Alberta, the province with the least regulated utilities sector, throughout this period, although other provinces narrowed the gap during the 2010s. There is also a significant uptick in average incomes of the top 10% in Ontario in 2015, which coincides with the beginning of the privatization of Hydro One, Ontario's largest electricity provider. This is in line with previous research in Great Britain which showed that top executives at utilities companies received significant pay increases within two years of privatization that could

**Figure 13:** Average incomes for the top 10% of earners in utilities in key provinces



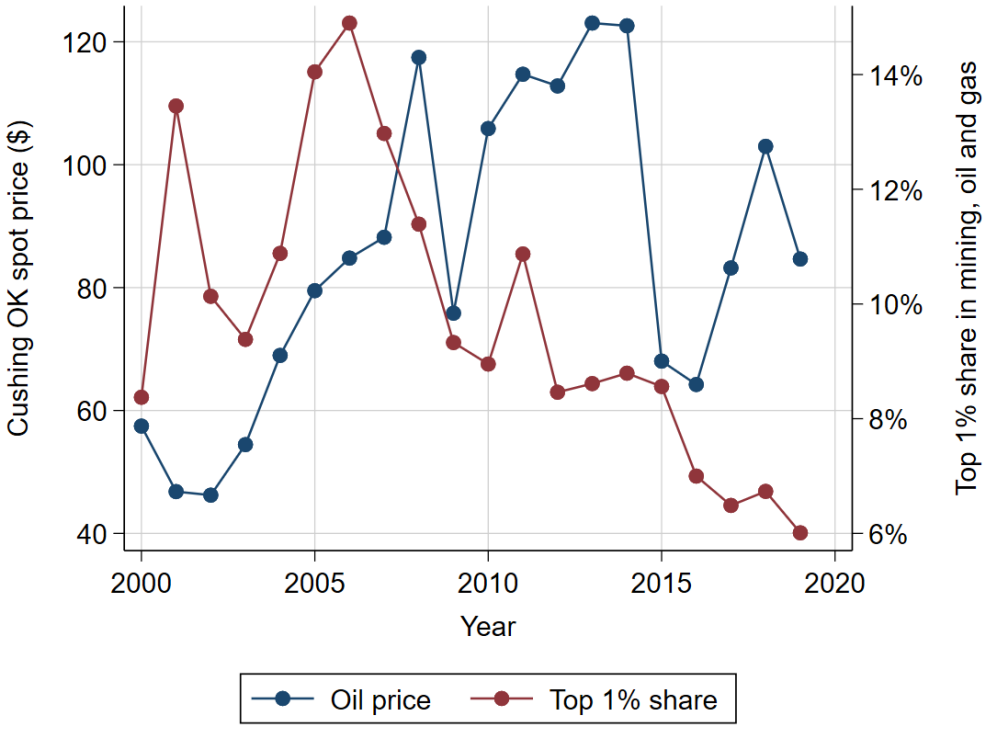

not be explained by increases in firm valuation or other measures of performance (Wolfram, 1998).

Thus it appears that the income distribution within the utilities sector is affected by the level of regulation. Increased regulation and public ownership is related to a more equal income distribution within the utilities sector. The mechanisms could include direct price regulation which limit the amount of rents available to a company and the potential for public scrutiny which limits the acceptable amount of compensation for executives to award themselves. This also likely explains why utilities is much more equally distributed than other high-earning sectors. Top executives have less power over the income distribution because of the oversight of independent regulators.

### 4.3.3 Mining, oil and gas

The mining, oil and gas sector is of interest because it is one of the few sectors that has experienced significant fluctuations in inequality over the past two decades. Top 1% shares were higher than

**Figure 14:** Top 1% fiscal income shares in mining, oil and gas and crude oil prices




every sector except management, real estate and finance in the late 2000s, peaking above 17%. This period aligns with the beginning of the oil price boom although while oil prices continued increasing through 2008, as shown in Figure 14, top 1% shares began to fall. Bottom 50% shares also fell significantly during the initial oil price boom (see Appendix Figure B8). This trend suggests that top earners may have captured the initial unexpected rents made available by the oil price boom but that later on these rents were distributed to other workers in the form of higher wages and increased employment. Oil prices again rose in 2010 and 2011, while top 1% shares increased significantly in 2011, although they did not persist at higher levels like they did in the late 2000s.

Unlike the finance and utilities sectors, which saw a greater increase in top shares in Alberta in the mid-2000s than in any other province, top shares increased in each major province in the oil and gas sector in the mid-2000s. Alberta's share of the national top 1% of earners also increased from about 13% in 2000 to nearly 21% in 2008 despite only having 10% of Canada's taxfilers (see Appendix Figure B9). All these results suggest that the oil price boom and its spillover effects on

the rest of the Albertan income distribution played a role in the rise in national top fiscal income shares in Canada in the mid-2000s. In the early 2010s, there is an increase in the top 1% pretax income share that is not reflected in the top 1% fiscal income share. That executive compensation in the mining, oil and gas sector peaked in 2014 suggests that this could be due to a shift towards retaining corporate profits and equity compensation for executives.

# 5 Power and income inequality

Next, I examine the relationships between different conceptions of power and sector-level income distributions. I describe my empirical specifications and then present the results.

## 5.1 Econometric specifications

Initial analyses are aimed at identifying whether conceptions of power are associated with sector-level income inequality, not identifying the causal effect of changes in power on the income distribution. Thus, these models focus on explaining variation between sectors, controlling for other factors that could affect sector-level income distributions.[2] Pesaran's CD test suggested the presence of contemperaneous correlations across panels, thus I use panel-corrected standard errors. Woolridge tests for autocorrelation rejected the null hypothesis of no autocorrelation at the 5% level for each model. Thus, I used Prais-Winsten regressions that allow for panel-specific autocorrelation with panel-corrected standard errors to estimate the relationship between measures of power and top and bottom income shares. I did not estimate models of this type for market concentration because market concentration statistics are not comparable across sectors. Main specifications to identify between-sector effects are of the following general form:

[2]Sector fixed effects alone explain 99.6% of variance in unionization rates, 87% of variance in unemployment rates, 94.7% of variance in CR4, 88.2% of variance in top 1% shares and 96.1% of variance in bottom 50% shares.

$$Y_{it} = \beta_0 + \beta_1 U_{it} + \alpha \mathbf{X_{it}} + \delta_t + \varepsilon_{it}$$

where $U_{it}$ is either the unemployment or unionization rate in sector i in year t. $Y_{it}$ is the income share of the top 0.1%, top 1%, top 10%, upper middle 40% or bottom 50% of taxfilers within sector i in year t. $X_{it}$ is a vector of covariates which include several factors that could affect the income distribution: the log of sector value added, the log of the number of taxfilers in the sector, the real average income in the sector, the share of workers that are female and the share of workers that are part-time. $\delta_t$ is a vector of year fixed effects that account for any variance caused by annual shocks that affect the income distribution across all sectors.

Then, I estimate the effect of changes in within-sector measures of power and real average incomes on changes in the income distribution. With 20 panels and 20 years of data (16 for market concentration), neither traditional time-series nor traditional panel data methods are optimal in this context. I chose to use panel data techniques but used time-series techniques to ensure estimated effects did not arise from spurious correlation. Hadri unit root tests for top and bottom income shares, unionization rates, market concentration and sector average incomes all reject the null hypothesis that all panels are stationary while Levin, Liu and Chiu tests reject the null hypothesis that panels contain unit roots for the first differences of these variables. Pedroni cointegration tests that allow for panel-specific autoregressive parameters found that top income shares are cointegrated with unionization rates, sector average incomes and market concentration. Thus, while some information is lost by using first differences, these panel regressions should not suffer from spurious correlation.

I use panel-corrected standard errors again because the CD test suggests contemperaneous correlation across panels. Cumby-Huizinga autocorrelation tests suggested the presence of one lag of autocorrelation in first difference models and four lags of autocorrelation in fixed effects models. Thus, in my main specification, I use Prais-Winsten first differenced models which are suitable to deal with only 1 lag of autocorrelation.

$$\Delta Y_{it} = \beta_0 + \sum_{j=1}^{4} \beta_j \Delta P_{it} + \alpha \mathbf{\Delta X_{it}} + \delta_t + \varepsilon_{it}$$

where $\Delta P_{it}$ is the change in the measure of power in sector i in year t. When $P$ is real average income, I use percentage growth instead of first differences to improve comparability across sectors. $\Delta X_{it}$ is a vector of first-differenced covariates and $\delta_t$ represents year fixed effects. Standard errors are heteroskedasticity-robust and adjusted for contemperaneous correlation across panels. In alternative specifications, I use a fixed effects model using the level of the dependent variable and the level of the independent variable.

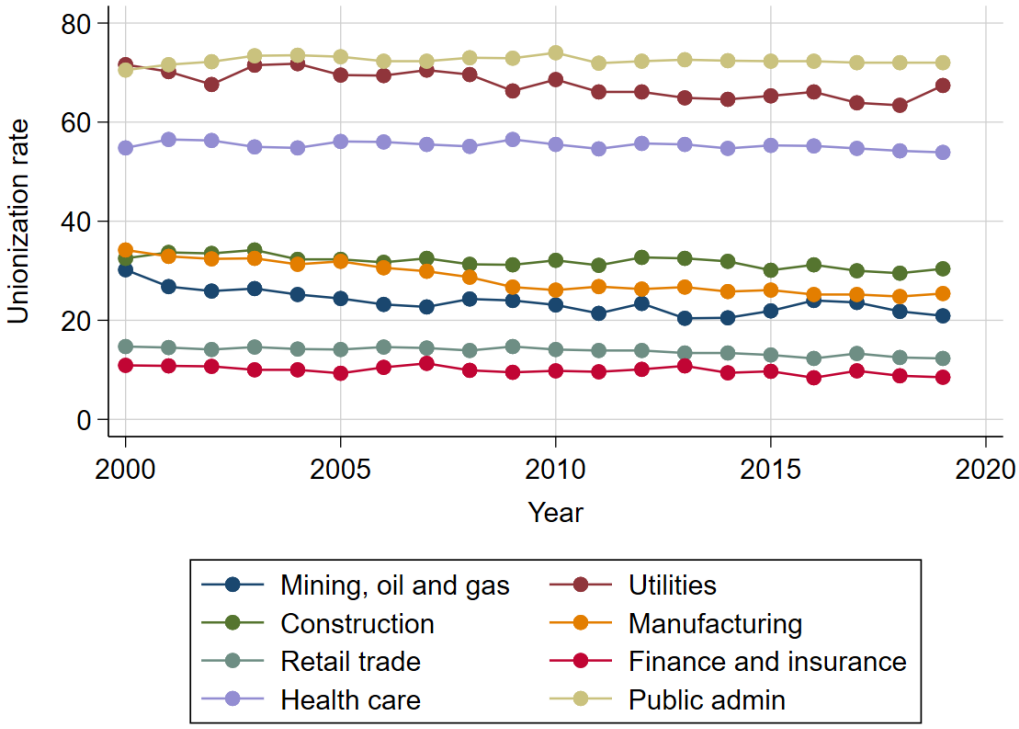
Three lags of the measure of power are included to assess the long-run effect of unionization and to alleviate concerns of reverse causality. Increased variation in top incomes, especially dividend realization, could result in a positive $\beta_1$ for the effect of changes in average incomes mechanically. If the relationship between average incomes and top shares was purely a result of higher variance in top incomes, then I would expect $\beta_2 = -\beta_1$.

## 5.2 Power and sector-level income inequality

In this section, I analyze whether the differences in inequality observed across sectors can be explained by different conceptions of power and then whether changes in inequality within sectors are related to changes in worker power and market power. First, I display the unionization rates in key sectors over time in figure 15. Sectors that are either directly controlled by the public sector or heavily regulated, including public administration, utilities, and health care, exhibit high and stable levels of unionization. On the other hand, unionization fell from 30.2% to 20.9% in mining, oil and gas and from 34.2% to 25.4% in manufacturing between 2000 and 2019.

Figure 16 and 17 display scatterplots of sector-year unionization rates against top 10% and bottom 50% within-sector fiscal income shares, respectively (see Appendix Figures C1 and C2 for top 1% and middle 40% shares, respectively). There is a clear negative relationship between

**Figure 15:** Unionization rates for key sectors, 2000-2019

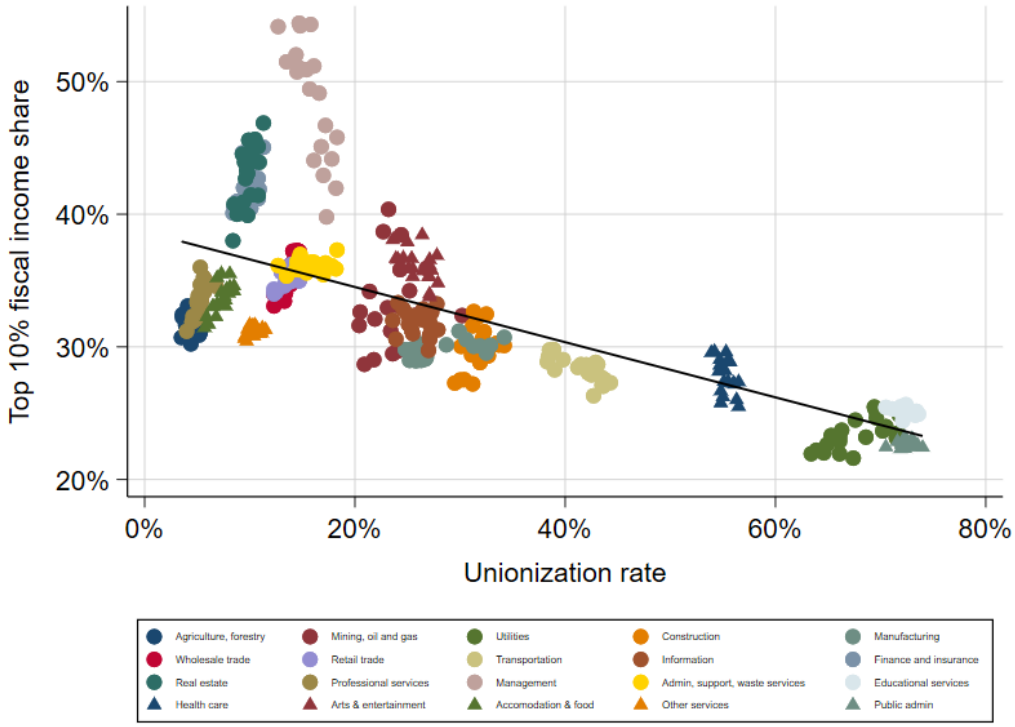



unionization rates and top 10% shares, although this is almost entirely between sectors, as shown by the clustering of sectors. Public sectors have the highest unionization rates and lowest top 10% shares. The inverse relationship is evident between bottom 50% shares and unionization rates. This relationship still holds, albeit slightly weaker, if sectors with significant direct public control (public administration, utilities, education services and health services) are removed (see Appendix Figure C3).

Figures 18 and 19 (and Appendix Figures C4 and C5) display analogous relationships for unemployment rates. There is a positive relationship between sector-level unemployment and top 10% shares and a negative relationship between sector-level unemployment and bottom 50% shares. The relationship between unemployment and top shares, however, is contingent on the inclusion of the management sector, which is somewhat of an outlier (see Appendix Figures C6 and C7).

Next, I examine whether the observed relationships between unionization, unemployment rates

**Figure 16:** Top 10% fiscal income shares and unionization rates by sector-year




and the income distribution can be explained by other factors known to affect the income distribution. Table 2 presents descriptive statistics of key variables I include in regression analyses.

Results of main specifications are displayed in Table 3. Coefficients can be interpreted as the estimated increase in the income share of the group in the top row for a 1% increase in the independent variable. Coefficients are between-sector effects, these are not effects of *changes* in unionization or unemployment. They demonstrate that relationships between unionization, unemployment and the income distribution across sectors hold after controlling for several other factors that could affect sector-level income distributions.

Sectors with 10% higher unionization have on average 2.1% lower top 10% shares (6.4% of the mean). Over half of this additional income for the top 10% is concentrated in the top 1% and almost half of this is concentrated in the top 0.1%. This income is drawn about equally from the middle 40% and the bottom 50%. Further analysis (see appendix Table C4) demonstrates

**Figure 17:** Bottom 50% fiscal income shares and unionization rates by sector-year

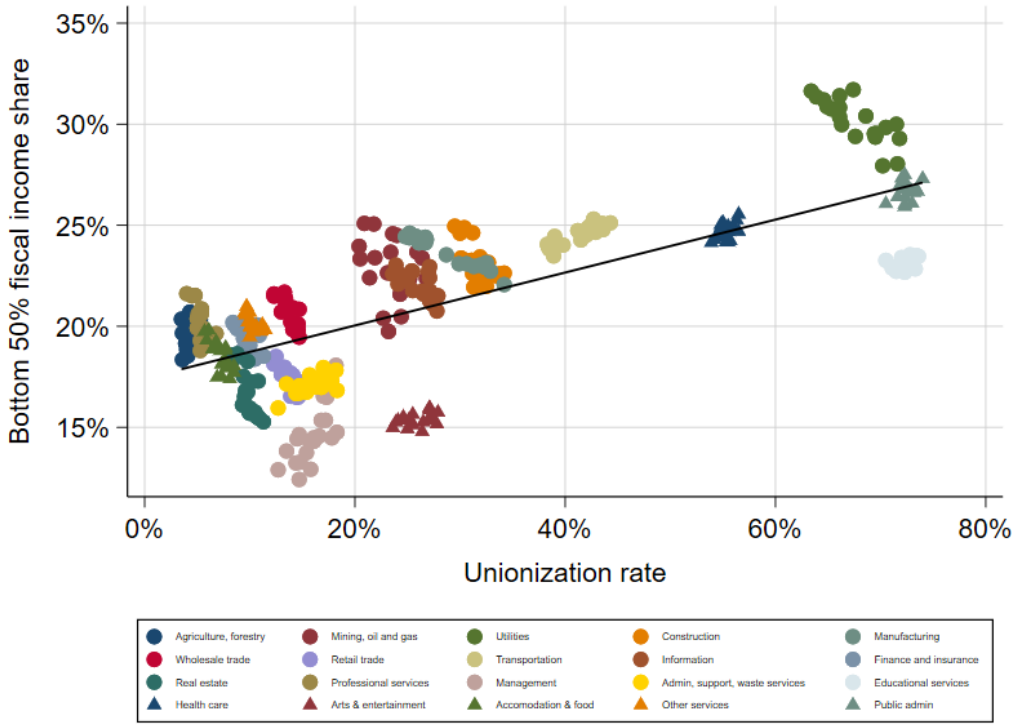
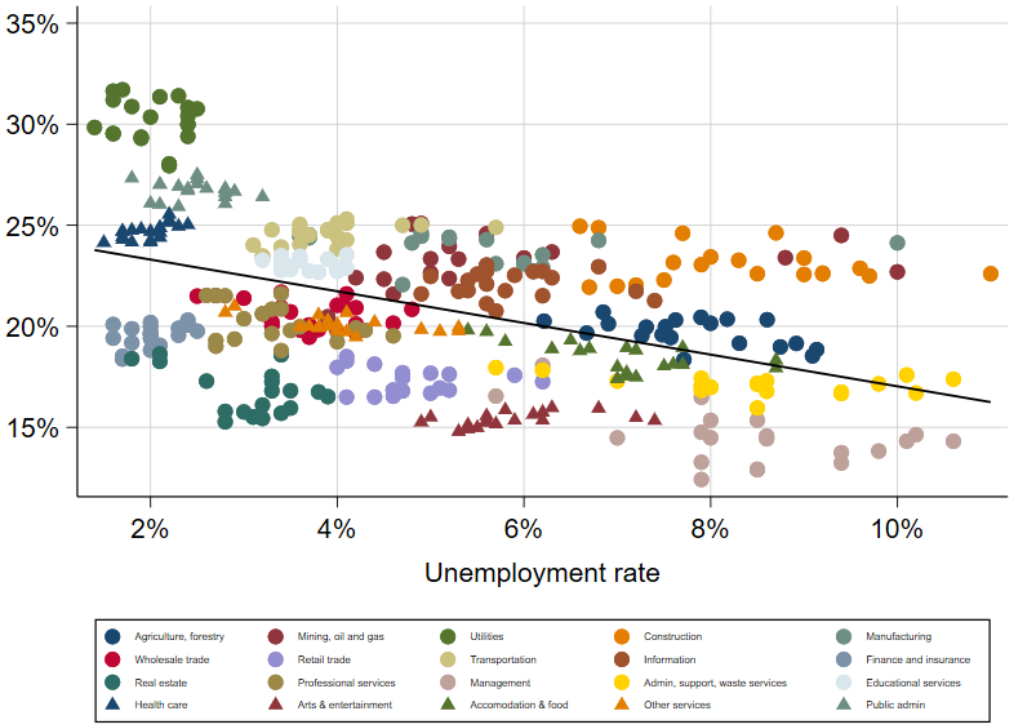



**Figure 18:** Top 10% fiscal income shares and unemployment rates by sector-year

**Figure 19:** Bottom 50% fiscal income shares and unemployment rates by sector-year




that the majority of the additional income for the top 10% (1.9%) comes from taxfilers between the $25^{th}$ percentile and the $75^{th}$ percentile of the within-sector distribution. Sectors with 10% higher unemployment are predicted to have 0.8% higher top 10% shares but this is not statistically significant. The relationship between unemployment and the middle 40% of the distribution is negative and statistically significant. When including both unemployment and unionization in the same model, the unemployment rate is no longer statistically significant while unionization is relatively unchanged.

Two other factors that could affect sector-level income distributions for which data was not available for the full sample are educational inequality and import competition. Appendix Tables C6 and C7 show that the relationship between unionization and the income distribution holds after controlling for both of these factors. However, the relationship between the middle 40% share and the unemployment rate is not robust. The exclusion of the management sector renders the relationship between unemployment and the income distribution insignificant (see Appendix Table

**Table 2:** Summary statistics for sector-level variables

| | Mean | SD | Min | Max | N |
|---|---|---|---|---|---|
| Bottom 50% | 21 | 3.9 | 12 | 32 | 400 |
| Middle 40% | 46 | 3.8 | 33 | 52 | 400 |
| Top 10% | 33 | 6.5 | 22 | 54 | 400 |
| Top 1% | 10 | 4.4 | 4.2 | 28 | 400 |
| Top 0.1% | 3.3 | 1.8 | .6 | 8.2 | 400 |
| Unemployment rate | 4.9 | 2.3 | 1.4 | 11 | 400 |
| Unionization rate | 28 | 22 | 3.5 | 74 | 400 |
| CR4 | 22 | 15 | .87 | 62 | 239 |
| CR8 | 34 | 23 | 4.5 | 89 | 186 |
| Number of taxfilers | 803,327 | 552,380 | 83,950 | 2,297,665 | 400 |
| AY index | 44 | 5 | 35 | 52 | 57 |
| Share of workers with a bachelor's | .24 | .15 | .061 | .64 | 57 |
| Ratio of imports to gross output | .24 | .22 | .0045 | .69 | 72 |
| Average income (2019 $) | 62,754 | 25,302 | 19,596 | 135,030 | 400 |
| Share of workers that are female | .43 | .17 | .1 | .83 | 400 |
| Share of workers that are part-time | .18 | .11 | .013 | .43 | 400 |

C8). Overall, there is little evidence of any relationship between sector-level unemployment and the sector-level income distribution.

Results are similar if capital gains are included in the income shares (see Appendix Table C9). However, as pointed out by the DINA methodology (Blanchet, Chancel, Flores, & Morgan, 2021), these income distributions still exclude retained corporate profits that are earned by capital owners. Further research should use sector-level data on corporate profits to explore the relationship between retained earnings and measures of power.

Figures do not suggest any economically significant contemporaneous relationship between changes in concentration ratios nor changes in unionization rates and changes in top or bottom income shares (see Appendix Figures C8-C13). However, five-year differences in unionization are negatively related to top 10% shares and, to a lesser extent, positively related to bottom 50% shares (see Appendix Figures C14 and C15). In first differences models when controlling for sector characteristics, there is a small positive relationship between changes in market concentration and changes in the income distribution (see Appendix Table C10). These effects do not appear in bivariate figures because

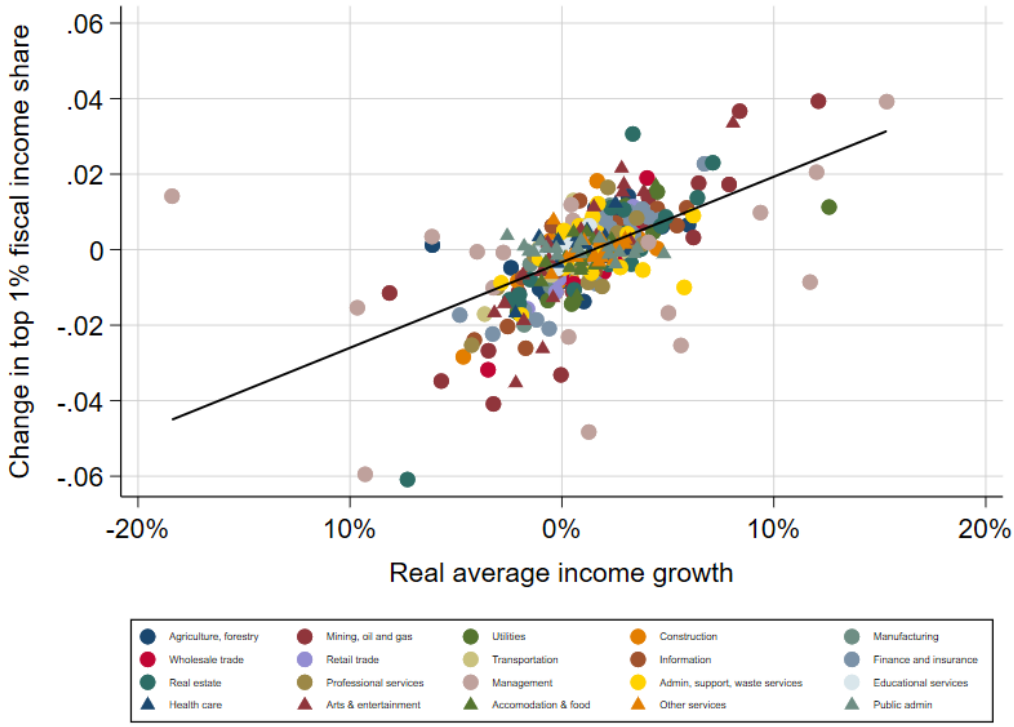
**Table 3:** Relationship between unionization, unemployment and sector-level income distributions

| | Top 0.1% | Top 1% | Top 10% | Upper Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| *Panel A: Separate models* | | | | | |
| Unionization rate | -0.056*** | -0.135*** | -.209*** | 0.125*** | 0.107*** |
| | (0.008) | (0.013) | (0.022) | (0.012) | (0.013) |
| Unemployment rate | 0.022 | 0.027 | 0.083 | -0.144 * | 0.011 |
| | (0.052) | (0.094) | (0.095) | (0.057) | (0.049) |
| *Panel B: Unionization and unemployment in the same model* | | | | | |
| Unionization rate | -0.060*** | -0.142*** | -.224*** | 0.123*** | 0.097*** |
| | (0.009) | (0.012) | (0.017) | (0.012) | (0.011) |
| Unemployment rate | -0.024 | -0.051 | 0.069 | -0.089 | 0.031 |
| | (0.054) | (0.092) | (0.091) | (0.054) | (0.047) |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses.
Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models control for log of sector GDP, log of number of taxfilers in the sector, average sector income, female employment share, part-time employment share and year fixed effects.

they are contingent on controlling for changes in average income, which, as shown in section 5.3, have a significant effect on the income distribution. Results suggest that a 1 percentage point increase in the market share of the four largest firms in a sector increases the top 1% fiscal income share by 0.08 percentage points and that this effect is persistent after three years. Furthermore, the effect on top 1% shares is greater than the effect on top 10% shares, in line with the theory that it is mainly top executives at large firms who benefit from increasing market concentration in the short-run. Unionization rates only have a significant contemporaneous effect on the top 1% income share. However, effects get stronger over time. After three years, a 1% increase in unionization is predicted to reduce top 10% fiscal income shares by 0.33 percentage points, corresponding to a 0.12 percentage point increase in bottom 50% shares and 0.20 percentage point increase in upper middle 40% shares.

**Figure 20:** Top 1% fiscal income shares and growth in real average income by sector-year

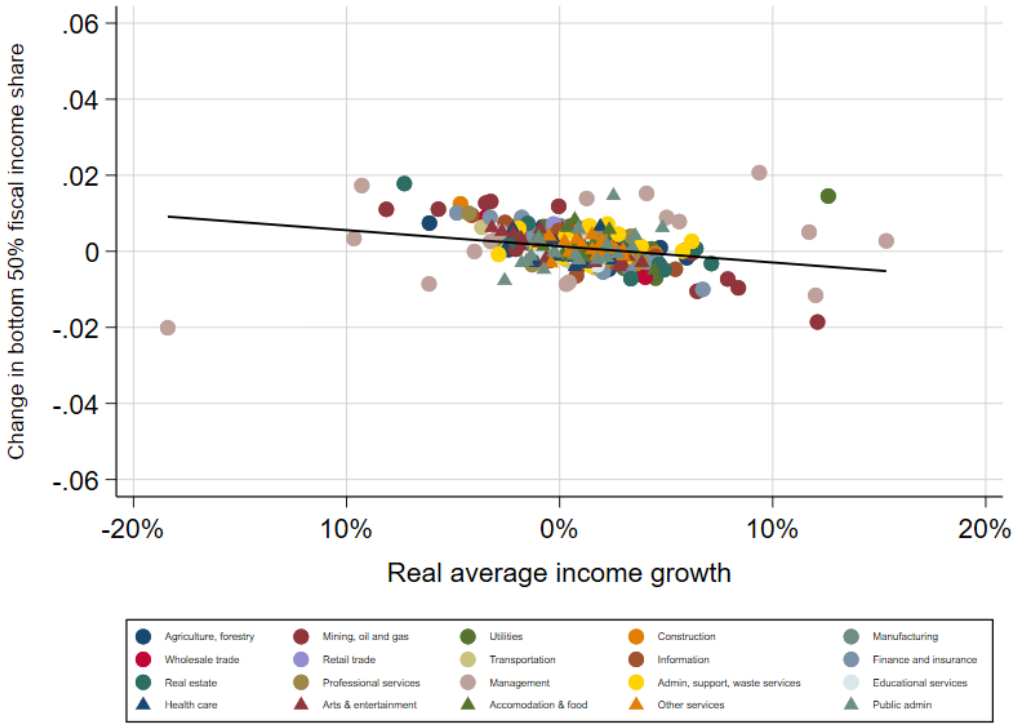



## 5.3 Rent-seeking and income inequality

Next, I turn to an exploratory analysis of the relationship between real average sector-level income growth and the income distribution. Figures 20 and 21 present scatterplots of changes in top 1% and bottom 50% income shares, respectively, against real average sector income growth. There is a strong positive relationship between average income growth and top 1% shares and a moderate negative relationship between average income growth and bottom 50% shares. As in previous analyses, the management sector is clearly an outlier in some years in both figures. Thus, main regression analyses exclude the management sector while results including the management sector are available in Appendix Table C14.

As discussed previously, these observed relationships could be driven purely by increased volatility of top incomes. Figure 22 addresses this concern by plotting sectors' centered top 1% shares against the previous years' income growth. While the effect is clearly weaker than the contem-

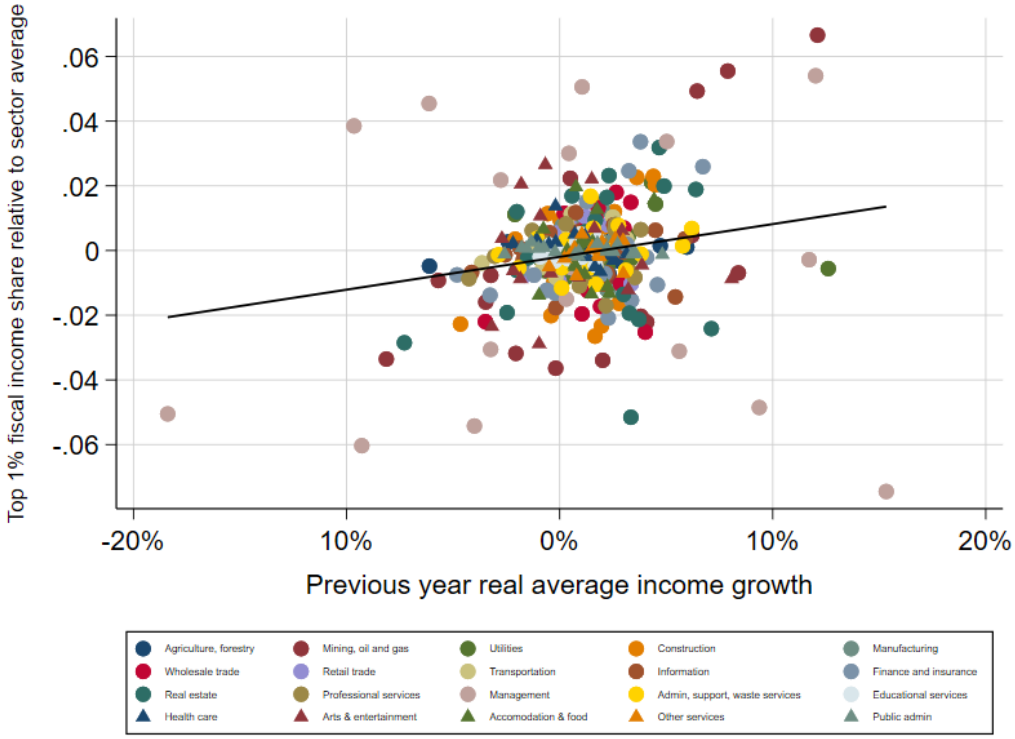
**Figure 21:** Bottom 50% fiscal income shares and growth in real average income by sector-year




poraneous case, there is still a positive relationship between top shares and previous year income growth. This suggests that while some of the effect of average income growth on top shares is explained by volatility in top incomes, average income growth has some persistent effects on the income distribution. These figures also suggest, however, that these effects are not exclusively driven by increases in real average incomes leading to increased top shares, but also by reductions in real average incomes leading to reductions in top shares. This may be due to wage contracts at the bottom of the distribution being stickier than at the top of the distribution. Next, I estimate these effects quantitatively.

Main results are displayed in Table 4. Growth in sector average incomes is significantly related to income shares of each group at the 0.1% level. Results suggest that a 1% increase in real average income in a sector is associated with an increase of 0.275 percentage points in top 1% income shares. Over half of this increase goes to the top 0.1%. The effect on top 10% income shares is 0.264, indicating there is no positive effect on the income shares of the $2^{nd} - 10^{th}$ percentiles. Income

**Figure 22:** Top 1% fiscal income shares and past growth in real average income by sector-year




shares fall by 0.194 for the upper middle 40% and 0.070 for the bottom 50%. About two thirds of the increase in top 10% shares is from a reduction in income shares of the middle 50% ($25^{th} - 75^{th}$ percentiles).

Lag coefficients are largely small and statistically insignificant, indicating that these effects are not purely driven by increases in top incomes driving up average incomes. The effect of income growth on top 1% shares is only mitigated by about 15% after one year. To test whether sector average income growth has an effect on the income distribution in the long-run, I use a Wald test of whether the sum of the four coefficients (contemporaneous and three lags) is significantly different from 0. The effect is statistically significant at the 1% level for all groups except the bottom 50% which is significant at the 5% level. Coefficients suggest that a 1% increase in real average incomes is related to a sustained increase in top 1% income shares of 0.22 and a sustained fall in middle 50% shares of 0.14 after three years.

**Table 4:** Effect of changes in sector average incomes on income shares for each income group

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% | Middle 50% |
|---|---|---|---|---|---|---|
| Income growth (%) | 0.171*** | 0.275*** | 0.264*** | -0.194*** | -0.070*** | -0.173*** |
| | (0.015) | (0.023) | (0.019) | (0.013) | (0.010) | (0.012) |
| Income growth, t-1 | -0.055*** | -0.040 | -0.024 | 0.026* | 0.001 | 0.012 |
| | (0.016) | (0.022) | (0.019) | (0.013) | (0.010) | (0.012) |
| Income growth, t-2 | 0.019 | 0.011 | -0.006 | -0.003 | 0.009 | 0.010 |
| | (0.013) | (0.020) | (0.017) | (0.011) | (0.009) | (0.011) |
| Income growth, t-3 | -0.024 | -0.025 | -0.021 | 0.016 | 0.008 | 0.016 |
| | (0.013) | (0.019) | (0.017) | (0.010) | (0.009) | (0.011) |
| $N$ | 304 | 304 | 304 | 304 | 304 | 304 |
| P-value LR effect | 0.000 | 0.000 | 0.000 | 0.000 | 0.018 | 0.000 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 estimates the effect of a $1 increase in sector average incomes on average incomes for each income group. After three years, a $1 increase in average incomes is associated with a $50 increase in top 0.1% incomes, a $15 increase in top 1% incomes and a $0.45 increase in bottom 50% incomes.

In Appendix Table C15, I estimate the effect of income growth on the level of top shares using an alternative fixed effects model. Results show that levels of top shares remain higher than the within-sector average even three years after income growth while bottom 50% shares and middle 40% shares remain significantly lower. However, the effects are reduced by about two thirds after three years. Thus, while much of the increase can be explained by increased top incomes inflating sector-level growth, income growth has persistent effects on the income distribution.

Now, I examine whether these effects are mitigated by unionization. If workers have greater bargaining power, top earners may be less able to capture new sectoral incomes. In Table 6, I interact unionization rates with income growth (alternative models which interacted unionization rates with lags of income growth had similar results). Unionization does mitigate the effect of

**Table 5:** Effect of changes in sector average incomes on average incomes for each income group

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% | Middle 50% |
|---|---|---|---|---|---|---|
| Income growth | 194.487*** | 40.228*** | 6.384*** | 0.600*** | 0.235*** | 0.389*** |
| | (18.101) | (4.060) | (0.381) | (0.058) | (0.035) | (0.045) |
| Income growth, t-1 | -53.998** | -7.412 | -0.649 | 0.124* | 0.030 | 0.049 |
| | (20.113) | (4.195) | (0.383) | (0.059) | (0.035) | (0.046) |
| Income growth, t-2 | -1.121 | -5.395 | -0.848* | 0.103* | 0.083** | 0.101* |
| | (17.860) | (3.718) | (0.337) | (0.052) | (0.032) | (0.040) |
| Income growth, t-3 | -89.232*** | -12.712*** | -1.172*** | 0.173*** | 0.103** | 0.143*** |
| | (15.155) | (3.613) | (0.335) | (0.051) | (0.031) | (0.041) |
| $N$ | 323 | 323 | 323 | 323 | 323 | 323 |
| P-value LR effect | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

average income growth on the income distribution for each income group. Marginal effects plots (see Appendix Figures C16, C17, C18) show that the effect of a 1% increase in sector average incomes on top 1% and top 10% shares is mitigated at high levels of unionization. There is no effect of a 1% increase in sector average incomes on bottom 50% shares for sectors at the $90^{th}$ percentile of the distribution of unionization.

The interaction with unionization provides some further support for the idea that the causal chain runs from growth in average incomes to increases in top shares. If increases in top incomes were instead due to increases in the productivity of top earners, and this was driving the observed increases in average incomes, there is no reason that these effects would be less pronounced in more heavily unionized sectors. Rather, these results align with a rent-seeking interpretation whereby unions are able to mitigate the proportion of new income that top earners are able to capture.

I also examined whether this effect was present for income shocks, rather than simply trends in sector average incomes. An income shock is defined as real income growth at least 2% higher than the moving average growth rate over the past three years. Results are displayed in Table C16. The

**Table 6:** Effect of changes in sector average incomes and unionization on income shares for each income group

| | Top 0.1% |
|---|---|
| Income growth (%) | -0.124*** |
| | (0.014) |
| Income growth x unionization | 0.002*** |
| | (0.000) |
| Unionization rate | -0.007*** |
| | (0.001) |
| *N* | 361 |

Standard errors in parentheses
Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year fixed effects.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

same pattern of results is evident. Although some effects are not statistically significant after three years, coefficients are all in the hypothesized direction after three years and effects are significant at the 1% level for top 1% shares and at the 5% level for middle 40% shares. Results are also robust to excluding the 2008-09 recession (Appendix Table C17) and to excluding the 2015-16 period in which top shares change because of a change in government (Appendix Table C18).

# 6 Discussion

Income inequality at the national level has changed little in Canada since the turn of the $21^{st}$ century. However, it has fluctuated considerably throughout this period and various sectors have contributed differently to national inequality over time. Top fiscal income shares peaked in the late 2000s during a sustained period of growth. This period also coincided with peaks in oil prices and the share of Albertans in the national top 1%. This provides suggestive evidence that top earners in Canada were able to capture rents produced by unexpected increases in global oil prices during this period. The largest increase in top shares in Canada occurred during the 1990s, a period during which the national unionization rate declined by nearly 5 percentage points. This macro-level

evidence suggests that power and rent-seeking play a role in shaping the income distribution.

However, a similar rise in oil prices and period of economic growth in the early 2010s did not result in the same increase in top fiscal income shares observed in the late 2000s. This may be due to a shift in top earners' incomes from labour to capital income and a shift towards equity-based compensation for executives. I found that real equity compensation for top executives increased significantly from 2004-2019 while real cash-based compensation declined. This highlights the need to use measures of income inequality that capture retained corporate profits such as applying the DINA methodology (Blanchet et al., 2021), as well as to use publicly available executive compensation data to improve estimates of the distribution of retained corporate profits.

Sector-level evidence also supports the notion that worker power and market power shape the income distribution. I developed novel estimates of the income distribution in 20 different sectors in Canada from 2000-2019. Top shares have fluctuated most drastically in the mining, oil and gas sector, possibly because of the volatility of global oil prices. Excluding the management sector, finance and insurance, a sector in which there is evidence of significant rents (Philippon & Reshef, 2012), has the highest top income shares. Top earners in the finance and insurance sector now represent over 12% of the national top 1% while the share of the national top 1% in manufacturing has declined considerably.

Sectors with higher unionization rates have lower top fiscal income shares and higher bottom fiscal income shares, especially in the middle of the distribution. Increases in market concentration are related to increases in top 1% shares once sector average income growth is controlled for. Decreases in unionization increase top 10% shares and decrease bottom 50% and middle 40% shares and these effects get stronger over time. Consistent with Stansbury and Summers (2020), the effect of changes in unionization is larger than the effect of changes in market concentration, suggesting that declining worker power plays a greater role in structural changes observed in the economy than rising market power.

I also find that growth in average sector incomes has a positive effect on top income shares.

This can partially be explained by the higher variability of top incomes because dividend payments are lumpier than salaries. However, I find that average income growth at the sector level has a persistent effect on top income shares three years later, indicating that this cannot be fully explained by mechanical effects. I argue that one feasible explanation is that top earners are able to use their power to capture new rents available to firms. Together, these results suggest the need to focus on systemic explanations of income distributions, rather than relying exclusively on the individual factors suggested by neoclassical economic theory.

Future research should use executive compensation data to better estimate the distribution of retained corporate profits, which up until now, have been assumed to follow the distribution of observed capital income in pretax income estimates. This could be done at the sector level so that links between sector-level measures of power and pretax income inequality could be analyzed. Further work is also needed to measure market power. Measuring price markups instead of market concentration and the use of a more disaggregated set of sectors would improve the precision of analyses of market power. Access to income tax microdata would permit linking these measures of market power to measures of income inequality for more disaggregated sectors.

# 7 Conclusion

In conclusion, economic debate around the income distribution must be refocused to examine questions of power rather than being restricted to individual-level explanations. Sectors of the Canadian economy with higher levels of worker power have lower levels of inequality. Peaks in inequality nationally and at the sector-level have coincided with periods of growth, suggesting opportunistic rent-seeking by top earners. Decreases in sector-level worker power and increases in market power are associated with increases in sector-level inequality. To tackle inequality, we must acknowledge the power of certain groups to shape the income distribution, develop better theories to understand this power and act politically to change it.

# References

Abul Naga, R. H., & Yalcin, T. (2008, December). Inequality measurement for ordered response health data. *Journal of Health Economics*, *27*(6), 1614–1625. Retrieved 2022-05-11, from https://www.sciencedirect.com/science/article/pii/S0167629608000994 doi: 10.1016/j.jhealeco.2008.07.015

Alberta Electric System Operator. (2022, March). *AESO 2021 Annual Market Statistics* (Tech. Rep.). Calgary, AB. Retrieved 2022-05-24, from https://www.aeso.ca/assets/Uploads/market-and-system-reporting/2021-Annual-Market-Stats-Final.pdf

Alesina, A., Stantcheva, S., & Teso, E. (2018, February). Intergenerational Mobility and Preferences for Redistribution. *American Economic Review*, *108*(2), 521–554. Retrieved 2022-05-26, from https://pubs.aeaweb.org/doi/10.1257/aer.20162015 doi: 10.1257/aer.20162015

Atkinson, A. B. (2007). Measuring top incomes: Methodological issues. In A. B. Atkinson & T. Piketty (Eds.), *Top incomes over the twentieth century.* Oxford: Oxford University Press.

Autor, D., Dorn, D., Katz, L. F., Patterson, C., & Van Reenen, J. (2020, May). The Fall of the Labor Share and the Rise of Superstar Firms. *The Quarterly Journal of Economics*, *135*(2), 645–709. Retrieved 2022-05-07, from https://doi.org/10.1093/qje/qjaa004 doi: 10.1093/qje/qjaa004

Bajgar, M., Berlingieri, G., Calligaris, S., Criscuolo, C., & Timmis, J. (2019). *Industry Concentration in Europe and North America* (OECD Productivity Working Papers No. 18). Paris: OECD.

Blanchet, T., Chancel, L., Flores, I., & Morgan, M. (2021). *Distributional National Accounts Guidelines* (Tech. Rep.).

Boadway, R. (2015). Tax Policy for a Rent-Rich Economy. *Canadian Public Policy / Analyse de Politiques*, *41*(4), 253–264. Retrieved 2022-05-13, from http://www.jstor.org/stable/43699179

Cairó, I., & Sim, J. (2020, August). Market Power, Inequality, and Financial Instability. *Finance and Economics Discussion Series*, *2020*(057). Retrieved 2022-04-18, from https://www.federalreserve.gov/econres/feds/market-power-inequality-and-financial-inst doi: 10.17016/FEDS.2020.057

Card, D., Lemieux, T., & Riddell, W. C. (2004). Unions and wage inequality. *Journal of Labor Research*, *25*(4), 41.

CBC News. (2011, June). *FAQ: Back-to-work legislation.* Retrieved 2022-06-30, from https://www.cbc.ca/news/canada/faq-back-to-work-legislation-1.1000525

Cohen, A. J., & Harcourt, G. C. (2003, February). Retrospectives Whatever Happened to the Cambridge Capital Theory Controversies? *Journal of Economic Perspectives*, *17*(1), 199–214. Retrieved 2022-06-30, from https://pubs.aeaweb.org/doi/10.1257/089533003321165010 doi: 10.1257/089533003321165010

De Loecker, J., Eeckhout, J., & Unger, G. (2020, May). The Rise of Market Power and the Macroeconomic Implications*. *The Quarterly Journal of Economics*, *135*(2), 561–644. Retrieved 2022-05-11, from https://doi.org/10.1093/qje/qjz041 doi: 10.1093/qje/qjz041

Dumas, A., & Silber, J. (2021, March). On the measurement of educational attainment and inequality with ordinal variables. *Education Economics*, *29*(2), 158–172. Retrieved 2022-05-03, from https://www.tandfonline.com/doi/full/10.1080/09645292.2020.1856336 doi: 10.1080/09645292.2020.1856336

Ennis, S. F., Gonzaga, P., & Pike, C. (2019, July). Inequality: A hidden cost of market power. *Oxford Review of Economic Policy*, *35*(3), 518–549. Retrieved 2022-02-04, from https://academic.oup.com/oxrep/article/35/3/518/5531384 doi: 10.1093/oxrep/grz017

Financial Post Staff. (2021, July). FP500: The Premier Ranking of Corporate Canada. *Financial Post*. Retrieved 2022-03-26, from https://financialpost.com/financial-post-magazine/fp500/fp500-the-premier-ranking-of-corporate-canada-2

Fine, B. (2019, September). Economics and Interdisciplinarity: One Step Forward, N Steps Back? *Revista Crítica de Ciências Sociais*(119), 131–148. Retrieved 2022-05-09, from https://journals.openedition.org/rccs/9230 (Number: 119 Publisher: Centro de Estudos Sociais da Universidade de Coimbra) doi: 10.4000/rccs.9230

Fortin, N., Green, D. A., Lemieux, T., Milligan, K., & Riddell, W. C. (2012, June). Canadian Inequality: Recent Developments and Policy Options. *Canadian Public Policy*, *38*(2), 121–145. Retrieved 2022-05-04, from https://utpjournals.press/doi/10.3138/cpp.38.2.121 doi: 10.3138/cpp.38.2.121

Fortin, N. M., & Lemieux, T. (1997, May). Institutional Changes and Rising Wage Inequality: Is There a Linkage? *Journal of Economic Perspectives*, *11*(2), 75–96. Retrieved 2022-03-30, from https://pubs.aeaweb.org/doi/10.1257/jep.11.2.75 doi: 10.1257/jep.11.2.75

Greenspon, J., Stansbury, A., & Summers, L. H. (2021). Productivity and Pay in the United States and Canada. *International Productivity Monitor*, *41*, 28.

Herzer, D. (2016, September). Unions and Income Inequality: A Heterogeneous Panel Cointegration and Causality Analysis. *LABOUR*, *30*(3), 318–346. Retrieved 2022-05-07, from https://onlinelibrary.wiley.com/doi/10.1111/labr.12075 doi: 10.1111/labr.12075

Jacobs, D., & Dirlam, J. C. (2016, September). Politics and Economic Stratification: Power Resources and Income Inequality in the United States. *American Journal of Sociology*, *122*(2), 469–500. Retrieved 2022-05-07, from https://www.journals.uchicago.edu/doi/full/10.1086/687744 (Publisher: The University of Chicago Press) doi: 10.1086/687744

Kalleberg, A. L., Wallace, M., & Althauser, R. P. (1981). Economic Segmentation, Worker Power, and Income Inequality. *American Journal of Sociology*, *87*(3), 651–683. Retrieved 2022-02-11, from http://www.jstor.org/stable/2778937 (Publisher: University of Chicago Press)

Kollmeyer, C. (2018, October). Trade union decline, deindustrialization, and rising income inequality in the United States, 1947 to 2015. *Research in Social Stratification and Mobility*, *57*, 1–10. Retrieved 2022-03-28, from

https://www.sciencedirect.com/science/article/pii/S0276562417301774 doi: 10.1016/j.rssm.2018.07.002

Krueger, A. (1993). How computers have changed the wage structure: evidence from microdata, 1984–1989. *Quarterly Journal of Economics*, *108*(1), 33–60.

Lemieux, T. (1998, April). Estimating the Effects of Unions on Wage Inequality in a Panel Data Model with Comparative Advantage and Nonrandom Selection. *Journal of Labor Economics*, *16*(2), 261–291. Retrieved 2022-04-18, from https://www.journals.uchicago.edu/doi/10.1086/209889 doi: 10.1086/209889

Lemieux, T., & Riddell, W. C. (2015). Who Are Canada's Top 1 Percent? In D. Green, W. C. Riddell, & F. St-Hilaire (Eds.), *Income inequality: The Canadian Story* (p. 54). Institute for Research on Public Policy.

Levy, F., & Murnane, R. J. (1992). U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations. *Journal of Economic Literature*, *30*(3), 1333–1381. Retrieved 2022-05-26, from http://www.jstor.org/stable/2728062 (Publisher: American Economic Association)

Lin, K.-H., & Tomaskovic-Devey, D. (2013). Financialization and U.S. Income Inequality, 1970–2008. *American Journal of Sociology*, *118*(5), 46.

Macdonald, D. (2021, January). *The Golden Cushion: CEO compensation in Canada* (Tech. Rep.). Canadian Centre for Policy Alternatives. (ISBN: 978-1-77125-534-9)

Marchand, Y., Dubé, J., & Breau, S. (2020, March). Exploring the Causes and Consequences of Regional Income Inequality in Canada. *Economic Geography*, *96*(2), 83–107. Retrieved 2022-02-04, from https://doi.org/10.1080/00130095.2020.1715793 (Publisher: Routledge _eprint: https://doi.org/10.1080/00130095.2020.1715793) doi: 10.1080/00130095.2020.1715793

Park, Y. W., Nelson, T., & Huson, M. R. (2001). Executive Pay and the Disclosure Environment: Canadian Evidence. *Journal of Financial Research*, *24*(3), 347–365. Retrieved 2022-02-04, from

https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1475-6803.2001.tb00774.x (_eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1475-6803.2001.tb00774.x) doi: 10.1111/j.1475-6803.2001.tb00774.x

Perkins, T. (2022, April). Revealed: top US corporations raising prices on Americans even as profits surge. *The Guardian*. Retrieved 2022-05-13, from https://www.theguardian.com/business/2022/apr/27/inflation-corporate-america-increased-prices-profits

Philippon, T., & Reshef, A. (2012, November). Wages and Human Capital in the U.S. Finance Industry: 1909–2006*. *The Quarterly Journal of Economics*, *127*(4), 1551–1609. Retrieved 2022-05-27, from https://doi.org/10.1093/qje/qjs030 doi: 10.1093/qje/qjs030

Riddell, W. C. (1993). Unionization in Canada and the United States: A Tale of Two Countries. In D. E. Card & R. B. Freeman (Eds.), *Small differences that matter: labor markets and income maintenance in Canada and the United States.* Chicago: University of Chicago Press.

Saez, E., & Veall, M. R. (2005, May). The Evolution of High Incomes in Northern America: Lessons from Canadian Evidence. *American Economic Review*, *95*(3), 831–849. Retrieved 2022-02-04, from https://pubs.aeaweb.org/doi/10.1257/0002828054201404 doi: 10.1257/0002828054201404

Sraffa, P. (1960). *Production of Commodities by Means of Commodities: Prelude to a Critique of Economic Theory.* Cambridge, UK: Cambridge University Press.

Stansbury, A., & Summers, L. H. (2020). *The declining worker power hypothesis: an explanation for the recent evolution of the american economy* (Tech. Rep. No. 27193). Cambridge, MA: NBER. Retrieved 2022-05-07, from https://www.nber.org/system/files/working$_p$apers/w27193/w27193.pdf

Statistics Canada. (2022, May). *Undistributed corporation profits - Table 6-10-0117-01.* Retrieved from https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610011701

Stiglitz, J. (2017). *Inequality, Stagnation and Market Power: The Need for a New Progressive Era* (Tech. Rep.). Roosevelt Institute.

Stiglitz, J. E. (2016). Inequality and Economic Growth. In M. Jacobs & M. Mazzucato (Eds.), *Rethinking Capitalism* (pp. 134–155). Wiley-Blackwell. Retrieved 2022-05-27, from https://doi.org/10.7916/d8-gjpw-1v31

The Globe and Mail. (2009, June). *100 Biggest Private Companies.* Retrieved 2022-04-12, from https://www.theglobeandmail.com/report-on-business/100-biggest-private-companies/article4278568/

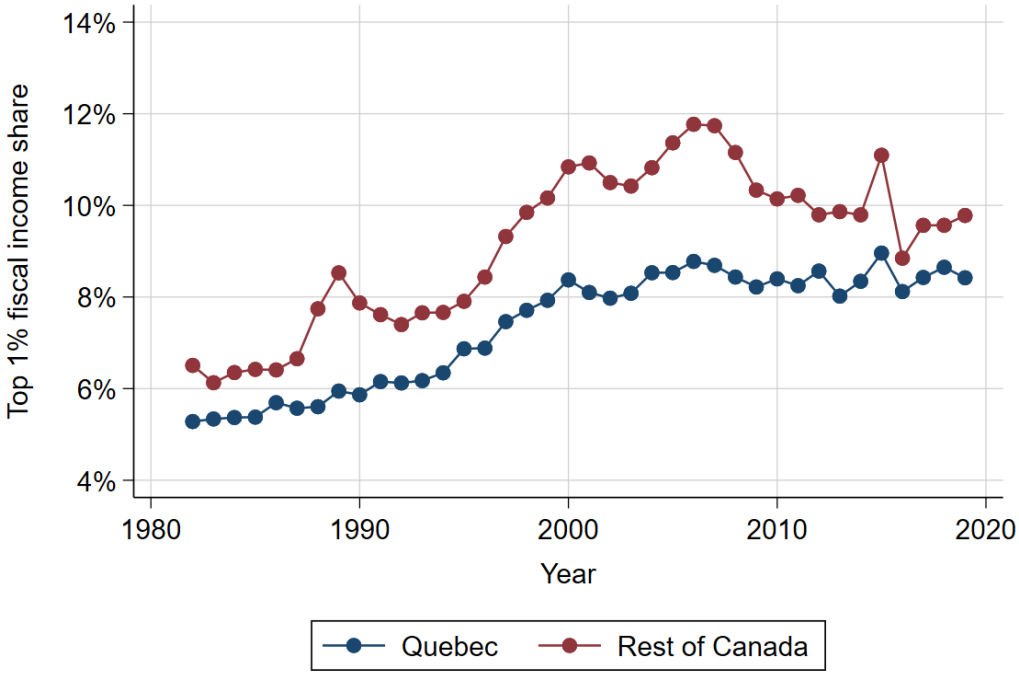
The Globe and Mail. (2015, June). *Canada's 50 biggest private companies.* Retrieved 2022-04-12, from https://www.theglobeandmail.com/report-on-business/rob-magazine/top-1000/rankings/canadas-50-biggest-private-companies/article25020836/

Tomaskovic-Devey, D., & Lin, K.-H. (2011, August). Income Dynamics, Economic Rents, and the Financialization of the U.S. Economy. *American Sociological Review*, *76*(4), 538–559. Retrieved 2022-05-12, from https://doi.org/10.1177/0003122411414827 (Publisher: SAGE Publications Inc) doi: 10.1177/0003122411414827

Wolfram, C. D. (1998). Increases in Executive Pay Following Privatization. *Journal of Economics & Management Strategy*, *7*(3), 327–361. Retrieved 2022-06-13, from https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1430-9134.1998.00327.x (_eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1430-9134.1998.00327.x) doi: 10.1111/j.1430-9134.1998.00327.x

# Appendix A Canadian income inequality

**Figure A1:** Top 1% fiscal income share within Quebec and within the rest of Canada, 1982-2019




Fiscal income includes employment income, self-employment income, dividends, rents, interest, pensions and employment insurance.

**Figure A2:** Sector composition of top 1% and next 9% of taxfilers, 2000-2019

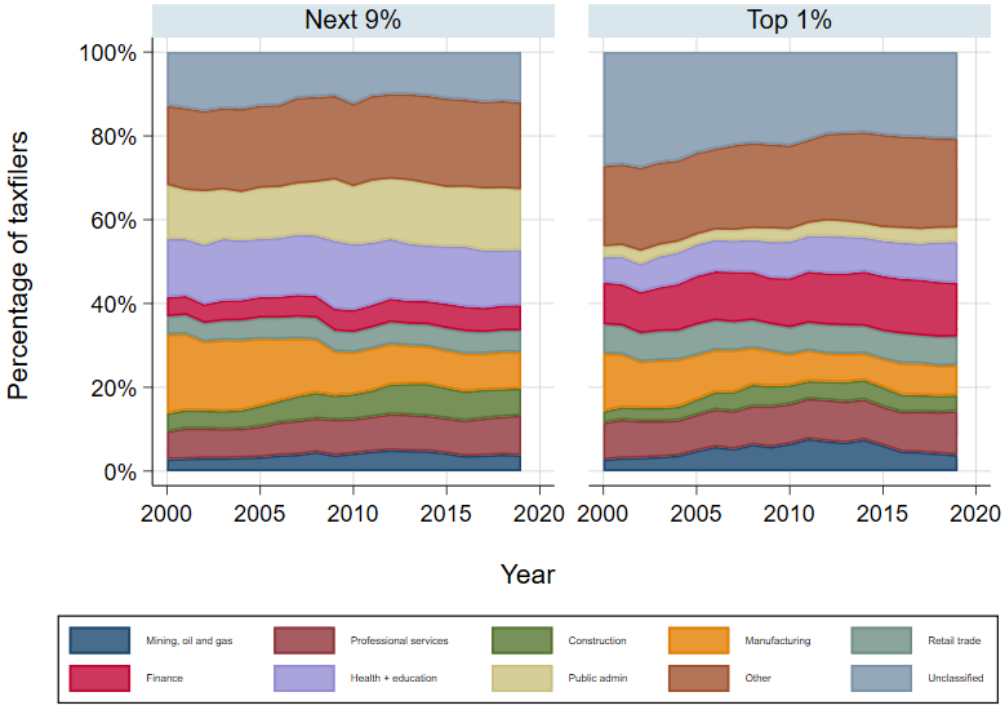



**Figure A3:** Sector composition of bottom 50% and upper middle 40% of taxfilers, 2000-2019

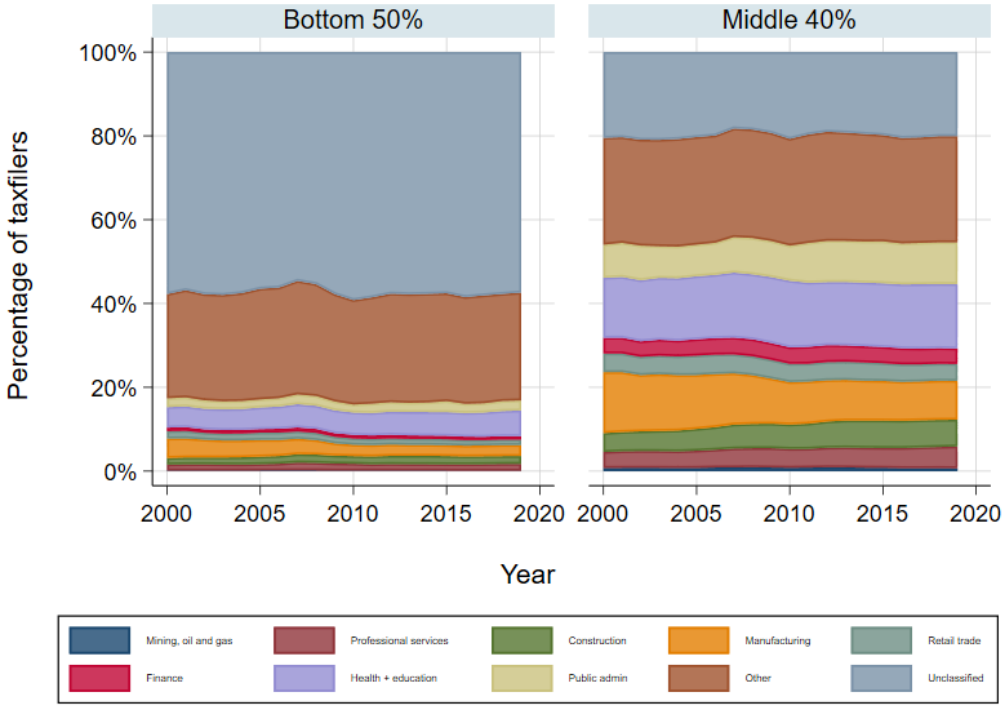
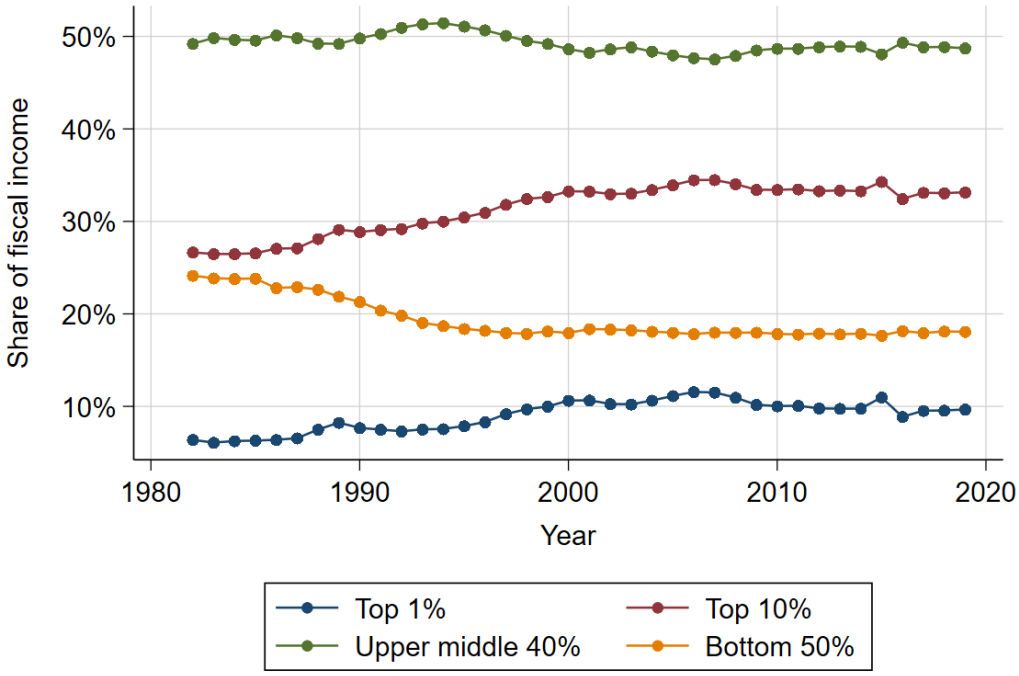


**Figure A4:** Fiscal income shares of key groups in Canada, 1982-2019




Fiscal income includes employment income, self-employment income, dividends, rents, interest, pensions and employment insurance.

# Appendix B Sector-level income inequality in Canada

**Figure B1:** Percentage of Canadian taxfilers for remaining sectors, 2000-2019

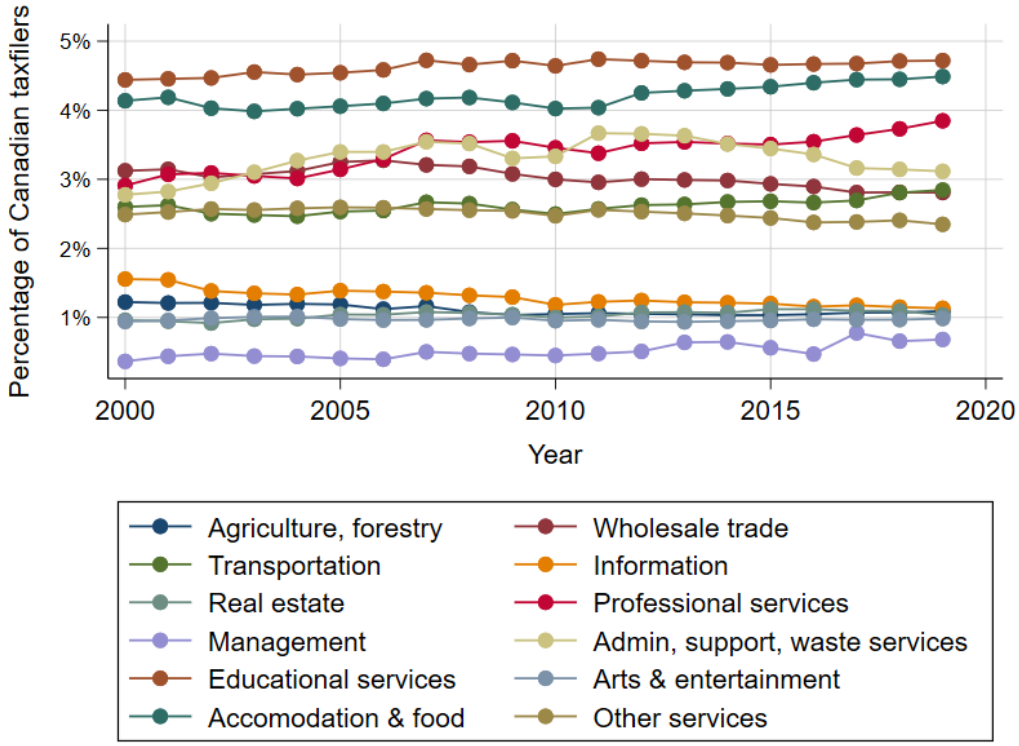


**Figure B2:** Average incomes of remaining sectors in 2019 $, 2000-2019

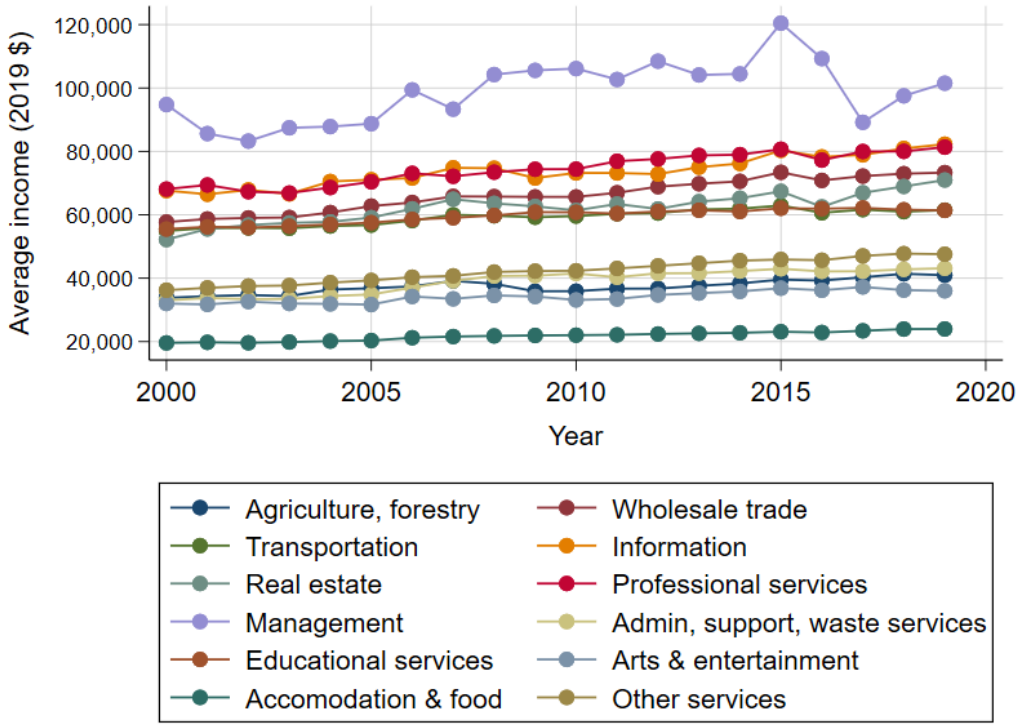



**Figure B3:** Top 0.1% shares for remaining sectors, 2000-2019

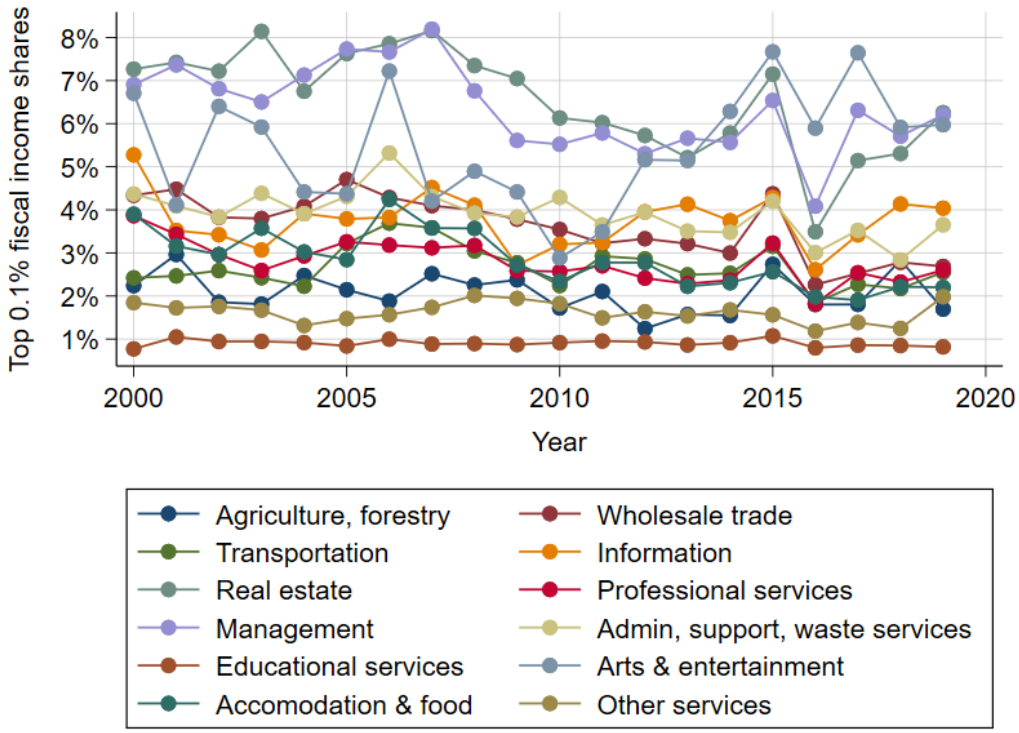


**Figure B4:** Top 1% shares for remaining sectors, 2000-2019

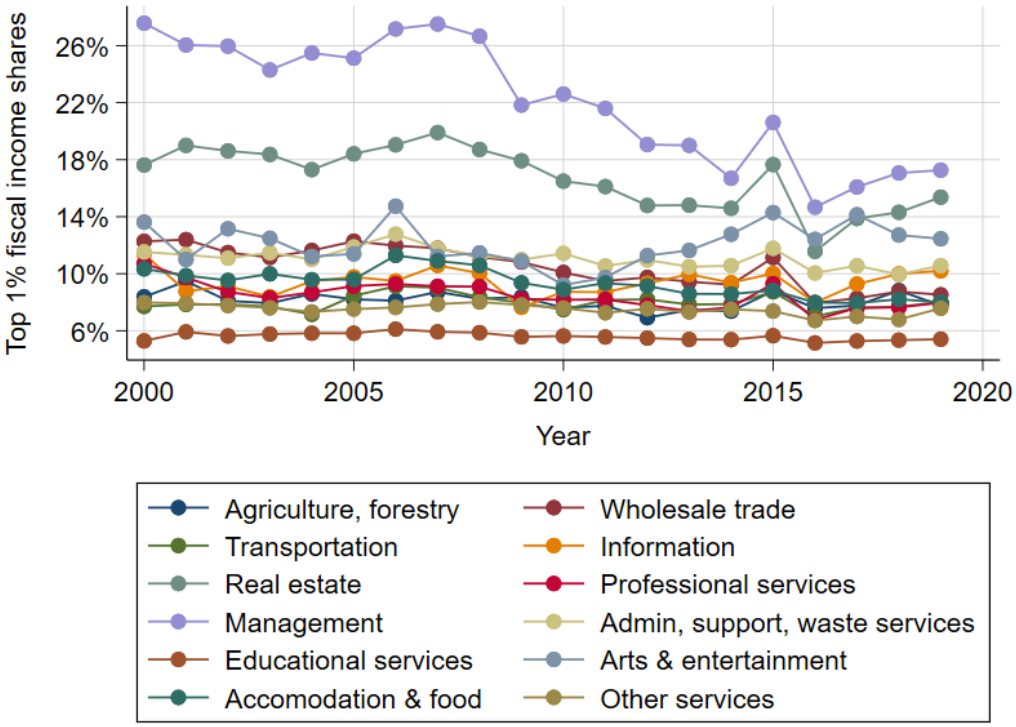



**Figure B5:** Top 10% shares for remaining sectors, 2000-2019

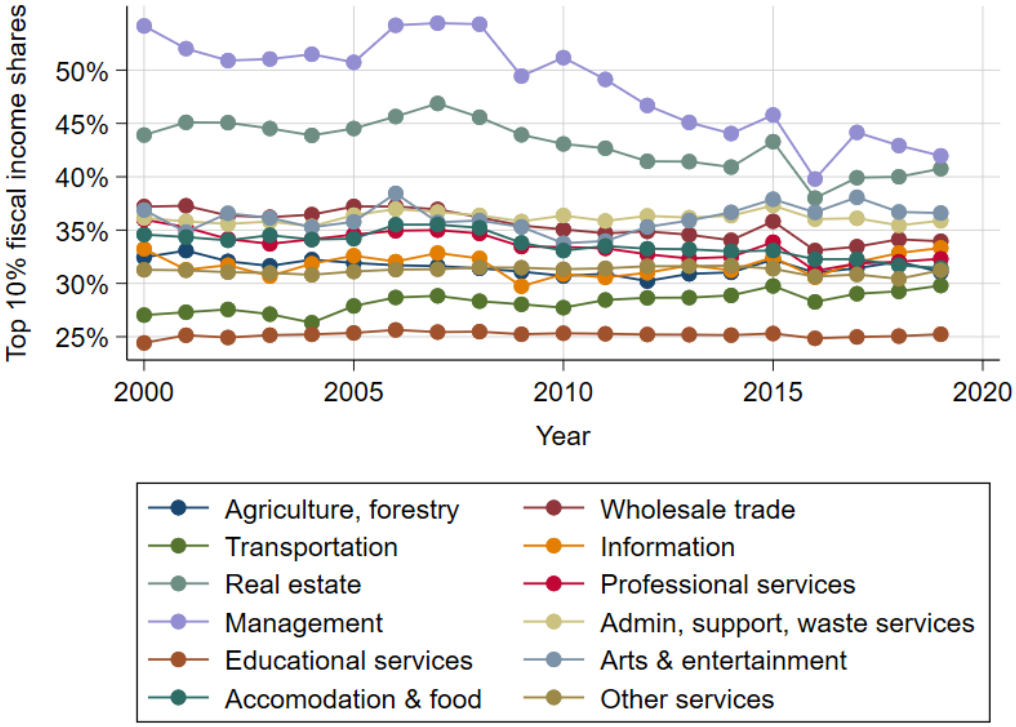


**Figure B6:** Bottom 50% shares for remaining sectors, 2000-2019

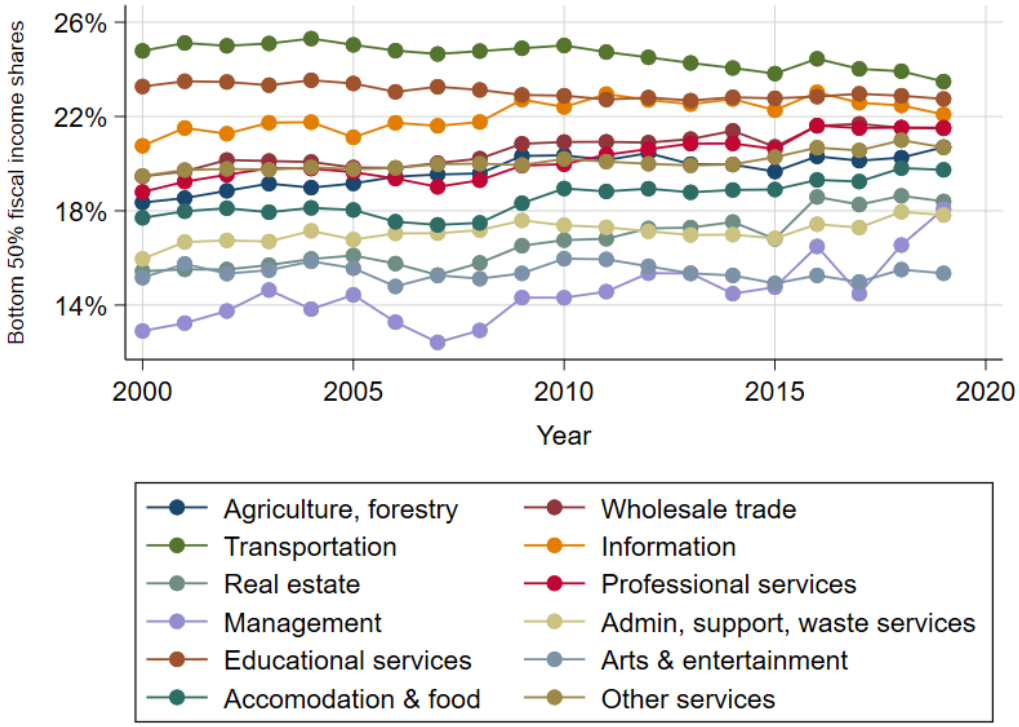



**Figure B7:** Proportion of the national top 1% by sector, 2000-2019

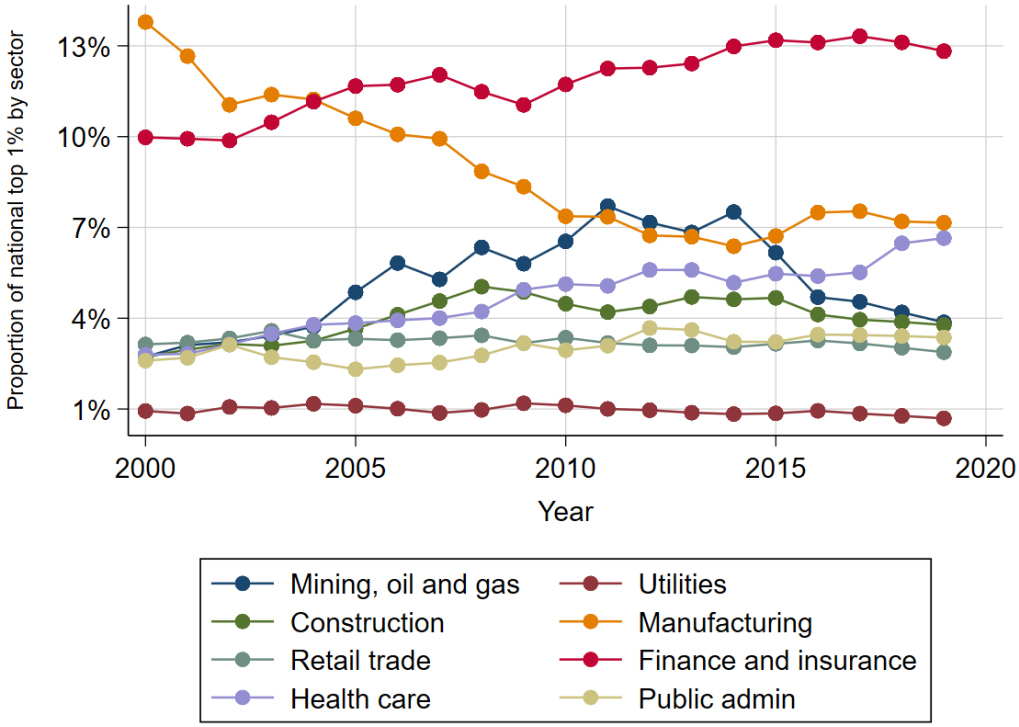


**Figure B8:** Bottom 50% fiscal income shares in mining, oil and gas and crude oil prices

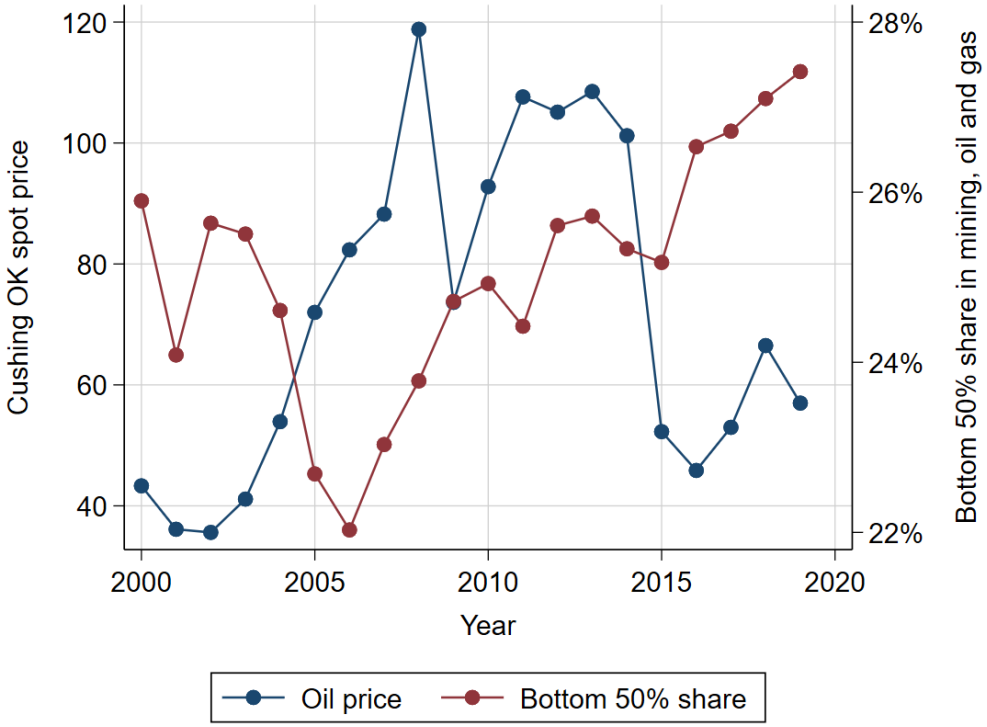
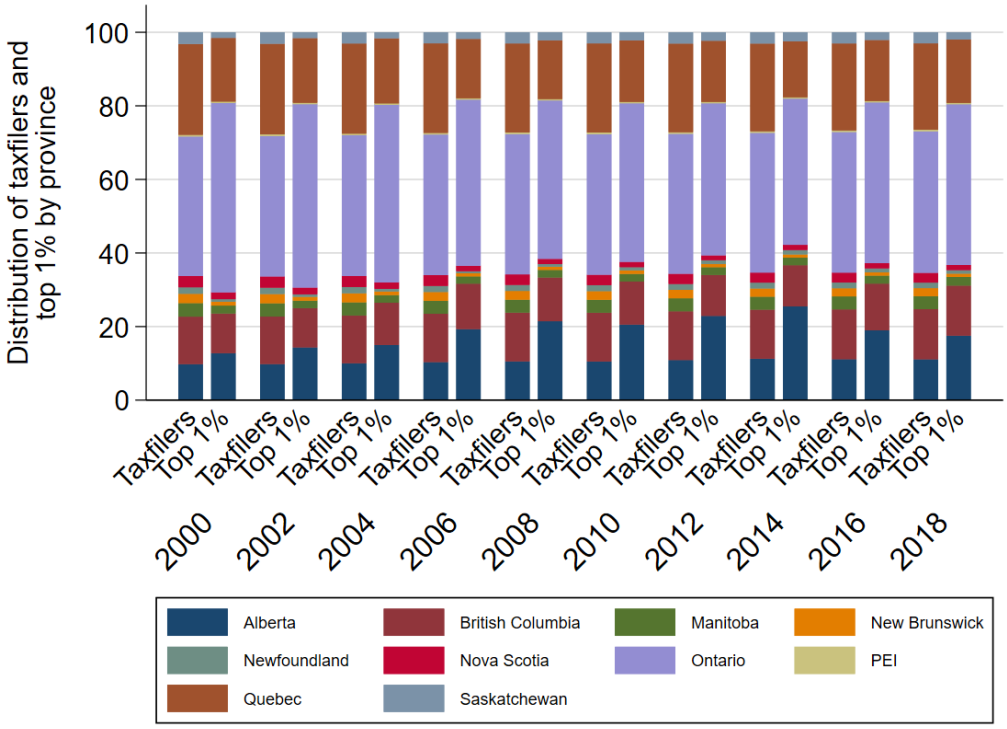



**Figure B9:** Distribution of taxfilers and top 1% earners by province



# Appendix C Power, rent-seeking and income inequality

**Figure C1:** Top 1% fiscal income shares and unionization rates

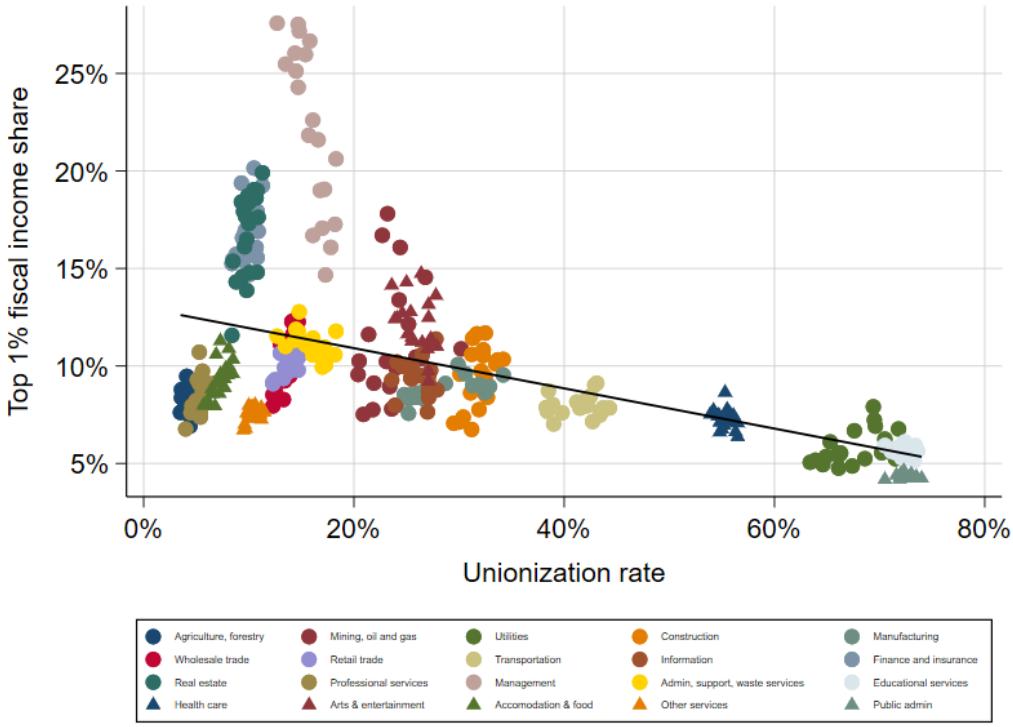


**Figure C2:** Middle 40% fiscal income shares and unionization rates

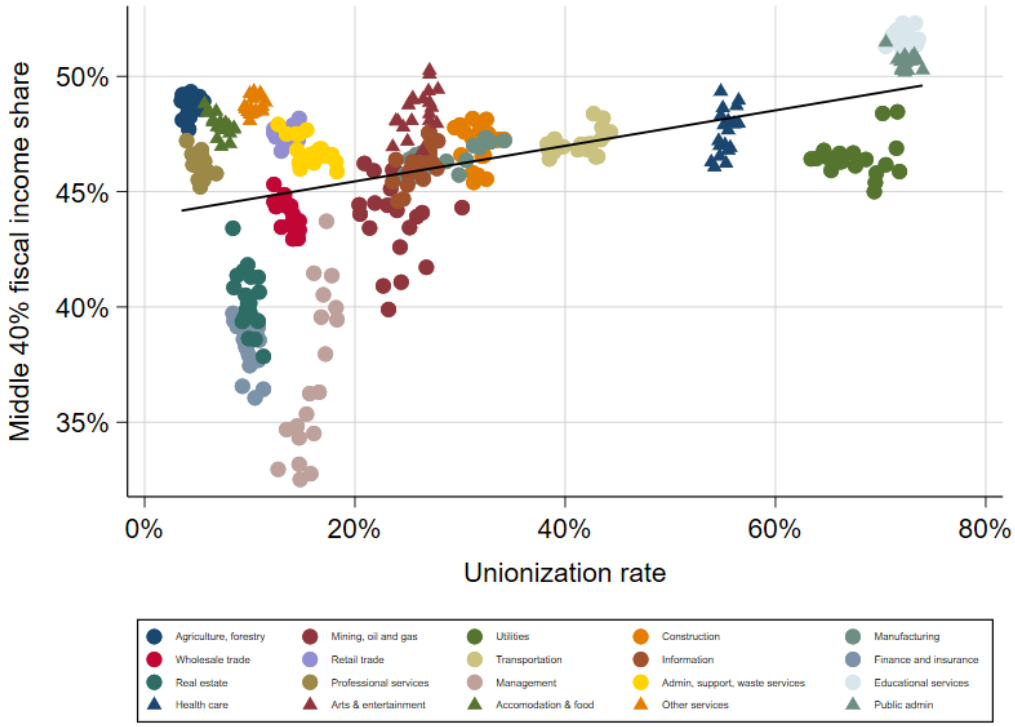



**Figure C3:** Top 10% fiscal income shares and unionization rates without public sectors

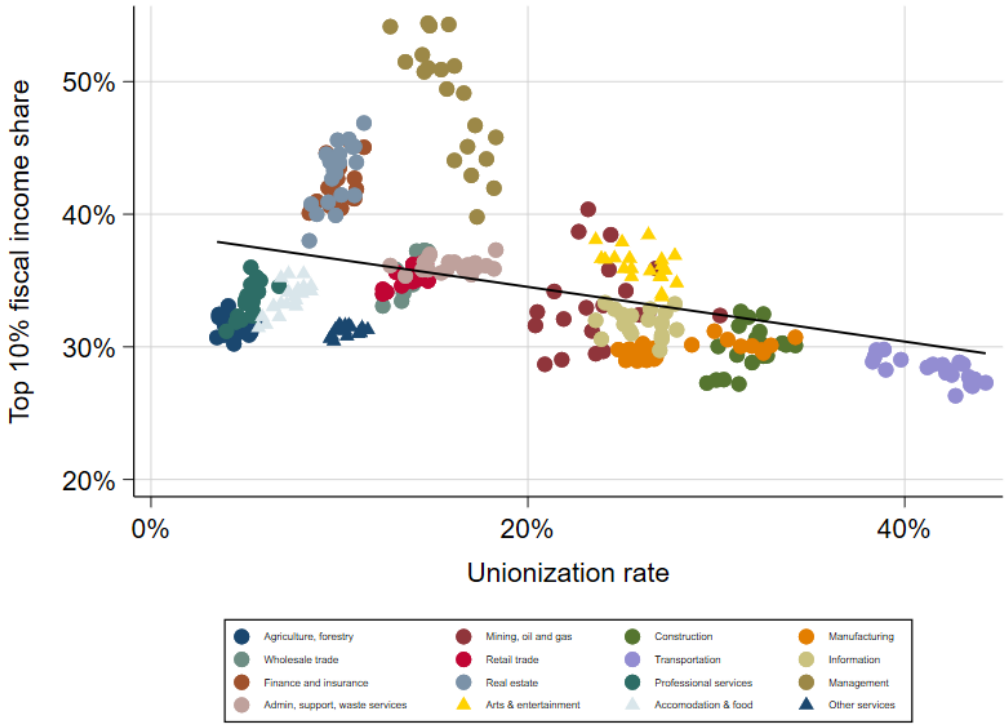


**Figure C4:** Top 1% fiscal income shares and unemployment rates

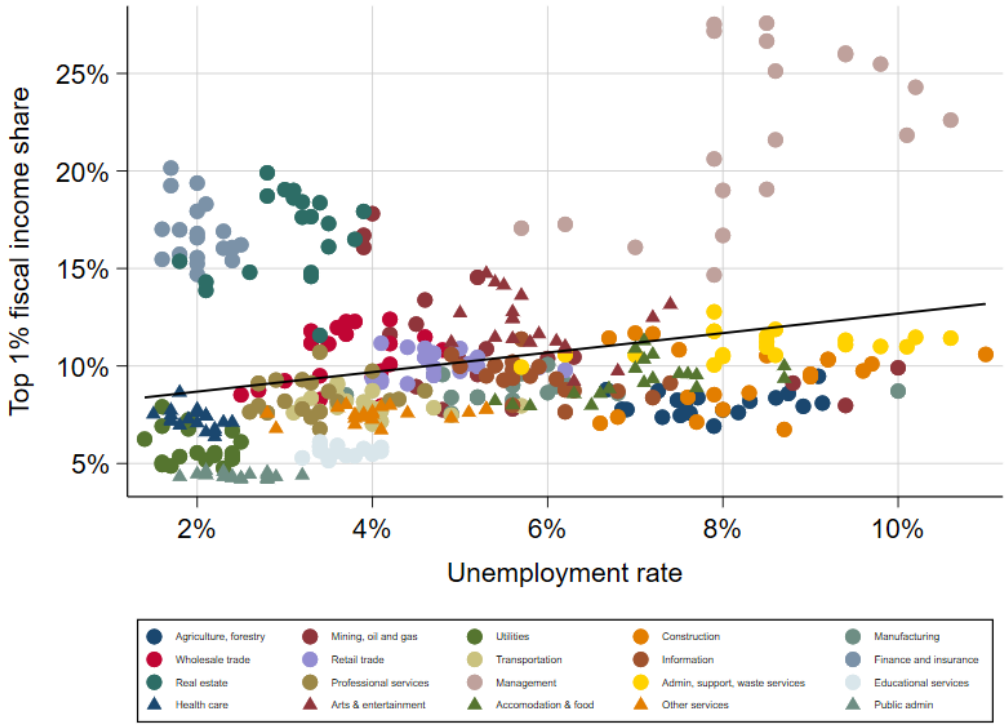



**Figure C5:** Middle 40% fiscal income shares and unemployment rates

**Figure C6:** Top 10% fiscal income shares and unemployment rates with management removed

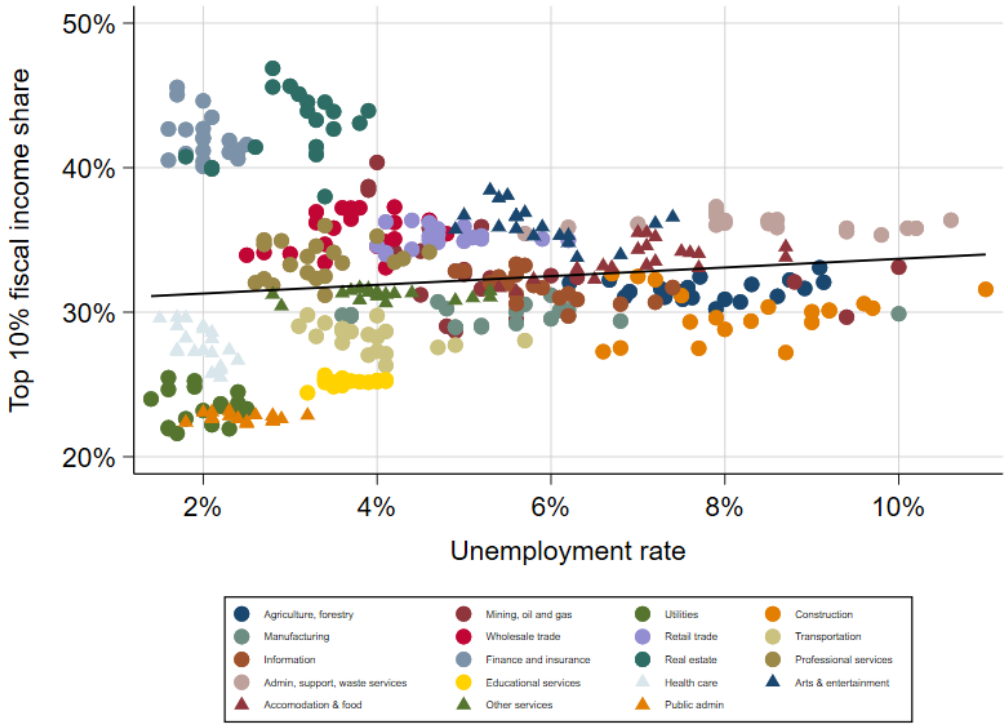



**Figure C7:** Bottom 50% fiscal income shares and unemployment rates with management removed

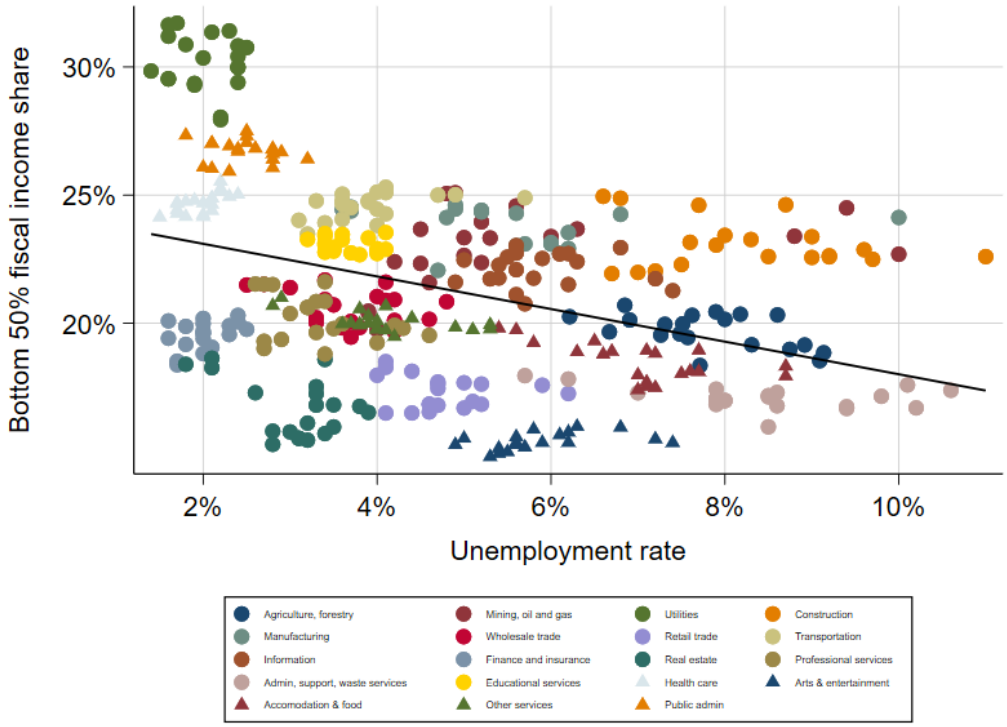


**Figure C8:** Changes in CR4 and changes in top 1% shares

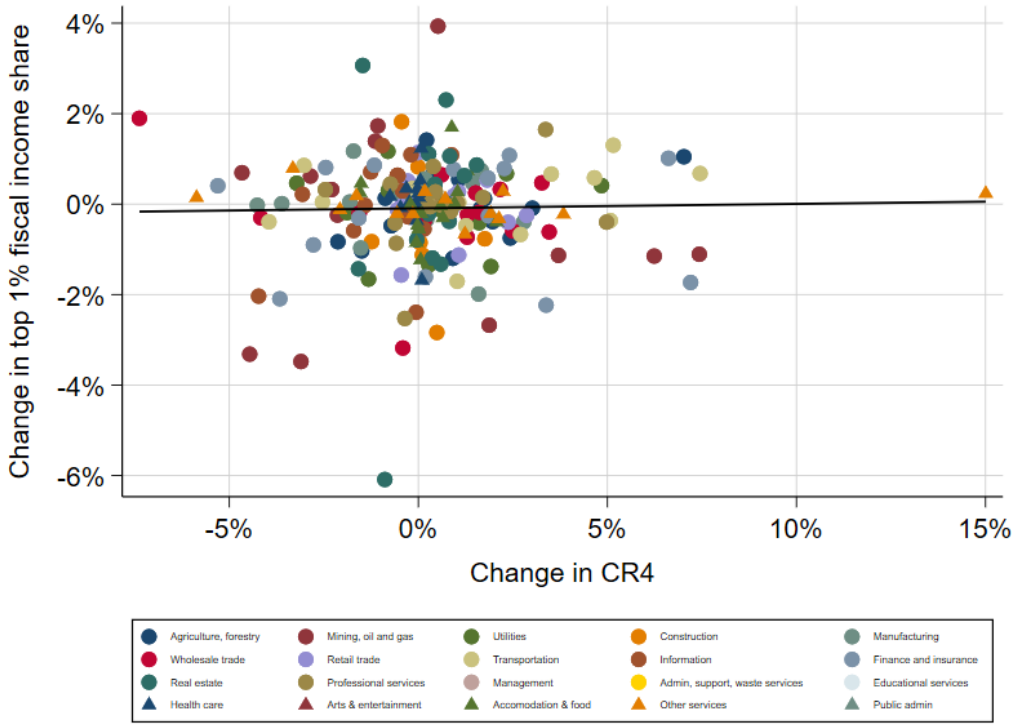



**Figure C9:** Changes in CR4 and changes in top 10% shares

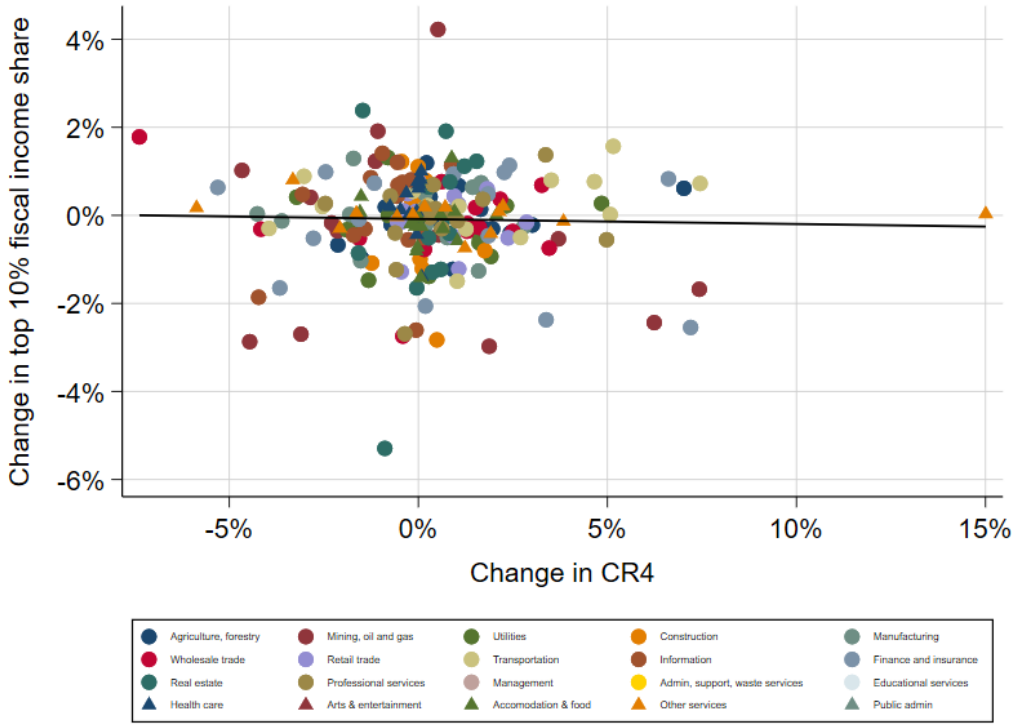


**Figure C10:** Changes in CR4 and changes in bottom 50% shares

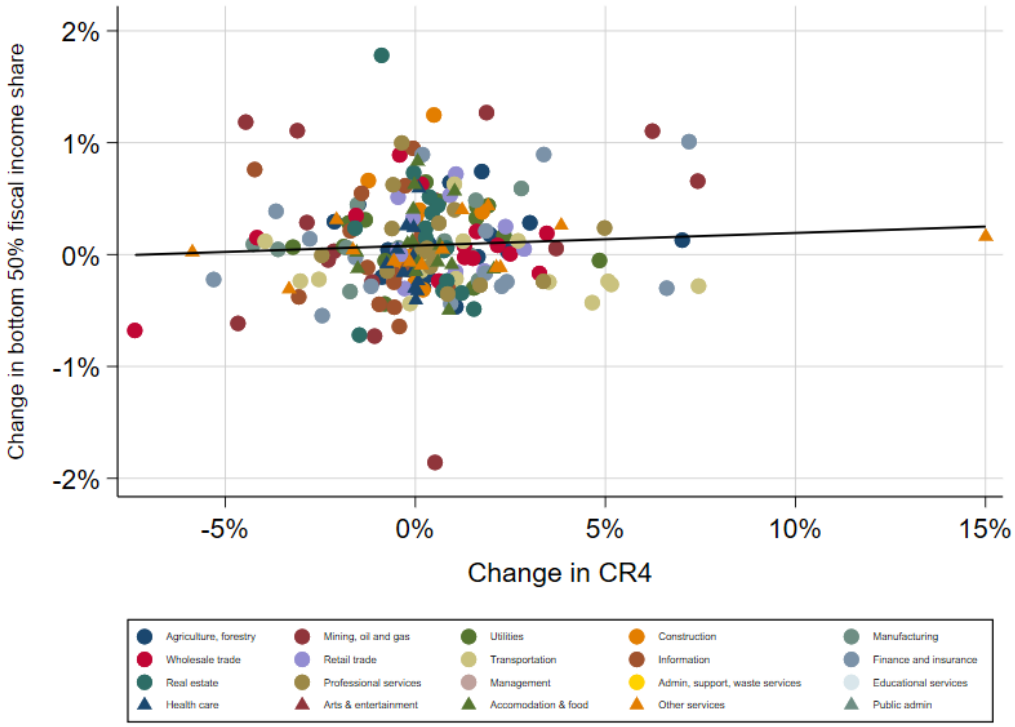



**Figure C11:** Changes in unionization rates and changes in top 1% shares

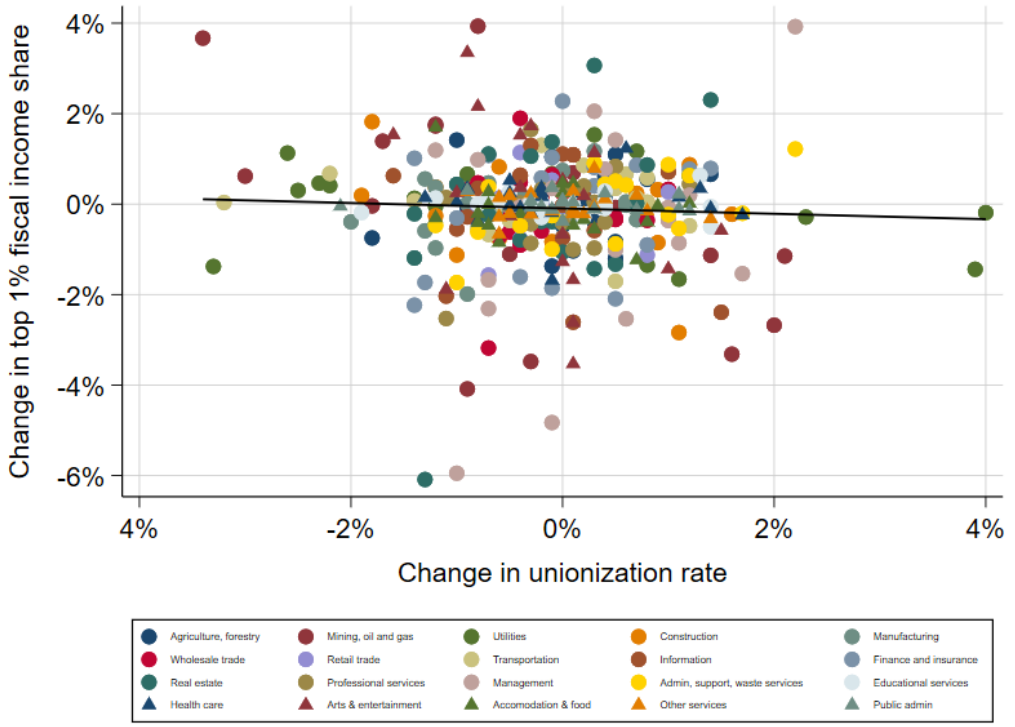


**Figure C12:** Changes in unionization rates and changes in top 10% shares

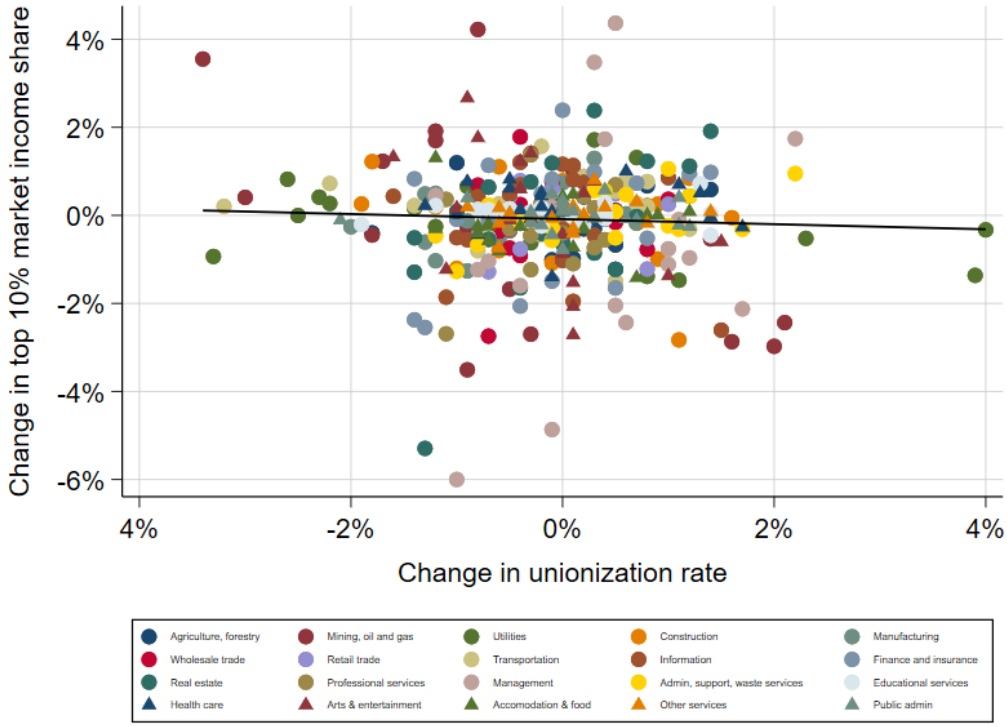



**Figure C13:** Changes in unionization rates and changes in bottom 50% shares

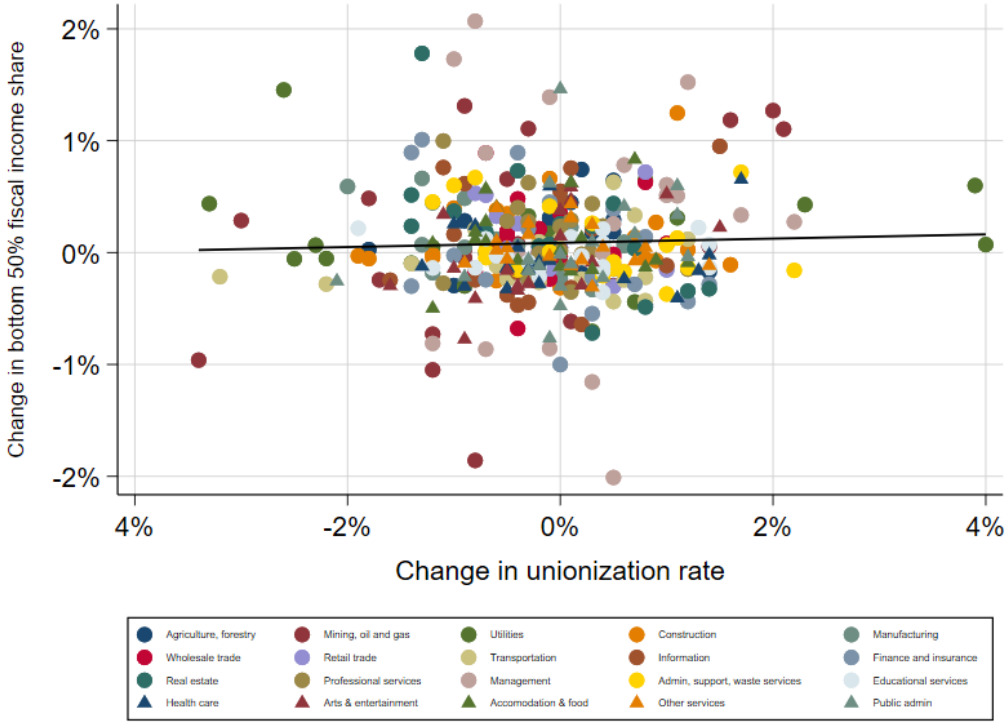


**Figure C14:** Five-year changes in unionization rates and top 10% shares

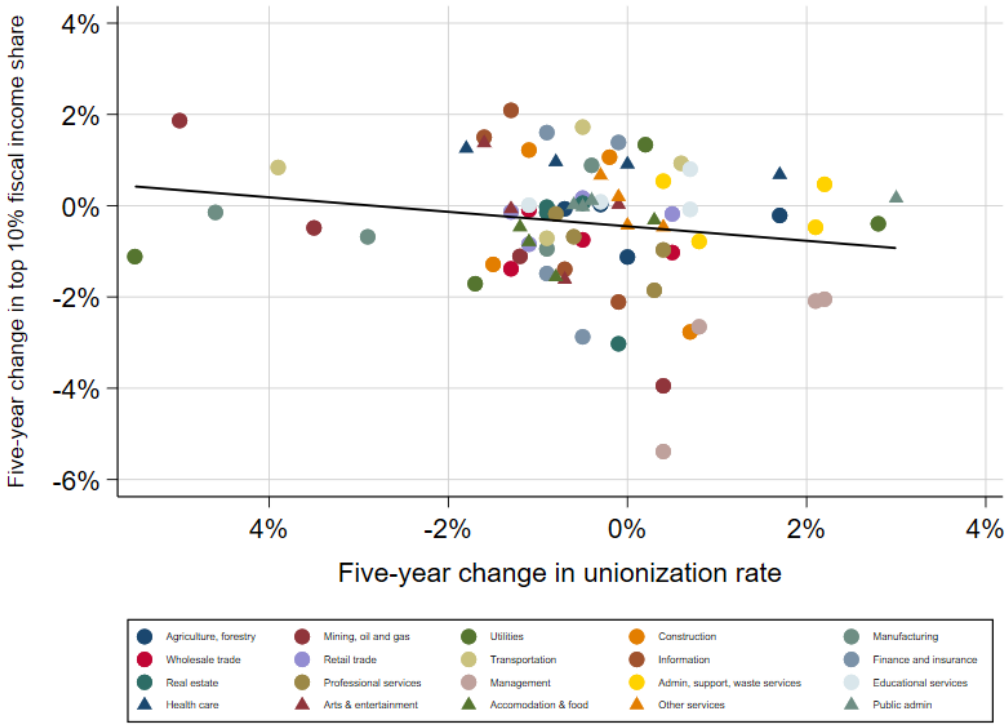



**Figure C15:** Five-year changes in unionization rates and bottom 50% shares

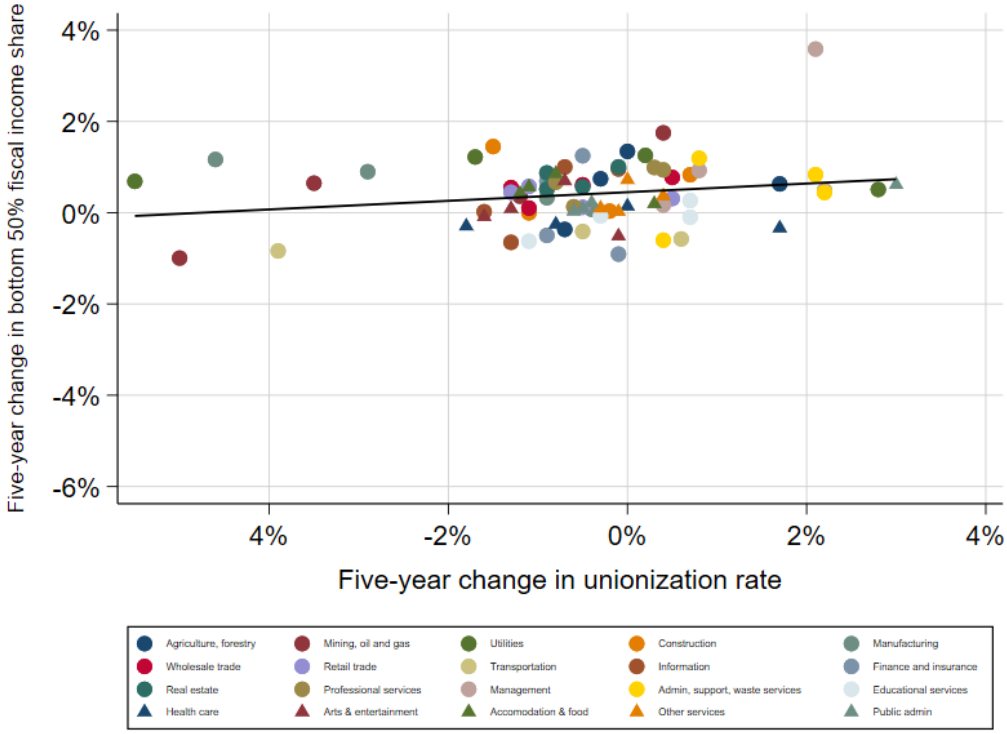
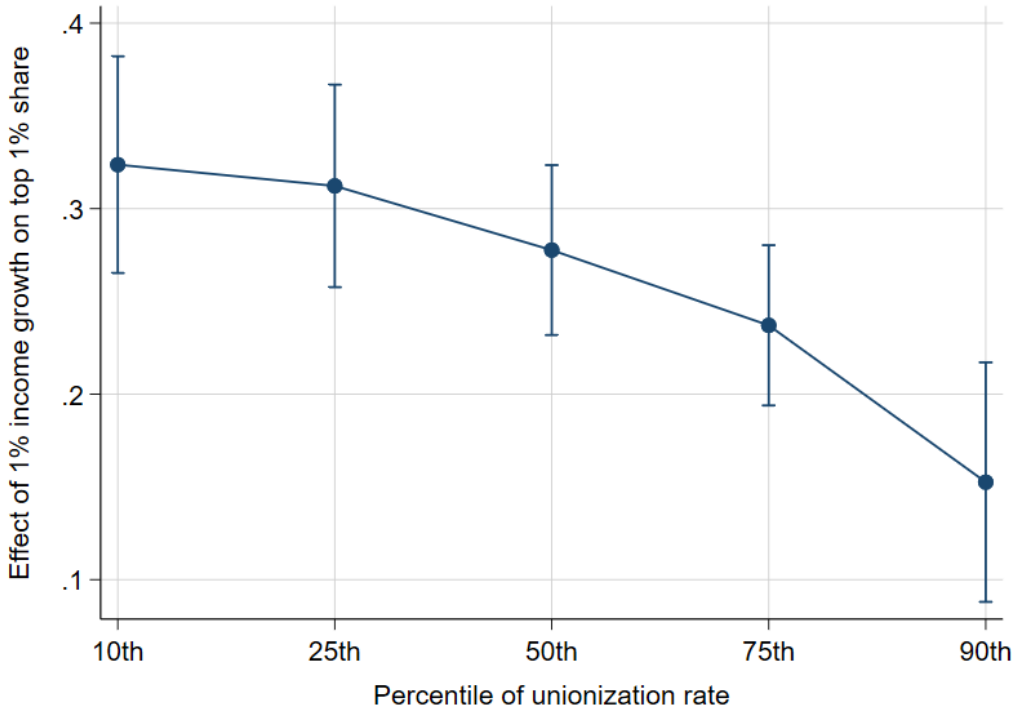
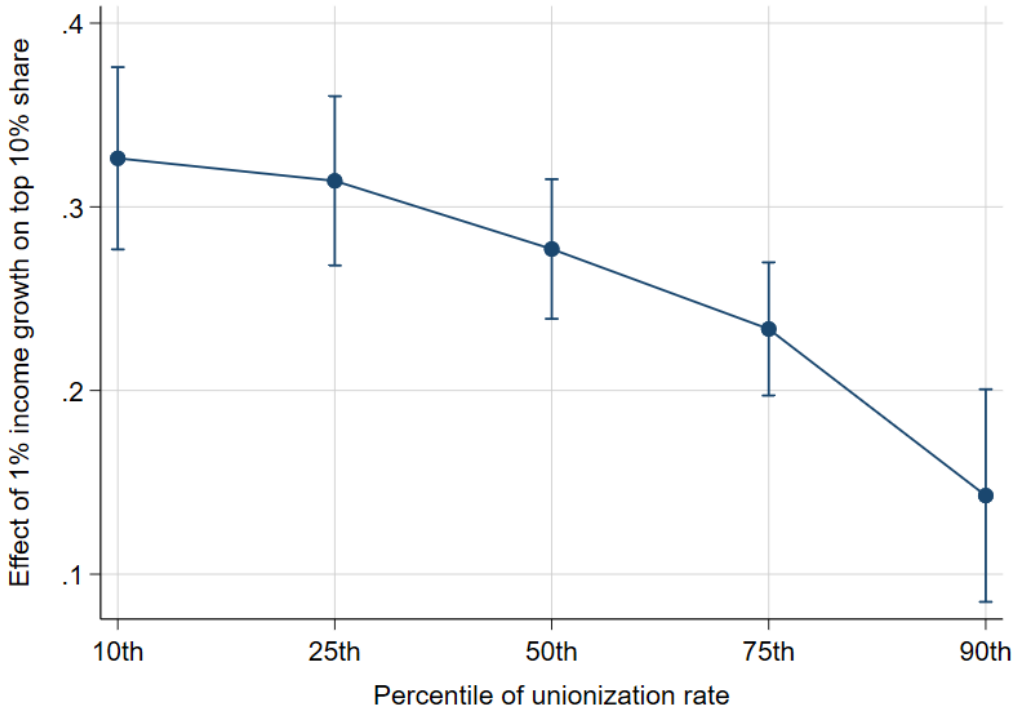


**Figure C16:** Marginal effect of income growth on top 1% shares by unionization rate



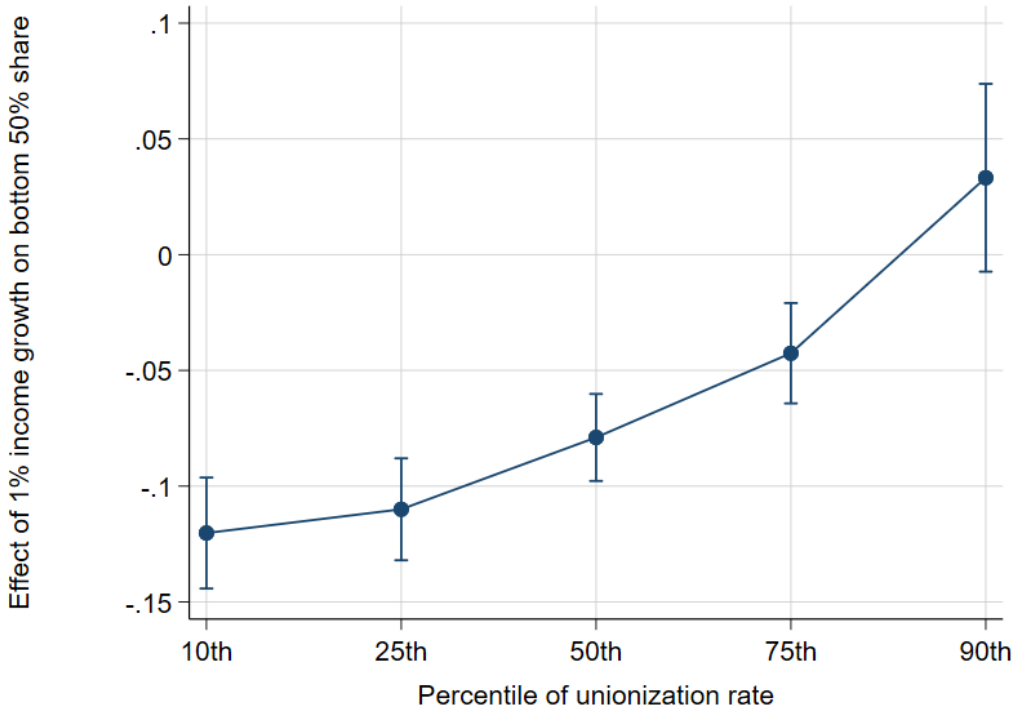

Marginal effects of a 1% increase in real sector average income on top 1% shares, estimated from the model reported in Table 6 column 2.

**Figure C17:** Marginal effect of income growth on top 10% shares by unionization rate




Marginal effects of a 1% increase in real sector average income on top 10% shares, estimated from the model reported in Table 6 column 3.

**Figure C18:** Marginal effect of income growth on bottom 50% shares by unionization rate




Marginal effects of a 1% increase in real sector average income on bottom 50% shares, estimated from the model reported in Table 6 column 5.

**Table C1:** Full between-sector unionization regressions

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| Unionization rate | -0.056*** | -0.135*** | -0.209*** | 0.125*** | 0.107*** |
| | (0.008) | (0.013) | (0.022) | (0.012) | (0.013) |
| Log(GDP per capita) | -0.442 | -1.895* | -1.866 | 0.766 | 1.186* |
| | (0.266) | (0.823) | (1.295) | (0.706) | (0.551) |
| Log(# of taxfilers) | -0.343 | 0.224 | 0.813 | -0.282 | -0.865* |
| | (0.314) | (0.811) | (1.379) | (0.557) | (0.432) |
| Sector avg income ($000) | 0.022 | 0.145*** | 0.158*** | -0.137*** | -0.021 |
| | (0.015) | (0.028) | (0.033) | (0.020) | (0.014) |
| Female share | 0.236* | 0.719** | 0.497 | -0.595** | -0.152 |
| | (0.109) | (0.247) | (0.258) | (0.229) | (0.102) |
| Part-time share | 0.019 | 0.835* | 0.673 | 0.148 | -0.784** |
| | (0.145) | (0.383) | (0.520) | (0.266) | (0.246) |
| Constant | 12.471* | 20.190* | 38.236* | 47.897*** | 19.129** |
| | (5.023) | (8.002) | (14.990) | (3.797) | (6.981) |
| $N$ | 400 | 400 | 400 | 400 | 400 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C2:** Full between-sector unemployment regressions

| | (1) Top 0.1% | (2) Top 1% | (3) Top 10% | (4) Middle 40% | (5) Bottom 50% |
|---|---|---|---|---|---|
| Unemployment rate | 0.022 | 0.027 | 0.083 | -0.144* | 0.011 |
| | (0.052) | (0.094) | (0.095) | (0.057) | (0.049) |
| Log(GDP per capita) | -0.470 | -2.542** | -3.330** | 0.925 | 1.584** |
| | (0.338) | (0.845) | (1.161) | (0.841) | (0.558) |
| Log(# of taxfilers) | -0.482 | 0.293 | 0.900 | -0.099 | -0.488 |
| | (0.313) | (0.763) | (1.036) | (0.872) | (0.397) |
| Sector avg income ($000) | 0.021 | 0.115*** | 0.141*** | -0.128*** | -0.019 |
| | (0.012) | (0.025) | (0.033) | (0.020) | (0.013) |
| Female share | -0.061 | -0.425 | 0.003 | 0.021 | 0.116 |
| | (0.111) | (0.221) | (0.243) | (0.132) | (0.140) |
| Part-time share | 0.590* | 1.827*** | 1.530* | -0.986** | -1.190*** |
| | (0.236) | (0.462) | (0.606) | (0.338) | (0.304) |
| Constant | 13.191** | 26.505*** | 46.212*** | 47.398*** | 11.948* |
| | (4.501) | (6.760) | (10.525) | (5.988) | (5.319) |
| $N$ | 400 | 400 | 400 | 400 | 400 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C3:** Full between-sector unemployment and unionization regressions

| | (1) Top 0.1% | (2) Top 1% | (3) Top 10% | (4) Middle 40% | (5) Bottom 50% |
|---|---|---|---|---|---|
| Unionization rate | -0.060*** | -0.142*** | -0.224*** | 0.123*** | 0.097*** |
| | (0.009) | (0.012) | (0.017) | (0.012) | (0.011) |
| Unemployment rate | -0.024 | -0.051 | 0.069 | -0.089 | 0.031 |
| | (0.054) | (0.092) | (0.091) | (0.054) | (0.047) |
| Log(GDP per capita) | -0.507 | -2.100** | -1.885 | 0.691 | 1.538** |
| | (0.269) | (0.775) | (1.232) | (0.710) | (0.520) |
| Log(# of taxfilers) | -0.202 | 0.799 | 0.692 | -0.320 | -0.786* |
| | (0.315) | (0.782) | (1.297) | (0.549) | (0.399) |
| Sector avg income ($000) | 0.025 | 0.142*** | 0.156*** | -0.139*** | -0.022 |
| | (0.014) | (0.027) | (0.033) | (0.020) | (0.014) |
| Female share | 0.228 | 0.621** | 0.669** | -0.600** | -0.119 |
| | (0.129) | (0.235) | (0.259) | (0.230) | (0.104) |
| Part-time share | 0.032 | 0.744 | 0.677 | 0.164 | -0.798** |
| | (0.184) | (0.387) | (0.468) | (0.278) | (0.263) |
| Constant | 11.434* | 16.030 | 38.737** | 49.613*** | 13.965* |
| | (5.024) | (8.760) | (13.272) | (3.776) | (6.776) |
| $N$ | 400 | 400 | 400 | 400 | 400 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific

autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C4:** Unionization and middle 50% (25th-75th percentiles) shares

| | (1) | (2) | (3) |
|---|---|---|---|
| Unionization rate | 0.192*** | | 0.196*** |
| | (0.012) | | (0.011) |
| Unemployment rate | | -0.076 | -0.077 |
| | | (0.063) | (0.059) |
| $N$ | 400 | 400 | 400 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C5:** Between-sector unionization controlling for educational inequality

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| Unionization rate | -0.033*** | -0.088*** | -0.189*** | 0.086*** | 0.103*** |
| | (0.004) | (0.007) | (0.009) | (0.006) | (0.003) |
| Log(GDP per capita) | 0.618 | 1.690** | 2.311*** | -1.857*** | -0.454* |
| | (0.326) | (0.537) | (0.538) | (0.365) | (0.184) |
| Log(# of taxfilers) | -0.689** | -1.589*** | -2.058*** | 1.420*** | 0.637*** |
| | (0.234) | (0.408) | (0.480) | (0.377) | (0.134) |
| Sector avg income ($000) | 0.009* | 0.024** | 0.013 | -0.051*** | 0.037*** |
| | (0.004) | (0.009) | (0.011) | (0.007) | (0.009) |
| Female share | -0.051 | 0.580*** | 0.896*** | -0.810*** | -0.086 |
| | (0.044) | (0.107) | (0.092) | (0.123) | (0.126) |
| Part-time share | 0.321*** | 0.234 | 0.408* | 0.516*** | -0.924*** |
| | (0.080) | (0.168) | (0.192) | (0.140) | (0.087) |
| Educ. inequality | 15.073*** | 20.564*** | 28.303*** | -15.398*** | -12.904*** |
| | (4.392) | (5.865) | (6.793) | (4.567) | (2.278) |
| propdeg | -2.765 | -6.917* | -7.639** | 7.161** | 0.479 |
| | (1.836) | (3.296) | (2.882) | (2.646) | (1.974) |
| Constant | 0.393 | 4.108 | 24.704*** | 55.785*** | 19.511*** |
| | (2.492) | (3.013) | (2.939) | (2.473) | (1.088) |
| $N$ | 57 | 57 | 57 | 57 | 57 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific

autocorrelation and standard errors are panel-corrected. All models include year fixed effects.

Sample is restricted to the years 2006, 2011 and 2016 for which educational data is available by sector.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C6:** Between-sector unionization controlling for import penetration

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| Unionization rate | 0.018 | -0.005 | -0.103** | 0.004 | 0.099*** |
| | (0.023) | (0.041) | (0.037) | (0.025) | (0.020) |
| Log(GDP per capita) | 0.989 | -0.266 | -0.446 | 1.082 | -0.620 |
| | (0.901) | (1.852) | (1.739) | (1.155) | (0.845) |
| Log(# of taxfilers) | -0.466 | 0.967 | 0.647 | 0.022 | -0.570 |
| | (0.632) | (1.310) | (1.161) | (0.788) | (0.571) |
| Sector avg income ($000) | 0.039* | 0.133*** | 0.161*** | -0.103*** | -0.051** |
| | (0.018) | (0.038) | (0.034) | (0.023) | (0.016) |
| Female share | 0.066 | -0.734 | -0.275 | 0.229 | 0.042 |
| | (0.507) | (0.663) | (0.616) | (0.424) | (0.340) |
| Part-time share | 2.806 | 6.600* | 7.404** | -2.215 | -5.097*** |
| | (1.502) | (2.614) | (2.274) | (1.531) | (1.199) |
| Imports | 4.593*** | 8.249** | 11.094*** | -9.353*** | -1.823 |
| | (0.954) | (2.518) | (2.363) | (1.766) | (1.290) |
| _cons | -8.418 | -14.332 | 11.890 | 44.365*** | 41.777*** |
| | (7.085) | (13.202) | (12.661) | (8.586) | (6.675) |
| $N$ | 72 | 72 | 72 | 72 | 72 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects. Sample is restricted to sectors with import data available: mining, oil and gas, utilities, construction and manufacturing.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C7:** Between-sector unemployment controlling for educational inequality

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| Unemployment rate | 0.001 | 0.071 | 0.073 | 0.198* | -0.272 |
| | (0.069) | (0.174) | (0.236) | (0.081) | (0.176) |
| Log(GDP per capita) | 0.898* | 2.454*** | 3.928*** | -2.529*** | -1.399*** |
| | (0.349) | (0.598) | (0.628) | (0.392) | (0.262) |
| Log(# of taxfilers) | -0.889*** | -2.148*** | -3.225*** | 1.856*** | 1.369*** |
| | (0.250) | (0.508) | (0.645) | (0.437) | (0.259) |
| Sector avg income ($000) | 0.002 | 0.007 | -0.025 | -0.030** | 0.055*** |
| | (0.006) | (0.011) | (0.015) | (0.011) | (0.010) |
| Female share | -0.227 | 0.186 | -0.034 | -0.134 | 0.168 |
| | (0.125) | (0.317) | (0.366) | (0.236) | (0.194) |
| Part-time share | 0.651*** | 1.031** | 2.212*** | -0.576** | -1.636*** |
| | (0.142) | (0.351) | (0.435) | (0.208) | (0.288) |
| Educ. inequality | 18.684*** | 29.909*** | 48.679*** | -25.592** | -23.087*** |
| | (5.240) | (8.633) | (13.272) | (8.003) | (5.368) |
| Proportion with bachelor's degree | -3.709 | -9.381* | -12.986* | 9.759* | 3.227 |
| | (2.314) | (4.489) | (5.463) | (4.229) | (1.930) |
| Constant | -1.766 | -1.907 | 12.089 | 60.631*** | 27.280*** |
| | (3.068) | (4.443) | (6.236) | (3.979) | (2.470) |
| $N$ | 57 | 57 | 57 | 57 | 57 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific

autocorrelation and standard errors are panel-corrected. All models include year fixed effects.

Sample is restricted to the years 2006, 2011 and 2016 for which educational data is available by sector.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C8:** Between-sector unemployment excluding the management sector

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| Unemployment rate | -0.039 | -0.085 | -0.091 | 0.007 | 0.057 |
| | (0.052) | (0.087) | (0.093) | (0.052) | (0.040) |
| Log(GDP per capita) | 1.183** | 3.150*** | 1.786* | -1.991*** | -0.061 |
| | (0.405) | (0.617) | (0.809) | (0.418) | (0.417) |
| Log(# of taxfilers) | -1.037*** | -1.696*** | -0.420 | 1.370*** | -0.262 |
| | (0.252) | (0.441) | (0.756) | (0.322) | (0.347) |
| Sector avg income ($000) | 0.004 | 0.025 | 0.095** | -0.058*** | -0.028* |
| | (0.011) | (0.021) | (0.029) | (0.016) | (0.013) |
| Female share | -0.072 | -0.205 | 0.293 | 0.001 | -0.035 |
| | (0.117) | (0.189) | (0.249) | (0.109) | (0.133) |
| Part-time share | 0.758** | 2.079*** | 2.942*** | -1.236*** | -1.551*** |
| | (0.242) | (0.427) | (0.414) | (0.262) | (0.245) |
| Constant | 3.367 | -5.910 | 7.631 | 55.790*** | 29.272*** |
| | (5.274) | (5.896) | (8.198) | (2.948) | (4.752) |
| $N$ | 380 | 380 | 380 | 380 | 380 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific

autocorrelation and standard errors are panel-corrected. All models include year fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C9:** Unionization, unemployment and sector income distributions, including capital gains

| | (1) Top 0.1% | (2) Top 1% | (3) Top 10% | (4) Middle 40% | (5) Bottom 50% |
|---|---|---|---|---|---|
| *Panel A: Separate regressions* | | | | | |
| Unionization rate | -0.057*** | -0.141*** | -0.221*** | 0.133*** | 0.109*** |
| | (0.008) | (0.013) | (0.020) | (0.012) | (0.011) |
| Unemployment rate | 0.019 | 0.020 | 0.076 | -0.127* | 0.010 |
| | (0.053) | (0.097) | (0.098) | (0.059) | (0.050) |
| *Panel B: Unionization and unemployment in the same regressions* | | | | | |
| Unionization rate | -0.061*** | -0.148*** | -0.231*** | 0.133*** | 0.097*** |
| | (0.009) | (0.012) | (0.015) | (0.013) | (0.010) |
| Unemployment rate | -0.028 | -0.059 | 0.063 | -0.080 | 0.026 |
| | (0.055) | (0.096) | (0.094) | (0.057) | (0.048) |

Standard errors in parentheses

Results are from Prais-Winsten regressions that assume common autocorrelation across industries and standard errors are panel-corrected. All models include year fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C10:** Effect of changes in market concentration on the income distribution - first differences

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| CR4 | 0.046** | 0.081*** | 0.055** | -0.045*** | -0.005 |
| | (0.014) | (0.021) | (0.019) | (0.012) | (0.008) |
| CR4, t-1 | 0.011 | 0.023 | 0.012 | -0.012 | 0.005 |
| | (0.013) | (0.020) | (0.018) | (0.012) | (0.008) |
| CR4, t-2 | 0.011 | 0.021 | 0.020 | -0.017 | 0.002 |
| | (0.011) | (0.017) | (0.016) | (0.010) | (0.008) |
| CR4, t-3 | -0.017 | -0.023 | -0.015 | 0.010 | 0.008 |
| | (0.012) | (0.017) | (0.017) | (0.011) | (0.008) |
| Unemployment rate | -0.005 | 0.041 | 0.139* | -0.091* | -0.039 |
| | (0.046) | (0.068) | (0.066) | (0.044) | (0.028) |
| Unionization rate | -0.013 | -0.051 | -0.045 | 0.028 | 0.010 |
| | (0.035) | (0.047) | (0.040) | (0.026) | (0.017) |
| Log(GDP per capita) | -0.655 | 1.089 | 1.133 | 0.996 | -2.052** |
| | (1.369) | (1.995) | (1.658) | (1.243) | (0.651) |
| Log(# of taxfilers) | -1.839 | -5.662** | -5.905** | 3.588** | 2.028** |
| | (1.230) | (2.057) | (1.850) | (1.239) | (0.724) |
| Avg income ($000) | 0.155*** | 0.306*** | 0.313*** | -0.223*** | -0.092*** |
| | (0.023) | (0.039) | (0.034) | (0.023) | (0.014) |
| Avg income ($000), t-1 | -0.044 | -0.056 | -0.025 | 0.020 | 0.007 |
| | (0.024) | (0.038) | (0.032) | (0.023) | (0.014) |
| Avg income ($000), t-2 | 0.015 | 0.000 | -0.040 | 0.003 | 0.033* |
| | (0.022) | (0.036) | (0.031) | (0.021) | (0.014) |
| Avg income ($000), t-3 | -0.036 | -0.076* | -0.034 | 0.029 | 0.010 |
| | (0.019) | (0.032) | (0.027) | (0.018) | (0.013) |
| Female share | 0.049 | 0.051 | 0.035 | -0.020 | -0.023 |
| | (0.032) | (0.051) | (0.046) | (0.029) | (0.019) |
| Part-time share | 0.083 | 0.127 | 0.067 | -0.066 | 0.005 |
| | (0.045) | (0.071) | (0.067) | (0.043) | (0.030) |
| Constant | -0.190* | -0.584*** | -0.608*** | 0.367*** | 0.201** |
| | (0.084) | (0.123) | (0.132) | (0.082) | (0.067) |
| $N$ | 179 | 179 | 179 | 179 | 179 |
| P-value LR effect | 0.027 | 0.010 | 0.059 | 0.011 | 0.473 |

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models control for changes in unionization, unemployment, log of sector GDP, log of number of taxfilers in the sector, three lags of average sector income, female employment share, part-time employment share and year fixed effects.

**Table C11:** Effect of changes in market concentration on the income distribution - limited covariates

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| CR4 | 0.045*** | 0.081*** | 0.053** | -0.043*** | -0.005 |
| | (0.013) | (0.021) | (0.018) | (0.012) | (0.008) |
| CR4, t-1 | 0.004 | -0.001 | -0.011 | 0.004 | 0.010 |
| | (0.013) | (0.020) | (0.018) | (0.012) | (0.008) |
| CR4, t-2 | 0.012 | 0.024 | 0.018 | -0.014 | -0.000 |
| | (0.011) | (0.017) | (0.016) | (0.010) | (0.008) |
| CR4, t-3 | -0.016 | -0.021 | -0.011 | 0.007 | 0.008 |
| | (0.011) | (0.017) | (0.017) | (0.010) | (0.008) |
| Avg income ($000) | 0.140*** | 0.268*** | 0.261*** | -0.182*** | -0.082*** |
| | (0.022) | (0.040) | (0.036) | (0.023) | (0.015) |
| Avg income ($000), t-1 | -0.047* | -0.069 | -0.020 | 0.017 | 0.009 |
| | (0.021) | (0.037) | (0.034) | (0.022) | (0.015) |
| Avg income ($000), t-2 | 0.017 | 0.003 | -0.030 | -0.008 | 0.033* |
| | (0.022) | (0.037) | (0.034) | (0.022) | (0.015) |
| Avg income ($000), t-3 | -0.039* | -0.074* | -0.021 | 0.022 | 0.006 |
| | (0.019) | (0.035) | (0.031) | (0.019) | (0.013) |
| Constant | -0.185** | -0.530*** | -0.650*** | 0.383*** | 0.209** |
| | (0.068) | (0.111) | (0.126) | (0.078) | (0.064) |
| $N$ | 179 | 179 | 179 | 179 | 179 |
| P-value LR effect | 0.026 | 0.022 | 0.134 | 0.027 | 0.379 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation

and standard errors are panel-corrected. All models include three lags of average sector income and year fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C12:** Effect of changes in unionization rates on the income distribution - first differences

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| Unionization rate | -0.051 | -0.107* | -0.090 | 0.045 | 0.038 |
| | (0.035) | (0.052) | (0.052) | (0.035) | (0.023) |
| Unionization rate, t-1 | 0.001 | -0.079 | -0.088 | 0.057 | 0.028 |
| | (0.034) | (0.049) | (0.051) | (0.035) | (0.025) |
| Unionization rate, t-2 | 0.008 | 0.003 | -0.013 | 0.013 | 0.006 |
| | (0.034) | (0.047) | (0.049) | (0.033) | (0.024) |
| Unionization rate, t-3 | -0.037 | -0.096* | -0.136** | 0.083* | 0.043 |
| | (0.034) | (0.048) | (0.049) | (0.033) | (0.023) |
| Unemployment rate | -0.053 | 0.036 | 0.211* | -0.151** | -0.042 |
| | (0.048) | (0.089) | (0.086) | (0.058) | (0.037) |
| Log(GDP per capita) | -1.017 | -0.256 | 1.864 | 0.315 | -2.326** |
| | (0.841) | (1.877) | (1.942) | (1.474) | (0.846) |
| Log(# of taxfilers) | 2.047** | 2.712 | 6.740*** | -3.409** | -2.983*** |
| | (0.761) | (1.699) | (1.720) | (1.254) | (0.776) |
| Avg income ($000) | 0.064*** | 0.170*** | 0.162*** | -0.138*** | -0.024 |
| | (0.017) | (0.037) | (0.036) | (0.023) | (0.016) |
| Avg income ($000), t-1 | -0.031 | -0.076* | -0.092** | 0.081*** | 0.013 |
| | (0.016) | (0.035) | (0.033) | (0.023) | (0.014) |
| Avg income ($000), t-2 | 0.015 | 0.004 | 0.028 | -0.013 | -0.016 |
| | (0.015) | (0.031) | (0.031) | (0.021) | (0.013) |
| Avg income ($000), t-3 | -0.042** | -0.067* | -0.076* | 0.059** | 0.024 |
| | (0.016) | (0.034) | (0.033) | (0.022) | (0.015) |
| Female share | 0.014 | 0.067 | 0.063 | -0.051* | -0.008 |
| | (0.029) | (0.041) | (0.038) | (0.025) | (0.017) |
| Part-time share | 0.075 | 0.051 | 0.027 | 0.003 | -0.015 |
| | (0.050) | (0.065) | (0.062) | (0.043) | (0.026) |
| Constant | -0.035 | 0.006 | -0.025 | -0.016 | 0.054 |
| | (0.054) | (0.092) | (0.098) | (0.066) | (0.041) |
| $N$ | 320 | 320 | 320 | 320 | 320 |
| P-value LR effect | 0.297 | 0.019 | 0.014 | 0.034 | 0.089 |

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models control for changes in unionization, unemployment, log of sector GDP, log of number of taxfilers in the sector, three lags of average sector income, female employment share, part-time employment share and year fixed effects.

**Table C13:** Effect of changes in unionization rates on the income distribution - limited covariates

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% |
|---|---|---|---|---|---|
| Unionization rate | -0.071 | -0.119* | -0.115* | 0.071 | 0.037 |
| | (0.038) | (0.057) | (0.057) | (0.040) | (0.027) |
| Unionization rate, t-1 | -0.020 | -0.101 | -0.115 | 0.080 | 0.040 |
| | (0.037) | (0.058) | (0.060) | (0.042) | (0.030) |
| Unionization rate, t-2 | 0.024 | -0.004 | -0.038 | 0.037 | -0.001 |
| | (0.037) | (0.057) | (0.059) | (0.041) | (0.030) |
| Unionization rate, t-3 | -0.022 | -0.089 | -0.111 | 0.065 | 0.039 |
| | (0.035) | (0.056) | (0.057) | (0.039) | (0.027) |
| $N$ | 320 | 320 | 320 | 320 | 320 |
| P-value LR effect | 0.243 | 0.017 | 0.014 | 0.018 | 0.175 |

Standard errors in parentheses

Results are from first-difference Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C14:** Effect of changes in sector average incomes on income shares, including management sector

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% | Middle 50% |
| g_rAvgInc | 0.087*** | 0.192*** | 0.180*** | -0.150*** | -0.029* | -0.111*** |
| | (0.016) | (0.029) | (0.029) | (0.020) | (0.012) | (0.017) |
| L.g_rAvgInc | -0.028 | -0.052 | -0.058* | 0.053* | 0.006 | 0.028 |
| | (0.016) | (0.029) | (0.029) | (0.021) | (0.012) | (0.017) |
| L2.g_rAvgInc | 0.018 | 0.019 | 0.037 | -0.021 | -0.015 | -0.014 |
| | (0.014) | (0.025) | (0.025) | (0.018) | (0.011) | (0.015) |
| L3.g_rAvgInc | -0.034* | -0.045 | -0.051 | 0.034 | 0.020 | 0.034* |
| | (0.015) | (0.026) | (0.026) | (0.018) | (0.011) | (0.016) |
| $N$ | 320 | 320 | 320 | 320 | 320 | 320 |
| P-value LR effect | 0.080 | 0.024 | 0.050 | 0.022 | 0.484 | 0.062 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C15:** Effect of past income growth on income shares, fixed effects

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% | Middle 50% |
|---|---|---|---|---|---|---|
| Income growth | 0.146*** | 0.217*** | 0.214*** | -0.144*** | -0.070*** | -0.134*** |
| | (0.015) | (0.027) | (0.027) | (0.017) | (0.012) | (0.017) |
| Income growth, t-1 | 0.068*** | 0.133*** | 0.151*** | -0.092*** | -0.060*** | -0.101*** |
| | (0.013) | (0.028) | (0.029) | (0.017) | (0.014) | (0.018) |
| Income growth, t-2 | 0.066*** | 0.114*** | 0.104*** | -0.068*** | -0.036** | -0.065*** |
| | (0.011) | (0.025) | (0.025) | (0.015) | (0.012) | (0.016) |
| Income growth, t-3 | 0.043*** | 0.070** | 0.062** | -0.043*** | -0.021* | -0.034** |
| | (0.011) | (0.021) | (0.021) | (0.013) | (0.010) | (0.013) |
| $N$ | 304 | 304 | 304 | 304 | 304 | 304 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific

autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C16:** Effect of shocks to sector average incomes on income shares for each income group

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% | Middle 50% |
| Income shock | 0.414*** | 0.616*** | 0.621*** | -0.460*** | -0.158** | -0.441*** |
| | (0.089) | (0.129) | (0.126) | (0.086) | (0.058) | (0.079) |
| Income shock, t-1 | -0.305*** | -0.313* | -0.221 | 0.195* | 0.022 | 0.103 |
| | (0.092) | (0.131) | (0.122) | (0.083) | (0.055) | (0.076) |
| Income shock, t-2 | 0.091 | 0.060 | -0.064 | 0.025 | 0.036 | 0.054 |
| | (0.087) | (0.130) | (0.124) | (0.082) | (0.057) | (0.079) |
| Income shock, t-3 | 0.045 | 0.115 | 0.069 | -0.055 | -0.008 | -0.034 |
| | (0.089) | (0.136) | (0.127) | (0.088) | (0.056) | (0.080) |
| $N$ | 285 | 285 | 285 | 285 | 285 | 285 |
| P-value LR effect | 0.056 | 0.021 | 0.076 | 0.050 | 0.356 | 0.028 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific

autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C17:** Effect of changes in sector average incomes on income shares, excluding 2008-09

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% | Middle 50% |
|---|---|---|---|---|---|---|
| Income growth (%) | 0.183*** | 0.293*** | 0.280*** | -0.203*** | -0.072*** | -0.181*** |
| | (0.016) | (0.022) | (0.021) | (0.011) | (0.011) | (0.013) |
| Income growth, t-1 | -0.067*** | -0.059** | -0.043 | 0.041*** | 0.008 | 0.023 |
| | (0.018) | (0.023) | (0.022) | (0.012) | (0.012) | (0.014) |
| Income growth, t-2 | 0.024 | 0.020 | -0.001 | -0.012 | 0.010 | 0.007 |
| | (0.013) | (0.017) | (0.017) | (0.009) | (0.010) | (0.012) |
| Income growth, t-3 | -0.025* | -0.010 | -0.005 | 0.008 | 0.002 | 0.006 |
| | (0.013) | (0.017) | (0.017) | (0.010) | (0.009) | (0.011) |
| $N$ | 266 | 266 | 266 | 266 | 266 | 266 |
| P-value LR effect | 0.000 | 0.000 | 0.000 | 0.000 | 0.035 | 0.000 |

Standard errors in parentheses

Results are from Prais-Winsten regressions with sector-specific autocorrelation and standard errors are panel-corrected. All models include year and sector fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table C18:** Effect of changes in sector average incomes on income shares, excluding 2015-16

| | Top 0.1% | Top 1% | Top 10% | Middle 40% | Bottom 50% | Middle 50% |
|---|---|---|---|---|---|---|
| Income growth (%) | 0.137*** | 0.251*** | 0.292*** | -0.192*** | -0.095*** | -0.186*** |
| | (0.017) | (0.023) | (0.026) | (0.014) | (0.013) | (0.016) |
| Income growth, t-1 | -0.018 | -0.008 | -0.004 | 0.007 | -0.002 | 0.000 |
| | (0.016) | (0.021) | (0.025) | (0.014) | (0.013) | (0.015) |
| Income growth, t-2 | -0.019 | -0.023 | -0.017 | 0.006 | 0.014 | 0.007 |
| | (0.014) | (0.017) | (0.021) | (0.012) | (0.011) | (0.013) |
| Income growth, t-3 | -0.014 | -0.037* | -0.026 | 0.018 | 0.011 | 0.015 |
| | (0.013) | (0.017) | (0.021) | (0.011) | (0.011) | (0.013) |
| $N$ | 266 | 266 | 266 | 266 | 266 | 266 |
| P-value LR effect | 0.001 | 0.000 | 0.000 | 0.000 | 0.007 | 0.000 |

Standard errors in parentheses

Results are from Prais-Winsten regressions that assume common autocorrelation across sectors and standard errors are panel-corrected. All models include year fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$