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THE DECLINING WORKER POWER HYPOTHESIS:
AN EXPLANATION FOR THE RECENT EVOLUTION OF THE AMERICAN ECONOMY

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ABSTRACT

Rising profitability and market valuations of US businesses, sluggish wage growth and a declining labor share of income, and reduced unemployment and inflation, have defined the macroeconomic environment of the last generation. This paper offers a unified explanation for these phenomena based on reduced worker power. Using individual, industry, and state-level data, we demonstrate that measures of reduced worker power are associated with lower wage levels, higher profit shares, and reductions in measures of the NAIRU. We argue that the declining worker power hypothesis is more compelling as an explanation for observed changes than increases in firms' market power, both because it can simultaneously explain a falling labor share and a reduced NAIRU, and because it is more directly supported by the data.

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Since the early 1980s in the U.S., the share of income going to labor has fallen, measures of corporate valuations like Tobin's Q have risen, average profitability has risen even as interest rates have declined, and measured markups have risen. Over the same time period, average unemployment has fallen very substantially, even as inflation has stayed low with no sign of accelerating – suggesting a decline in the NAIRU.

We argue that the decline in worker power has been the major structural change responsible for these economic phenomena. A decline in worker power, leading to a redistribution of rents from labor to capital, would predict a fall in the labor income share, an increase in Q, corporate profitability, and measured markups, and a fall in the NAIRU. In this paper, we estimate the magnitude of the decline in worker rent-sharing in the U.S. over recent decades, show that it is large enough to be able to explain the entire decline in the aggregate labor share and a substantial fraction of the decline in the NAIRU, and show that at the state and industry level, declines in worker power are consistent with changes in labor shares, unemployment, and measures of corporate profitability. Our focus on the decline in worker power as one of the major structural trends in the U.S. economy is in line with a long history of progressive institutionalist work in economics, sociology, and political science, exemplified by Freeman and Medoff (1984), Levy and Temin (2007), Bivens, Mishel, and Schmitt (2018), Kristal (2010), Rosenfeld (2014), and Ahlquist (2017). As an explanation for these recent macro trends, we believe that the evidence for the declining worker power hypothesis is at least as compelling as – and likely more compelling than – the other commonly-positated explanations: specifically, technological change, globalization, and rising monopoly or monopsony power.¹ While it is possible that globalization or technological change caused the decline in the labor share, it is difficult to reconcile each of these purely competitive explanations with the rise in Q,

¹ For recent papers arguing that different aspects of globalization or technological change can explain the decline in the U.S. labor income share, see for example Elsby, Hobijn, and Sahin (2013), Karabarbounis and Neiman (2014), Abdi and Danninger (2017), Autor and Salomons (2018), Acemoglu and Restrepo (2018), and Autor, Dorn, Katz, Patterson, and Van Reenen (2020). For papers arguing that rising monopoly power can explain the decline in the labor share and/or rising corporate valuations and markups, see Barkai (forthcoming), Gutiérrez and Philippon (2017), (2019), Eggertsson. Robbins and Wold (2019), Farhi and Gourio (2018), De Loecker, Eeckhout, and Unger (2020). For arguments that rising monopsony power could play a role in these trends, see CEA (2016), Furman and Krueger (2016), Glover and Short (2018), Benmelech, Bergman, and Kim (2018), Philippon (2020). For work on the role of the decline in worker power in the declining U.S. labor share, see Elsby, Hobijn, and Sahin (2013) and Abdi and Danninger (2017), who both find some role for the decline in unionization, but argue that it is not the dominant factor, and Kristal (2010) and Jaumotte and Osorio Buitron (2015), who argue that differential declines in worker power across countries can explain differential patterns of change in the labor share and income inequality.

average profitability, and measured markups over recent decades (which suggest an increase in economic rents accruing to capital owners). Alternatively, while it is possible that rising monopoly or monopsony power caused the decline in the labor share, and these would also be natural explanations for the rise in Q , average profitability, and measured markups, it is more difficult to reconcile rising monopoly or monopsony power with the decline in the NAIRU.

What do we mean by declining worker power? We consider the American economy to be characterized by three types of power, to varying degrees: monopoly power, monopsony power, and worker power. Firms' monopoly power – arising from explicit barriers to entry, or from innate features of particular product markets, such as heterogeneous production technologies or short-run fixed costs – generates pure profits or rents. Firms' monopsony power in the labor market – arising from labor market concentration and/or labor market frictions – result in an upward sloping labor supply curve to the firm, enabling the wage to be marked down to some degree below the marginal revenue product. Worker power – arising from unionization or the threat of union organizing, firms being run partly in the interests of workers as stakeholders, and/or from efficiency wage effects – enables workers to increase their pay above the level that would prevail in the absence of such bargaining power.² This power gives workers an ability to receive a share of the rents generated by companies operating in imperfectly competitive product markets, and can act as countervailing power to firm monopsony power.

In this framework, therefore, a decline in worker power results in a *redistribution of product market rents from labor to capital owners*.

What caused this decline in worker power? The decline in worker power in the U.S. economy over recent decades was a result of three broad shifts. First, institutional changes: the policy environment has become less supportive of worker power by reducing the incidence of unionism and the credibility of the “threat effect” of unionism or other organized labor, and the real value of the minimum wage has fallen. Second, changes within firms: the increase in shareholder power and shareholder activism has led to pressures on companies to cut labor costs, resulting in wage reductions within firms and the “fissuring” of the workplace as companies increasingly outsource and subcontract labor.³ And third, changes in economic conditions:

² We use worker power as synonymous with bargaining power, rent-sharing power, and insider-outsider power.

³ For a detailed exposition of this trend, see Weil (2014).

increased competition for labor from technology or from low-wage countries has increased the elasticity of demand for U.S. labor, or, in the parlance of bargaining theory, has improved employers' outside option. In this paper, we emphasize the relative importance of the first two factors. While globalization and technological change surely did play some role in the decline in worker power, the cross-sector and cross-country evidence suggests that they are unlikely to have been the most important factors: within the U.S., unionization has declined at similar rates across both tradable and non-tradable industries, and the decline in the U.S. unionization rate has been much more pronounced than in many other countries (all exposed, to some extent, to similar international trends in technology and globalization).

We start our analysis in **Section I** by examining the empirical evidence of a decline in worker power. Most notable is the decline of the private sector union membership rate, from over one third at its peak in the 1950s to 6% today. In addition, the private sector union wage premium has declined somewhat since the early 1980s, suggesting that unionized workers are less able to share in the rents created by firms than they were in the past.

A different type of evidence of the importance of labor power comes from the fact that even without unions, workers may receive wage premia in other settings. Workers in larger firms, and in certain industries (like manufacturing, mining, telecommunications, and utilities), receive substantially higher wages relative to observably equivalent workers in smaller firms or in other industries, and evidence suggests that these large firm and industry wage differentials to a large extent reflect rents. But workers' ability to receive rents in large firms, or in high-rent industries, appears to have declined. Using the CPS, we show that since the 1980s there has been a decline of about one third in the large firm wage premium, and a decline of about one third in the dispersion of industry wage premia.

A further source of evidence that worker power has been attenuated is the apparent decline in the relationship between workers' pay and the profitability, revenues, and/or product market power of their firm or industry. In a classically competitive labor market, workers' pay is determined by the marginal product of labor within their labor market, and there should be no correlation between a worker's pay and their firm's or industry's performance. In practice however, there is a positive relationship (suggesting a degree of rent-sharing). We show that the strength of this relationship has diminished over time: in manufacturing industries, the degree to

which increases in revenue productivity translate into higher pay has declined since the 1960s,⁴ and we find suggestive evidence of a broad-based weakening in the relationship between industrial concentration and pay across sectors.

So, a large body of evidence points to a decline in worker power. But how big is this decline, in macroeconomic terms? In **Section II**, we use our estimates of the union wage premium, large firm wage premium, and industry wage premia to quantify the magnitude of the decline in total rents going to labor over 1982-2016. We demonstrate that labor rents are an important macroeconomic phenomenon, and that they have declined substantially: from 12% of net value added in the nonfinancial corporate business sector in the early 1980s to 6% in the 2010s. (This is likely an underestimate, since we cannot quantify explicitly the decline in labor rents caused by the rise of activist shareholders). This decline in labor rents is largely due to changes that have taken place within industries, rather than changes that have taken place across industries as employment has shifted from manufacturing to services.

The decline in labor rents could have been driven by two things: either a destruction of rents available to be shared (as product market competition increased, perhaps as a result of globalization), or a redistribution of rents from labor to capital. Industry-level evidence tends to suggest that the decline in labor rents was largely a result of the latter: the majority of industries which saw substantial declines in rents to labor also saw substantial increases in profits to capital over 1987-2016,⁵ and in manufacturing – the sector with the biggest decline in the labor share – the manufacturing industries with the greatest exposure to low-wage import competition were *not* the industries with the biggest declines in labor rents.

In **Section III**, we demonstrate that the trends in factor shares, corporate profitability, Q , and measured markups that have sometimes been attributed to rising monopoly power can be equally or more convincingly explained by our hypothesis of declining worker power. We begin by replicating the recent decomposition exercise of Farhi and Gourio (2018). Farhi and Gourio

⁴ Note that this is a different issue than in Stansbury and Summers (2019). In Stansbury and Summers (2019), we investigate the degree to which there is a relationship between changes in productivity and changes in compensation at the level of the *whole economy*. We find a close to one-for-one relationship between changes in productivity and pay at the level of the whole economy over the postwar period, which has not attenuated since the 1970s/80s. This finding could be consistent either with competitive or with imperfectly competitive labor markets, and is not inconsistent with our finding that the relationship between productivity and pay at the *industry level* has weakened (which indicates a decline in the degree of rent-sharing within different industries).

⁵ Our industry-level analysis spans 1987-2016, the longest period with data for consistent NAICS industries.

suggest that trends in factor shares, the profitability of capital, the investment-capital ratio, the risk-free rate, and other macroeconomic variables, can be explained by an increase in average markups – alongside rising risk premia and increased unmeasured intangibles. In this framework, they estimate that average markups in the U.S. rose from 7% to 15% over the 1980s to the 2000s. While their analysis makes it clear that there are changes that cannot be explained by a perfectly competitive model, we note that there is essentially no way in their framework to distinguish between the rise in markups they posit (indicating a rise in monopoly and/or monopsony power), and a fall in worker power. Modifying their decomposition, we show that our hypothesis of declining worker power – holding markups constant – can explain the macro facts in the model equally well.

Next, we take our measure of the magnitude of lost labor rents (calculated in section II from union wage premia, large firm wage premia, and industry wage premia) to the aggregate data on the nonfinancial corporate sector. We show that our estimate of the decline in labor rents – at roughly 6% of nonfinancial corporate sector value added since the 1980s – is big enough to (over-)explain the entire decline in the net labor share. At the state level, our measure of the decline in the labor rent share is predictive of changes in the labor share over 1984-2016.

We then compare trends in labor rents, labor shares, profitability, and measures of Q for 51 industries (at roughly the NAICS 3-digit level). We show that industries with larger declines in labor rents over 1987-2016 had much larger declines in their labor shares and increases in their average profitability. In horserace regressions, industry-level labor rents have substantially more power to explain changes in labor shares, profitability, and Q , than measures of product market concentration (which have been used as indicators of a rise in monopoly power).

In **Section IV**, we argue that the decline in worker power would be consistent with another highly salient aspect of the macro experience of recent decades: the substantial decline in both average unemployment and average inflation. The unemployment rate was below 5%, the level previously thought to have been the NAIRU, for nearly half of the twenty-three years from 1997 to 2020, and was below 4% from May 2018 until February 2020, at levels not reached since the 1960s. At the same time, inflation has been low and has shown little sign of accelerating. These facts suggest that there has been a quite substantial decline in the NAIRU, and/or a flattening of the Phillips Curve.

Almost all models of declining worker power predict a fall in the NAIRU, as the decline in the cost of labor increases firms' hiring, and/or as "wait unemployment" falls. In keeping with these predictions, we show that states and industries with bigger falls in worker power over the last four decades saw bigger falls in their unemployment rate. Extrapolation from our analysis of state-level unemployment rates suggests that the aggregate change in worker power could be big enough to explain a large fraction of the decline in the NAIRU. (We further verify this conclusion with informal calculations in the Appendix, drawing on various models of the relationship between worker power and the NAIRU). We note, on the other hand, that an increase in monopoly power offers no explanation for the decline in the NAIRU. If anything it has usually been thought to act in the other direction: in the presence of downward nominal wage rigidity, rising monopoly power would tend to predict rising prices (as firms transition to a new equilibrium of higher markups and higher prices) alongside a rise in unemployment (as the rise in monopoly power leads to a restriction in output). Increasing monopsony power would tend to be associated with less, rather than more, hiring and so does not provide a natural explanation for a declining NAIRU. And globalization and technological change, while possibly disinflationary, would tend to increase average unemployment by increasing disruption and structural change in the economy, making their implications for the NAIRU ambiguous.

In **Section V**, we address possible objections to the declining worker power hypothesis. First, we show that the apparent weakness of investment relative to fundamentals – which has been a major motivator of the monopoly power argument – can be reconciled with our hypothesis. Second, we show that recent research emphasizing the importance of between-firm reallocation in explaining changes in factor shares is consistent with the declining worker power hypothesis. Third, we note that our measure of labor rents does not incorporate any increase in rents which may have accrued to the highest earners – such as executives, or top earners in finance – and should be thought of as a measure of the decline in the rents accruing to the *majority* of workers.⁶ Fourth, we argue that the rise in occupational licensing has likely not played a major role in the trend in aggregate labor rents over recent decades. Finally, we note that the decline in the labor share has been much more pronounced in the U.S. than other industrialized economies similarly exposed to globalization and technological change, and that

⁶ This is because our measure of labor rents is estimated in the CPS, which is top-coded for high earners and has higher non-response rates for these groups.

the decline in the labor share has been most pronounced in U.S. manufacturing, which (given increasing globalization) is not an industry where a large rise in monopoly power seems likely to have occurred. We also note that there is little evidence of any large increase in import-adjusted sales concentration in manufacturing, or in local-level sales concentration in services, and that local labor market concentration has declined over time. Together, these suggest to us that globalization, technological change, or rising monopoly or monopsony power alone lack the ability to explain recent economic developments in a unified way.

While the focus of this paper is on the distribution of rents between labor and capital, we note that the decline of labor rents has also likely increased inequality in labor incomes: the declines in unionization and the real value of the minimum wage, and the fissuring of the workplace, affected middle- and low-income workers more than high-income workers, and some of the lost labor rents for the majority of workers may have been redistributed to high-earning executives (as well as capital owners). Consistent with these hypotheses, we show that the decline in labor rents was larger for non-college-educated workers than for college-educated workers, and estimate, in a back-of-the-envelope exercise, that the decline in labor rents could account for a large fraction of the increase in the income share of the top 1% over recent decades.

Overall, we conclude that the decline in worker power is one of the most important structural changes to have taken place in the U.S. economy in recent decades. Our emphasis on the decline of worker power is justified both by the strength of the direct evidence, and by its ability to provide a unified explanation for a variety of macroeconomic phenomena: changes in labor and capital incomes, profitability, and the NAIRU.

This raises important challenges for policy. If a major feature of the U.S. economy were a rise in monopoly or monopsony power, reducing restrictiveness and increasing competition in markets could improve *both* efficiency and equity. But if, as we argue, the major explanation of the decline in the labor share and rise in corporate profitability is a decline in worker power, then measures to restrict monopoly or monopsony power alone – or indeed, to restrict globalization or technological change – may do little to reverse this trend. More profoundly, if markets are innately characterized by some degree of imperfect competition and rents, then completely eliminating all sources of market power may not be feasible. Instead, if increases in the labor share are to be achieved, institutional changes that enhance workers' countervailing power –

such as strengthening labor unions or promoting corporate governance arrangements that increase worker power – may be necessary (but would need to be carefully considered in light of the possible risks of increasing unemployment).

I. Evidence of declining rent-sharing in U.S. labor markets

Why do firms share rents with workers? There are three groups of reasons. First, workers may be able to lay claim to rents directly, either as a result of explicit bargaining power through unions, implicit bargaining power through the threat of union organizing (Freeman and Medoff 1984), or another ability to wield power within the firm. Second, some firms may be run partly in the interests of workers as stakeholders, rather than solely in the interests of shareholders. Third, it may be in firms' interests to share rents with workers for efficiency wage reasons – where workers are paid an above-market wage to incentivize effort (e.g. Yellen 1984) – or to maintain morale (perhaps as a result of fairness norms, as in Akerlof and Yellen (1986)).⁷ Efficiency wages may also play a role in reducing the cost to firms of paying above-market wages: if worker productivity increases when wages rise, then some of the extra cost of sharing rents with workers is offset by productivity benefits (Bulow and Summers 1986, Summers 1988).

Evidence from a wide range of sources has demonstrated the existence of rent-sharing in the U.S. labor market. Unionized workers, workers at large firms, workers in specific industries, and workers at certain firms receive substantial wage premia relative to observably equivalent workers. Similar wage premia also exist for workers who switch jobs, suggesting they do not reflect unobserved worker characteristics. These wage premia tend to be positively correlated with indicators of rents at the firm and industry level, including profits and concentration, and inversely correlated with quit rates (both of which are suggestive of rent-sharing). In addition, there is evidence of sizeable passthrough of industry- or firm-level shocks to productivity and

⁷ The rents received by workers may be 'true' rents or pure profits generated by a firm's monopolistic power in the product market -- or, they may be 'quasi' rents generated by sunk investments (Grout 1984, Caballero and Hammour 2005), or by the cost of recruiting new workers either in a frictional labor market or in a setting where job-specific training is required (e.g. Mortensen and Pissarides 1999, Manning 2003).

profits into workers' compensation. And there is a large body of work documenting persistent wage losses for displaced workers, which partly reflect lost rents.⁸

Over recent decades however, a number of forces have likely reduced labor rents in the U.S., particularly for lower-wage workers. Most obvious have been the decline in unionization and union bargaining power, and the erosion of the real value of the minimum wage. In addition, the increase in shareholder activism and the rise of the shareholder value maximization doctrine increased the power of shareholders relative to managers and workers, likely increasing pressure on firms to cut labor costs and, in particular, to redistribute rents from workers to shareholders.⁹ The increased 'fissuring' of the workplace, with outsourcing of non-core business functions, may be an outgrowth of this phenomenon (Weil 2014). In this section, we present a range of empirical evidence of this decline in rent-sharing.

I.A. Declining unionization rates

Unions are the clearest-cut example of workers having rent-sharing power. Unionized workers receive significantly higher wages than observationally equivalent nonunion workers, with most estimates of the private sector union wage premium between 15% and 25% (Rosenfeld 2014).¹⁰ But the ability of workers to share in rents through unions has declined substantially in recent decades. Private sector union membership gradually declined from a peak of around one third in the 1950s to 24% in 1973, and then declined more rapidly, reaching 6% in 2019 (Fig.1,

⁸ We briefly review evidence on union, industry, and firm size wage premia later in this section. For evidence on firm-specific wage premia, see Groshen (1991), and Davis and Haltiwanger (1991), and the large AKM literature starting with Abowd, Kramarz, and Margolis (1999). Estimates from the AKM literature suggest that firm effects and the covariance of worker and firm effects can explain 17-20% of the variance of wages (Abowd, Lengermann, and McKinney 2003, Abowd, McKinney, and Zhao 2018, Song et al 2019), and that around one-third of this reflects rents (Sorkin 2018). For evidence on wage losses for displaced workers, see (e.g) Jacobson, Lalonde, and Sullivan (1993), Davis and Von Wachter (2011), and Lachowska, Mas, and Woodbury (2018), among others.

⁹ See, for example, Shleifer and Summers (1988), who argue that a primary effect of hostile takeovers is the redistribution of value to shareholders from other stakeholders. Some evidence consistent with this mechanism can be found in Davis, Haltiwanger, Handley, Lipsius, Lerner, and Miranda (2019), who find that wage premia in target firms were largely erased after private equity buyouts.

¹⁰ Empirical evidence is consistent this wage premium representing a redistribution of rents from capital to labor. For example, Abowd (1987) finds substantial evidence to support a dollar-for-dollar tradeoff between workers and shareholders in union contract settlement data. Lee and Mas (2012) show that new unionization reduces firms' equity value. If this represents a redistribution of rents from capital to labor, the magnitude of the average effect they find would be consistent with a 10% union wage premium.

Rosenfeld 2014, Hirsch and Macpherson 2019).¹¹ In addition, estimates of the union wage premium suggest that it has declined since the early 1980s.¹²

Note that the impact of unions on workers' ability to receive rents likely extended beyond the workers who were unionized receiving wage premia. In industries where pattern bargaining was common, non-unionized firms would match the wage increases in union contracts (with the most famous example being the 1950 “Treaty of Detroit”). Even without pattern bargaining, the “threat effect” of unionization of workers in nonunion firms likely incentivized firms to offer better wages and benefits than they otherwise would have (e.g. Leicht 1989, Farber 2005, Denice and Rosenfeld 2018).¹³ And union bargaining power may have more generally supported norms of equity in pay structures (Western and Rosenfeld 2011).

The decline in unionization rates and union bargaining power was driven by a combination of institutional factors, which weakened labor law and its enforcement, and economic factors, which increased the elasticity of demand for labor and so weakened workers' ability to bargain for higher wages. Institutional factors included the breakdown of pattern bargaining in the 1980s, the expansion of the number of right-to-work states, and decreasing political support for and enforcement of labor laws.¹⁴ Economic factors that reduced worker bargaining power included increased import competition for manufactured goods and deregulation of transportation and telecoms, both of which reduced firms' abilities to compete while paying high wages (Peoples 1998, Levy and Temin 2007, Rosenfeld 2014). Note, however, that these economic factors are unlikely to have been the main drivers in the decline in

¹¹ The measured decline in the unionization rate may be an underestimate: as the unionization rate approaches zero, misclassification bias tends to produce inflated estimates (Card 1996, Western and Rosenfeld 2011).

¹² We estimate the union log wage premium for private sector workers in the CPS-ORG, regressing the log hourly wage on a dummy variable for union membership or coverage and controls for education, demographics, geography, occupation, and industry (More details in Appendix Section A1). Our estimate falls from 21 log points in 1982 to 15 by 2019. These are both within the historical range over the 20th-21st century as estimated by Farber et al (2018).

¹³ Unions may also raise wages for non-union workers in frictional labor markets as employers raise wages to retain the ability to hire easily (Manning 2003). On the other hand, unions may have negative spillovers on the wages of nonunion workers if the union raises wages but restricts employment in the union sector (e.g. Oswald 1982). Overall, though, evidence suggests a positive correlation between unionization rates and non-union wages, suggesting that union spillovers are on net positive (Farber 2005, Leicht 1989, Neumark and Wachter 1995, Denice and Rosenfeld 2018, Fortin, Lemieux, and Lloyd 2019).

¹⁴ See, for example, Levy and Temin (2007) and Rosenfeld (2014). Workers' ability to organize was reduced both by a direct weakening of labor law and labor law enforcement, and by an increased corporate use of union avoidance tactics (Bronfenbrenner 2009, McNicholas et al 2019). The ‘fissuring’ of the employment relationship has also decreased workers' ability to organize: workers employed as independent contractors, or employees in franchises, often have their terms of employment to some extent dictated by the end employer or franchisor (respectively), but lack the legal ability to collectively bargain with that end employer (see e.g. Paul 2016, Steinbaum 2019).

U.S. unionization: the proportional decline in the unionization rate from the mid-1980s to the mid-2000s was almost identical across a range of sectors which had very different exposures to globalization, technological change, and deregulation over the period in question (manufacturing, mining, transportation and utilities, retail trade, construction, and wholesale trade), and the rate of unionization has declined much more quickly in the U.S. than in most other industrialized economies, despite similar trends in globalization and technology (Schmitt and Mitukiewicz 2012, Denice and Rosenfeld 2018).¹⁵

I.B. Declining large firm wage premium

A large body of literature shows that large firms pay workers higher wages than their otherwise equivalent counterparts at smaller firms.¹⁶ While this firm size effect could be driven by a number of different causes – workers with higher unobserved productivity, compensating differentials, a greater propensity to pay efficiency wages, a decision to pay higher wages to fill vacancies faster – several studies have found that even when attempting to account for these possibilities a large unexplained firm size premium often remains (e.g. Brown and Medoff 1989). This implies that some substantial portion of the large firm wage premium reflects rents to labor.¹⁷ Over recent decades, however, the large firm wage premium has fallen (Hollister 2004, Even and Macpherson 2014, Cobb and Lin 2017, Song et al 2019). Estimating the large firm wage effect for observably equivalent private sector workers over 1990-2019 from the CPS-ASEC, we find a substantial decline in wage premia for workers at firms with 500 or more employees, relative to workers at small firms (Fig. 2),¹⁸ likely indicating a decline in rent-sharing. (To interpret it as something *other than* a decline in rent-sharing, there must have been either a substantial reduction in compensating differentials as small firms became relatively worse to work at, or a reduction in the sorting of highly productive workers into large firms.) Note that if large firms’ monopoly power had systematically increased over recent decades

¹⁵ See Appendix Section C1 for unionization rates by industry. Note also that, while Acemoglu, Aghion and Violante (2001) argue that the decline of unionization was endogenous, driven by skill-biased technological change, Farber et al (2018) find that the pattern of decline of U.S. union membership is unlikely to be consistent with this.

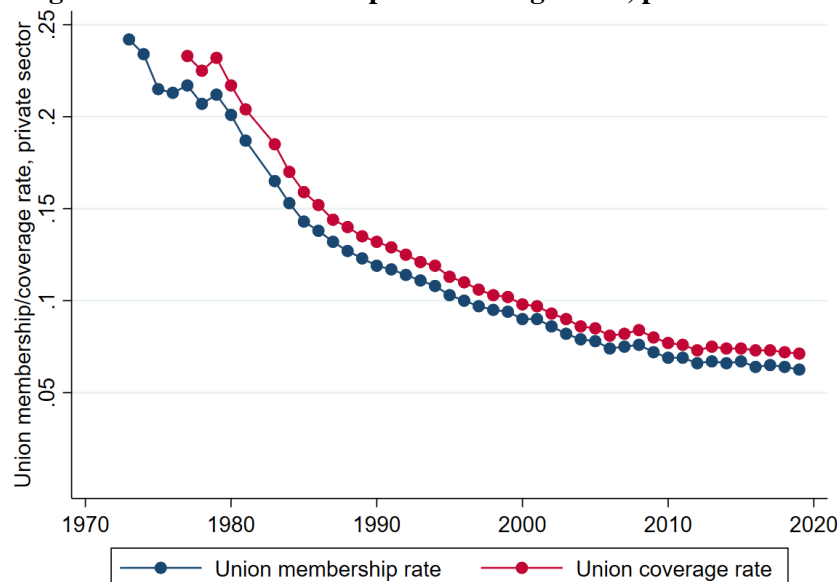
¹⁶ See e.g. Brown and Medoff (1989), Bulow and Summers (1986), Davis and Haltiwanger (1996).

¹⁷ And is consistent with large firms being more likely to have product market power – and so, rents.

¹⁸ We run log wage regressions on dummies for firm size and various demographic, occupation, and location controls. We obtain estimated for the firm size wage effects for workers at firms of 1000+, 500-999, and 100-499 workers, relative to firms with <100 workers. We regress on 5-year pooled samples as the sample size is too small for precise annual estimates. See Appendix A.2. for more details.

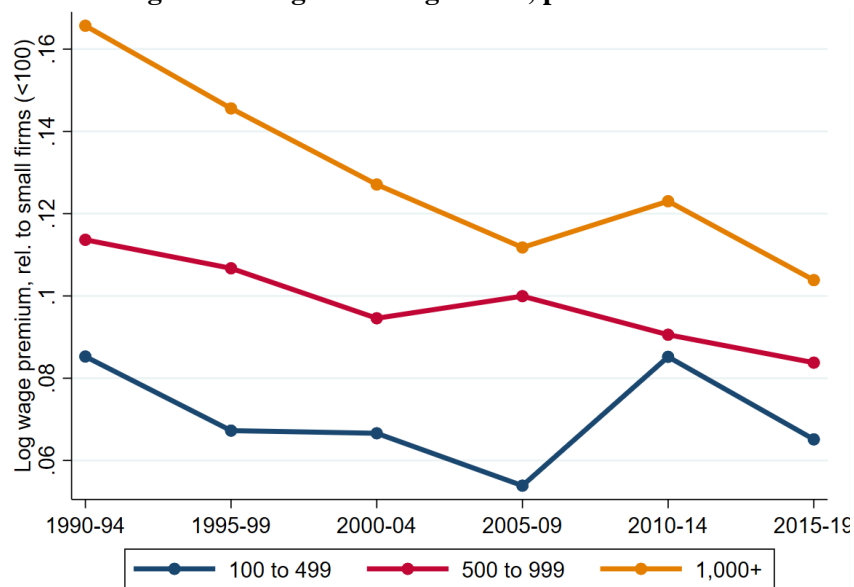
without any change in worker rent-sharing power, the large firm wage premium would have been expected to increase rather than decrease.

Figure 1: Union membership and coverage rates, private sector



Note: Union membership and coverage rate are from UnionStats.com, calculated by Hirsch and Macpherson.

Figure 2: Large firm wage effect, private sector



Notes: Large firm wage premium is estimated for firms with 100-499, 500-999, and 1,000+ employees in the CPS ASEC for five-year periods over 1990-2019, controlling for education, demographics, geography, occupation, industry, and union status. More details on estimation procedures are in the text and in Appendix section A2.

I.C. Declining variance of industry wage differentials

A large body of work on the inter-industry wage structure, over several decades, has found substantial and persistent dispersion of wages across industries for observably similar

workers. Evidence suggests that industry wage differentials to a large extent reflect rent-sharing with workers: the wage differentials persist even when accounting for worker productivity differences and compensating differentials, and are correlated with industry-level profitability, concentration, and capital-labor ratios (see for example Dickens and Katz 1987, Krueger and Summers 1988, Katz and Summers 1989, Gibbons and Katz 1992, Abowd et al 2012).¹⁹

Using the CPS-ORG, we estimate industry wage differentials for private sector workers in each year over 1984-2019. We regress log wages on a set of industry dummies at different levels of aggregation (18 sectors, 77 industries, or 250 detailed industries) alongside controls for education, demographics, geography, and occupation, and union membership/coverage.²⁰ This gives us a set of estimated wage fixed effects for each industry. If rent-sharing with labor has declined in recent decades, we would expect the variance of industry wage premia to have declined. As Fig. 3 shows, this is the case, at all levels of industry aggregation.²¹

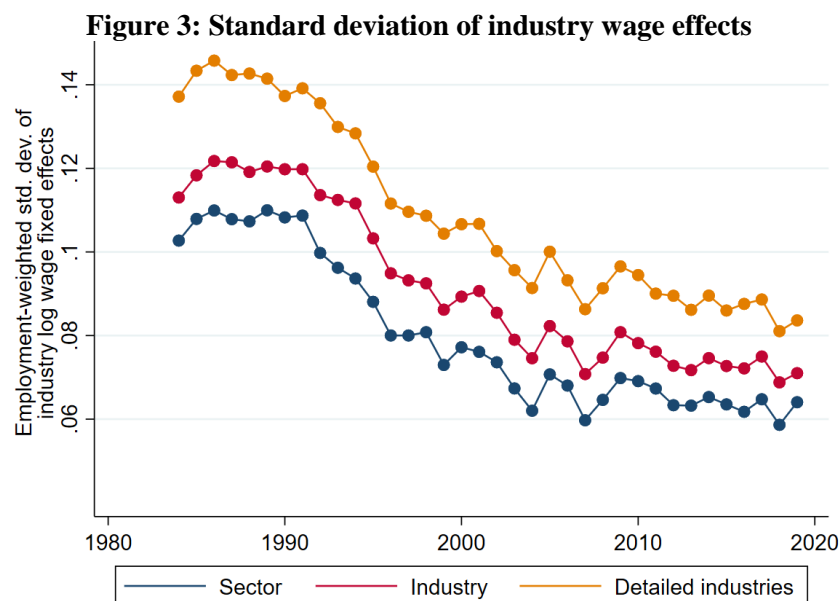
As with the decline in firm size wage effects, the decline in the variance of industry wage effects could be a result of falling rent-sharing, but could equally be a result of changing compensating differentials or sorting by unobserved worker productivity. We have no a priori reason to believe that there has been a substantial change in compensating differentials in the necessary direction (as it would imply that high-wage industries used to have much worse amenities, but have improved over time). We can test the sorting explanation by estimating industry fixed effects using the longitudinal component of the CPS, which enables us to control for worker-level unobserved productivity. The proportional decline in the variance of industry fixed effects estimated longitudinally is as large as for the cross-sectional estimates, suggesting

¹⁹ Further evidence that these premia indicated the presence of rents included the fact that wage premia for workers in different occupations in the same industry were highly correlated, and that industries with higher wage premia tended to have lower quit rates and higher ratios of applicants to job openings (shown in the previously mentioned studies, as well as Slichter (1950), Ulman (1965) and Holzer, Katz, and Krueger (1991)). More recently, Abowd et al (2012) found that industry wage differentials were strongly correlated with firm effects in an AKM decomposition, strengthening the case that they are to some extent a function of rents.

²⁰ Sectors correspond to NAICS sectors, industries to BEA industry codes (roughly NAICS 3-digit), and detailed industries to SIC industries. More details on estimation are in Appendix Section A.3. Note that the CPS-ORG data is top-coded, so we will not observe changes in firm size or industry wage premia for very high earners.

²¹ Kim and Sakamoto (2008) also find evidence of a decline in inter-industry wage dispersion using the CPS-ORG, albeit with a different methodology. Note that our result does not conflict with the result of Haltiwanger and Spletzer (2020), who find that the dispersion of average log earnings across industries has risen over 1997-2013: this pattern also exists in our raw CPS data, but is reversed once occupation and individual characteristics are controlled for. In addition, much of the decline in industry wage differentials we identify in the CPS occurs before 1997.

that the decline we observe is *not* driven primarily by a change in the degree of sorting of highly productive workers into high-wage industries.^{22,23}



Notes: Industry fixed effects are calculated as the fixed effect on industry dummies in annual log wage regressions from the CPS-ORG over 1984-2019, with demographic, location, and occupation controls. “Sector” refers to 18 aggregated NAICS sectors, “Industry” to 77 industries (roughly NAICS 3-digit level), and “Detailed industries” to 250 SIC industries. More details on estimation procedures are in the text and in Appendix section A3.

I.D. Decreased passthrough of productivity and profit shocks

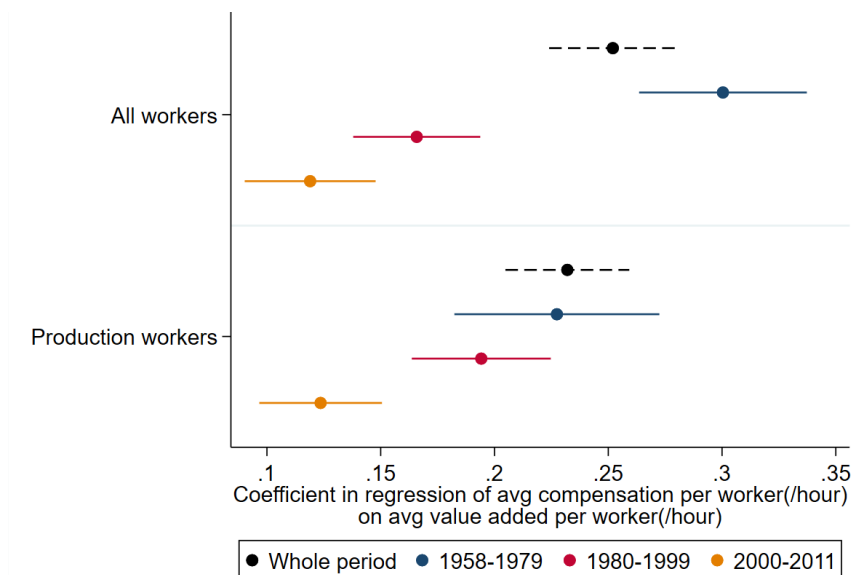
A different source of evidence that worker power has been attenuated is the apparent decline in the relationship between workers’ pay and the profitability, revenues, and/or product market power of their firm or industry. A perfectly competitive labor market would imply no relationship between firm- or industry-level performance and workers’ pay, but in practice there is substantial evidence that firms and industries with higher productivity or profitability do pay more to observably equivalent workers (as reviewed in Card et al 2018).²⁴

²² More details on the longitudinal estimates of are available in Appendix Section A.4. Note also that even to the extent that industry fixed effects *do* represent rents, a decline in the dispersion of industry fixed effects could be a result of a decline in the dispersion of industry-level rents, holding constant the degree of rent-sharing. This does not appear to be the case: the cross-industry dispersion of various measures of profitability has not fallen over the period. Another possibility is that the fall in the employment-weighted standard deviation of industry fixed effects simply represents a reallocation of workers from high-rent to low-rent industries. This also does not appear to be driving the result: the non-employment-weighted standard deviation of industry fixed effects has fallen by roughly the same amount. For more details, see Appendix Sections A.6. and A.7.

²³ A further indication that our measure of industry labor rents *is* picking up rents: we find that industries with higher wage premia have substantially and significantly lower quit rates (as found also by Holzer, Katz and Krueger 1991).

²⁴ See also Appendix Section D2 for a review of some of this evidence.

Figure 4: NAICS 6-digit industry-level regression of average compensation per worker on average value added per worker, manufacturing



Notes: Coefficients in NBER CES Manufacturing industry regressions: 1958-2011. “All workers” regresses the change in log compensation per employee on the change in log value added per employee, 3-year moving averages (following the specification in Stansbury and Summers 2019). “Production workers” regresses the change in log average hourly production worker pay on the change in log value added per production worker hour, 3-year moving averages. Regressions have NAICS 6-digit industry and year fixed effects. Standard errors are clustered at the NAICS 6-digit industry level. Dot represents point estimate and line represents 95% confidence interval. Each line/dot is from a separate regression.

There is some evidence to suggest, however, that this relationship has weakened over time. Using the NBER CES Manufacturing data, which covers 473 NAICS 6-digit manufacturing industries over 1958-2011, we regress the annual change in log value added per worker on the annual change in log compensation per worker.²⁵ We find evidence of rent-sharing over the period: in years with 10 log points higher value added per worker, average pay in a given industry was 2.5 log points higher. But the strength of that relationship fell by about half from the 1960s-70s to the present (Fig 4). In similar work, Bell, Bukowski, and Machin (2019) find a declining relationship between profits per worker and compensation per worker in U.S. manufacturing industries, also using the NBER CES data. Benmelech, Bergman, and Kim (2019) report a decline in the relationship between output per hour and compensation per hour at the plant level in U.S. manufacturing over 1978-2007. Together, this evidence is strongly suggestive

²⁵ Following Stansbury and Summers (2019) we use a 3-year moving average of each variable in the regression. Our results are robust to the choice of moving average length. Note that NAICS 6-digit manufacturing industries are very narrowly defined: for example, NAICS 337110 “Wood kitchen cabinet and countertop manufacturing”.

of a decline in rent-sharing in U.S. manufacturing: workers in firms and industries with higher revenue productivity and higher profits appear to share in this less than they used to.

We also examine evidence on the relationship between product market concentration and wages. At the very aggregated sector level, we find a positive relationship between average product market concentration and the sector wage premium, but the strength of that relationship declined over 1982-2012. In regressions of product market concentration on wage premia at the industry level, the general trend also suggests a weakening of the relationship between average concentration and the wage premium, but the change over time is not statistically significant.²⁶

I.E. Increased use of domestic outsourcing and subcontracting

A final indicator that rent-sharing has declined is the increase in the use of outsourcing and subcontracting of business functions, franchising, the growth in independent contracting and the gig economy, and the decline in internal labor markets, often referred to jointly as the “fissuring” of the workplace (see Weil 2014, Bernhardt, Batt, Houseman, and Applebaum 2016, and Bidwell, Briscoe, Fernandez-Mateo, and Sterling 2013). If workers' ability to share in firm-level rents depends on them being employed within the firm, then one would expect that this fissuring would lead to wage decreases, particularly for workers working (indirectly) for high-rent firms.²⁷ There is increasing evidence that outsourced workers receive wage penalties, and that this is related to a loss of rents.²⁸ While the scale of fissuring is difficult to measure with existing data (Bernhardt et al 2016), evidence suggests that it is widespread. Weil (2019)

²⁶ See Appendix Section C2 for details of these analyses. Note that if product market concentration became a noisier measure of monopoly power over time, we might expect to see a weakening relationship between concentration and wage premia *even if* the underlying relationship between monopoly power and wage premia remained constant.

²⁷ Factors driving the fissuring of the workplace may have been an increase in shareholder pressure to cut labor costs, increased ability to coordinate and monitor the performance of contracted out workers, increased focus on firm “core competencies”, declining union presence, and an erosion of antitrust standards prohibiting non-price vertical restraints (see Weil 2014, Bernhardt et al 2016, Bidwell et al 2013, Steinbaum 2019). Factors which make rent-sharing more likely if workers are employed within the boundaries of the firm include the degree to which rent-sharing is determined by unionization or the threat of unionization, and/or the degree to which rent-sharing depends on a sense of pay equity or internal labor markets within the firm

²⁸ Dube and Kaplan (2010) find that outsourced janitors and guards lose wage premia, consistent with a loss of firm-specific rents; Dorn, Schmieder, and Spletzer (2018) find evidence of a loss of wage premia for outsourced workers in food, cleaning, security, and logistics occupations; Mishel (2018) links the decline in the manufacturing wage premium to the increase in the use of staffing agencies; and Wilmsers (2018) finds that workers at supplier firms which become dependent on a dominant buyer lose wages, consistent with a loss of rents. Evidence from Handwerker (2018) and Song et al (2019) is also consistent with the fissuring of the workplace leading to a loss of rents: Handwerker finds that wages are lower in firms with more concentrated occupational employment, and this concentration has increased over time, and Song et al (2019) find an increase in the sorting of highly-paid workers into high-paying firms (and vice versa).

estimates that – as a rough lower bound – 19 percent of private sector workers were in industries where fissured arrangements predominate. Looking at specific occupations, the share of workers in security, cleaning, and logistics occupations who work in business services industries rose from less than 10% in 1970 to 35%, 25%, and 20% respectively in 2015 (Dorn, Schmieder, and Spletzer 2018).

II. Estimating the magnitude of the decline in labor rents

The evidence in Section I paints a picture of declining rent-sharing with labor – but was it big enough to explain the macro trends we have seen? We use a back-of-the-envelope approach to estimate the total quantity of labor rents in the U.S. nonfinancial corporate sector for each year from 1982-2016, as follows:

$$\text{Total labor rents} = \text{Union rents} + \text{Industry rents} + \text{Firm size rents}$$

where “union rents” refers to rents arising from union wage premia for unionized workers, “industry rents” refers to rents arising from industry wage premia, and “firm size rents” refers to rents arising from large firm wage premia. We calculate union rents, industry rents, and firm size rents from our estimates of union, industry, and firm size wage premia as outlined below.²⁹ Note that our estimate is of the total quantity of labor rents for the *majority* of workers, excluding the very highest earners, since top-coding and non-response in the CPS mean we cannot estimate union, industry, or firm size rents for these earners.

Union rents: For each year t , we estimate the share of total compensation in the non-financial corporate sector which was union rents, using estimates of the union log wage premium uwp_t , the union coverage rate in each year ucr_t , and compensation in the non-financial corporate sector,³⁰ as follows:

$$\text{Union rents} = \text{compensation}_t \left(1 - \frac{1}{1 + ucr_t(e^{uwp_t} - 1)} \right)$$

²⁹ Full details of the calculation are in Appendix Section B1. We focus on the nonfinancial corporate sector for our baseline estimates, and present estimates of labor rents for the full corporate sector in Appendix Section B2.

³⁰ We estimate the union log wage premium from the CPS-ORG for 1984-2019, and use estimates from Blanchflower and Bryson (2004) for years 1982 and 1983. We estimate the union coverage rate for workers in private industries excluding finance, insurance, and real estate for 1984-2019 from the CPS-ORG and extend these back to 1982 using data on the private sector union coverage rate from unionstats.com.

Industry rents: For each industry j and year t , we estimate the share of total compensation in that industry which was industry rents. We start with our estimated industry fixed effects from log wage regressions, at the level of 19 NAICS sectors for 1987-2016 and 9 SIC sectors for 1982-1986. To calculate the industry wage *premia* from the estimated fixed effects, we first rescale the estimated industry fixed effects relative to the lowest-fixed-effect large industry, which is Retail Trade. (This calculation assumes that there are zero labor rents on average for workers in Retail Trade.) We then treat *half* of the deviation of the industry fixed effect from the Retail Trade fixed effect as an industry wage premium (“rents”). We only consider half of the industry wage differentials to represent rents because, even though we have controlled for as many person-level characteristics as we can, there may still be worker sorting into industries on unobserved productivity differences, and because part of the estimated inter-industry wage differentials may reflect compensating differentials. While we choose to simply cut industry wage effects in half for transparency, we have reason to believe this is reasonable: first, our estimates of industry wage premia from the longitudinal component of the CPS, controlling for person fixed effects, are very highly correlated with our cross-sectional estimates and are exactly half as big on average; and second, we benchmark our estimates against estimates of industry wage premia and the degree of rent-sharing from two papers using AKM estimation on U.S. data.³¹ This approach gives us industry wage premium $iwp_{j,t}$, and allows us to calculate industry rents as:

$$\text{Industry rents} = \sum_j^{\text{industries}} \text{compensation}_{j,t} \left(1 - \frac{1}{e^{iwp_{j,t}}} \right)$$

where *compensation* refers to our estimate of total nonfinancial corporate sector compensation for each industry.³²

³¹ More details on our longitudinal fixed effect estimates are in Appendix Section A.4. and on our benchmarking procedure in Appendix Section A.5. For our benchmarking procedure, we take estimates for the average firm fixed effect across different U.S. sector over 1990-2001 from Abowd et al (2012), and apply Sorkin’s (2018) estimate that one third of firm fixed effects on average represent rents. This gives us a rough estimate of the average log wage premium due to rents in each sector, over 1990-2001.

³² This is calculated as $\text{compensation in industry } j * \frac{\text{total compensation in nonfinancial corporate sector}}{\text{total compensation in private industries}}$. We make this adjustment because we want to estimate only the labor rents going to workers in the nonfinancial corporate sector, but we do not have data on compensation by industry broken down by corporate vs. noncorporate sector.

Firm size rents: For each firm size class s and year t we estimate the share of total nonfinancial corporate compensation which was firm size rents, using our firm size wage fixed effect estimates from the CPS for 1990-2016. As with the industry wage fixed effects, we halve the firm size (log) wage fixed effects to get our estimate of the firm size premium $fsp_{s,t}$, to account for possible compensating differentials and/or unobserved productivity differences. The firm size premium is estimated for firms of 500+ workers or 100-499 workers, relative to firms with 1-99 workers. We impute firm size rents for the years 1982-1989 using data on compensation share by firm size class and estimated firm size log wage premia from Levine et al (2002).³³ This gives us the following expression for firm size rents:

$$\text{Firm size rents} = \sum_s^{\text{firm size classes}} \text{compensation}_{s,t} \left(1 - \frac{1}{e^{fsp_{s,t}}} \right)$$

where *compensation* refers to our estimate of nonfinancial corporate sector compensation by firm size class.³⁴

Using this method, we think it likely that we will *underestimate* the true decline of labor rents over recent decades. First, because our estimates are based on union, industry, and firm size wage premia calculated relative to a baseline sector (non-unionized firms for union rents, Retail Trade for industry rents, and firms of under 100 employees for firm size rents), our calculation of total labor rents will miss any decline in rent-sharing which has occurred commonly across industries, firm size classes, and/or union status. This could include a generalized increase in shareholder activism and more “ruthless” corporate management practices, a generalized increase in the use of domestic outsourcing, or a generalized decrease in the threat effect of unions. Second, in each calculation we assume that there are no rents in the baseline sector: workers receive the wage that would prevail in the absence of worker power. Our calculation will therefore miss any decline in rent-sharing which is specific to these baseline sectors – with the most obvious candidate being a decline in rents arising from the erosion in the real value of the minimum wage. Third, our estimates of labor rents are based on union, industry, and firm size *earnings* premia. Total rents, however, are estimated as a share of *compensation*. The union

³³ Full details on the imputation procedure are available in Appendix Section B1.

³⁴ This is estimated as total compensation in the nonfinancial corporate sector, multiplied by the payroll share of each firm size class (from the Census Bureau SUSB data).

and large firm premia for non-wage benefits are likely greater than for wages, making our calculation of total union and firm size rents an underestimate.³⁵

There are, on the other hand, some factors which could make our estimate of the decline in labor rents an overestimate. First, while we cut our estimated industry wage fixed effects and firm size fixed effects in half to account for unobserved productivity or compensating differentials, it is possible that they remain overestimates of the degree of rents (though our benchmarking exercise should assuage this concern). Second, we assume that there are zero rents in the baseline sectors (non-unionized firms, Retail Trade, and firms of under 100 employees) – but in some models, worker power in one sector lowers pay in other sectors (by restricting employment in the high worker power sector, leading workers to spill over into the low worker power sector, reducing wages). If this is the case, we would overestimate total labor rents.³⁶ On net, we think these concerns are outweighed by the factors pushing our estimate to be an underestimate.

II.A. Labor rents in the nonfinancial corporate sector, 1982-2016

Our measure of labor rents, as a share of net value added in the nonfinancial corporate business sector, declined from around 12% in the early 1980s to around 6% in the 2010s (Fig. 5, Table 1). Union rents fell by 2.1 pp as the unionization rate and union wage premia fell. Industry rents fell by 2.4 pp as industry wage premia fell and employment fell in high-rent industries. Firm size rents fell by 1.2 pp as firm size premia fell.

A set of simple counterfactuals illustrates that the decline in total labor rents is primarily due to changes in the ability of workers to lay claim to rents *within* any given industry, rather than changes in sectoral composition of the economy. First, if unionization within each sector had *not* fallen (and union wage premia had not fallen), but the sectoral composition of compensation had changed as it did over 1987-2016, union rents would have fallen from 2.4% to 1.9% over 1987-2016 (rather than falling from 2.4% to 0.9%).³⁷ On the other hand, if the sectoral

³⁵ Mishel, Bivens, Gould, and Shierholz (2012) show that the union premium is greater for non-wage benefits than for wages. Hollister (2004) finds that large firms are more likely to provide health and pension benefits, controlling on observables, but this differential has fallen over time, exacerbating the fall in the large firm wage premium.

³⁶ A further concern might be that we estimate union and industry wage effects in the CPS-ORG without controlling for firm size (which is not available in the CPS-ORG). As a robustness check, we estimate union, firm size, and industry wage premia all together in the CPS ASEC over 1990-2019. The estimated falls in the size of the union wage premium and industry wage premia are very close to those estimated from the CPS-ORG data.

³⁷ We carry out our counterfactual over 1987-2016 rather than 1982-2016 because it means we are able to use consistently defined NAICS industries. This is the period over which the majority of the fall in labor rents happened.

composition of compensation had not changed, but unionization rates within each sector, and union wage premia, had fallen to the levels they were at in 2016, union rents would have fallen by essentially the same amount that they fell in reality: from 2.4% to 0.9% over 1987 to 2016.³⁸ For industry rents, if industry wage premia had not declined but the sectoral composition of compensation had still changed over 1987-2016, the industry rent share would have only declined by around one tenth of a percentage point.³⁹ If industry wage premia had fallen but the sectoral composition of compensation had stayed the same, the industry rent share of net value added would have fallen from 5.2% in 1987 to 3.4% in 2016 rather than from 5.2% to 2.6%. Finally, for firm size rents, the share of workers in large firms has actually grown over the period, both in aggregate and within almost every sector, such that the decline in firm size rents reflects exclusively the decline in the firm size premium rather than compositional shifts.

Note that our analysis of the role of “union rents” only considers the *direct* effect of the decline in unionization: the loss of wage premia for unionized workers. To the extent that union power also increased the compensation of non-union workers in certain industries or large firms through “threat effects”, our estimates of the decline in industry or firm size rents could also be capturing effects of the decline of unions.⁴⁰

While our analysis in this paper is primarily focused on shifts in income between labor and capital, rather than inequality in labor incomes, we note that the decline in labor rents appears to have disproportionately affected workers with less formal education. Over 1984-2016, labor rents as a share of compensation fell by 8 percentage points for workers with no college or some college education, and by 4.5 percentage points for workers with a four year college education or more. This differential was driven by significantly larger declines in unionization rates and firm size rents for non-college workers.⁴¹ There is a large body of work documenting the effect of the decline in unionization on the rise in income inequality in the United States. See,

³⁸ This is because by 2016 the unionization rate in manufacturing had fallen to almost the level that it was in services. So, shifting the sectoral composition from services back to manufacturing in 2016 would have made little difference to aggregate unionization.

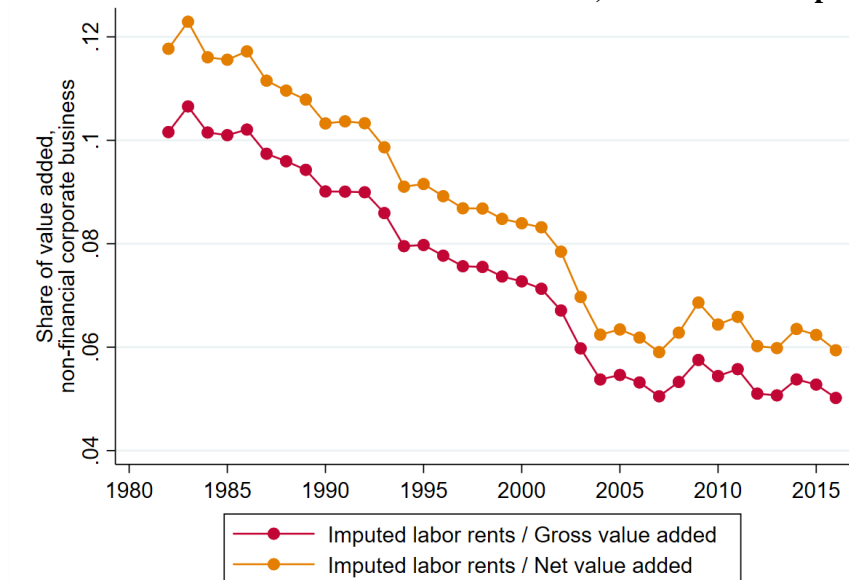
³⁹ This is due to two offsetting forces. The decline of the share of total compensation in manufacturing – which has a high average wage premium – exerted downward pressure on the industry rent share, but this was offset by increases in the compensation share of professional, scientific, and technical services, and health care and social assistance, which had high and medium-sized wage premia in the late 1980s (respectively).

⁴⁰ Supporting this, there is a very strong relationship between the decline in industry, firm size, and union rents at the state and industry level. See Appendix Section C8 for details.

⁴¹ See Appendix Sections B3 and C4 for the detail underlying these calculations. We start in 1984 as we cannot estimate union membership and wage premia by education group before 1984.

for example, DiNardo, Fortin, and Lemieux (1996), Card (1996), Rosenfeld (2014), Farber and others (2018), Fortin, Lemieux, and Lloyd (2018).

Figure 5: Estimated labor rents as share of value added, nonfinancial corporate sector



Note: Labor rents imputed from estimated union, firm size, and industry wage premia as described in Section II. Data on compensation and value added in nonfinancial corporate business sector from BEA NIPA.

Table 1: Estimated labor rents as share of value added, nonfinancial corporate sector

	1982	1986	1996	2006	2016
Shares of net value added, nonfinancial corporate sector					
Total labor rent share	11.7%	11.7%	8.9%	6.2%	5.9%
Union rent share	3.0%	2.6%	1.7%	1.2%	0.9%
Firm size rent share	3.7%	3.5%	2.9%	2.3%	2.5%
Industry rent share	5.0%	5.6%	4.2%	2.6%	2.6%
Shares of gross value added, nonfinancial corporate sector					
Total labor rent share	10.1%	10.2%	7.8%	5.3%	5.0%
Union rent share	2.6%	2.3%	1.5%	1.1%	0.7%
Firm size rent share	3.2%	3.0%	2.6%	2.0%	2.1%
Industry rent share	4.3%	4.9%	3.7%	2.2%	2.2%

II.B. Were labor rents redistributed or destroyed?

One natural explanation for the steep decline of labor rents is that it represents greater market pressures on particular industries, coming from technology, globalization, or some other extrinsic forces. If this were the case, one would expect (1) that returns to capital would fall alongside rents to labor, and (2) that the total rents in the industry – profits, plus labor rents – would be falling. It is striking, however, that for the industries in which the majority of the

decline in labor rents took place, this was *not* the case – suggesting there was a very important element of redistribution of rents from labor to capital.

In 29 industries – which employed around 30% of the private sector workforce in 2018 – returns to capital *rose* even while rents to labor fell over 1987-2016. Together, these industries were responsible for 73% of the decline in labor rents over the period. Of these industries, those responsible for the largest shares of the total decline in labor rents were: several manufacturing industries, wholesale trade, telecoms, utilities, and trucking. In the majority of these industries – 21 industries, employing around 24% of the private workforce in 2018 – returns to capital rose *by more than* rents to labor fell over 1987-2016, implying that the total underlying profits generated by these industries rose, even as rents to labor fell. These industries were responsible for 38% of the total decline in labor rents over 1987-2016.⁴²

We also take a closer look at manufacturing industries. The manufacturing sector can account for the majority of the decline in the labor share since the 1980s. It is a sector which saw particularly large declines in unionization and in our estimates of industry wage premia. And it is the sector that has been the most exposed to global competition over recent decades. This raises the question: were labor rents destroyed most in the manufacturing industries which were most exposed to global competition? Using changes in import penetration from low-wage countries as our measure of exposure to global competition, we investigate this for 18 manufacturing industries over 1989-2007.⁴³ Contrary to the predictions of the globalization thesis, labor rents declined the most in the industries with the *smallest* increases in low-wage import penetration over the period (Fig. 6). This evidence, while not dispositive, casts further doubt on the argument

⁴² See Appendix Section B.6. for details of these calculations. We study 51 industries at roughly the NAICS 3-digit level, over 1987-2016 (since consistent industry-level data through 2016 is not available before 1987.)

⁴³ We use low-wage import penetration data from Bernard, Jensen, and Schott (2006), updated by Peter Schott in 2011. Low-wage import penetration is calculated as the share of domestic sales within each industry represented by imports from low-wage countries, defined as countries with GDP per capita less than 5% of the U.S. level. We study 1989-2007 as this is the period for which we have consistently-defined data on low-wage import penetration. (See Appendix Section B7 for more details). Our sample period covers the period after the accession of China into the WTO, as well as the large increases in global trade in the 1990s. However, our sample period does not cover the effects of globalization in the 1970s and early-to-mid 1980s. Competition from low-wage countries would have been relevant for only a few industries during this period: in 1989, imports from low-wage countries only made up more than 1% of the US market in three manufacturing industries: apparel, textiles, and miscellaneous durable goods (Bernard and others (2006)). On the other hand, competition from high-wage countries may have destroyed rents in other manufacturing industries earlier in the postwar period, and this is not captured in our sample. Borjas and Ramey (1995), for example, argue that increased foreign competition in durable goods manufacturing over 1976-1990 destroyed rents in that sector, reducing the wage premia paid to workers.

that the decline in labor rents in manufacturing since the late 1980s was primarily a result of globalization.

Overall, these results suggest that a large share of the decline in labor rents was a result of a redistribution of rents from labor to capital, rather than a destruction of rents as a result of increased competition or market pressure. This informs our approach in the rest of the paper.

Figure 6: Low-wage import penetration and labor rents in manufacturing, 1989-2007



Note: Manufacturing industries at BEA industry code level. Imputed labor rent share of value added calculated from estimated industry and union wage premia (from CPS-ORG), and compensation and value added by industry from BEA Industry Accounts. Low-wage import penetration by industry from Bernard, Jensen, and Schott (2006).

III. Factor shares, profits, and measured markups

The labor share of income has declined since the 1980s, with a corresponding rise in the capital share (Elsby, Hobijn, and Sahin 2013, Karabarbounis and Neiman 2014). The Tobin's Q of publicly listed corporations – the ratio of their stock market value to the replacement cost of their capital stock -- has risen from around 1 in 1970 to 1.75 by 2015, alongside an increase in the value of financial assets relative to the value of productive capital. (Eggertsson et al 2018). The average profitability of capital has risen, even as the risk-free rate has declined. And, by a

range of measures, several authors have found that markups have risen (e.g. De Loecker et al 2020, Eggertsson et al 2018, Covarrubias et al 2019).⁴⁴

A number of explanations have been proposed for the decline in the labor share of income. Many of these have centered on certain aspects of globalization or technological change – such as the increase in offshoring, the declining price of capital goods, or rising automation – as the major cause of the decline in the labor share. These include Elsby, Hobijn, and Sahin (2013), Abdi and Danninger (2017), Acemoglu and Restrepo (2018), and Autor et al (2020) (focusing on the U.S.); and Karabarbounis and Neiman (2014), Dao, Das, Koczan, and Liang (2017), and Autor and Salomons (2018) (taking a cross-country perspective).

More recently, a growing body of research argues that these trends can be explained by a rise in the market power of corporations. Rising monopoly power in product markets would lead firms to increase their markups, reducing the labor share of income and increasing corporate profitability. This would in turn increase Tobin’s Q and the value of financial assets relative to physical capital. Different aspects of this argument have been made by (in alphabetical order) Barkai (2017), Brun and Gonzalez (2017), Covarrubias, Gutiérrez, and Philippon (2019), De Loecker and Eeckhout (2019), De Loecker, Eeckhout, and Unger (2020), Eggertsson, Robbins, and Wold (2019), Farhi and Gourio (2018), Gonzalez and Trivin (2017), Grullon, Larkin, and Michaely (2019), Gutiérrez and Philippon (2017, 2019), Hall (2018), Philippon (2020). Some authors have also argued that these trends could be rationalized by a rise in companies’ monopsony power in labor markets (e.g. CEA 2016, Furman and Krueger 2016, Glover and Short 2018, Benmelech, Bergman, and Kim 2019, Philippon 2020).

It is difficult to rationalize the trends in corporate valuations, corporate profitability, and measured markups in a model of perfect competition. In this sense, we agree with the monopoly/monopsony power arguments that the explanation of these macro trends must involve some degree of rents created by imperfect competition (in contrast to explanation based solely on technological change or globalization).

Our preferred explanation for these macro trends, however, focuses on a *redistribution* of existing rents rather than a *creation* of new rents. That is, the decline in the labor share, and the

⁴⁴ The magnitude of the rise in measured markups depends on the method used. See Traina (2018), Karabarbounis and Neiman (2018), Edmond, Midrigan, and Xu (2018), and Baqaee and Farhi (2020). All measures that we are aware of show *some* increase in markups over recent decades.

rise in corporate valuations, profitability, and measured markups, could have been caused by a decline in worker power.

To see this, consider an economy characterized by three types of power, to varying degrees: monopoly power, monopsony power, and worker power.

Firms have monopoly power in the product market, created by a combination of monopolistic competition and restrictions to entry. They set their price at a markup above marginal cost, and make some ‘pure profits’ or rents which are not fully competed away by new entrants. These rents may arise as a result of explicit barriers to entry, regulatory or otherwise. But they may also arise from heterogeneous production technologies, with new entrants unable to perfectly replicate incumbents’ products or production techniques. And in the short run, there may be rents because of the presence of fixed costs due to previously installed capital, and prices in excess of variable costs.⁴⁵

Firms may also have monopsony power in the labor market, by which we mean the wage-setting power firms derive from an upward-sloping labor supply curve. This can arise either from employers’ size in their local labor market (“conventional monopsony”), and/or from labor market search frictions, switching costs, or different worker preferences for different employers (“dynamic monopsony”). In a monopsonistically competitive labor market, the wage a firm pays is a markdown from the marginal revenue product of labor at the firm.⁴⁶

Finally, there is also worker power. By worker power, we mean workers' ability to increase their pay above the level that would prevail in the absence of such bargaining power. In this framework, worker power not only acts as countervailing power to firm monopsony power, but also gives workers an ability to receive a share of the rents generated by companies operating in imperfectly competitive product markets. We use the term worker power as synonymous with

⁴⁵ Note that in the latter two cases the existence of rents does not necessarily signal a market imperfection which can be corrected through antitrust or competition policy. In this framework the presence of rents is therefore, to some extent, an innate feature of the structure of particular product markets.

⁴⁶ Our definition of monopsony power follows the modern monopsony literature. In the presence of monopsony, the size of the wage markdown is an inverse function of the elasticity of labor supply to the firm. The perfectly competitive case occurs where the elasticity of labor supply to the firm is infinite. Labor market concentration and search frictions both therefore create monopsony power because they both generate upward-sloping labor supply curves to the firm – but their welfare and policy implications can be different, as highlighted by Manning (2003).

worker bargaining power, worker rent-sharing power, and insider-outsider power of the kind that was used in earlier work to explain increases in unemployment.⁴⁷

In this framework, if workers' ability to receive some of the rents generated by their firms has fallen over time, we would expect to see a decline in the labor share – as rents going to workers fall and rents going to shareholders rise (holding constant the total quantity of rents generated). We would also expect to see a divergence between the average profitability of capital and the risk-free rate, as profits to shareholders rise, and a rise in Tobin's Q and the ratio of financial wealth to physical capital, as the rise in profits to shareholders increases the net present value of the claim shareholders have over corporate profits (even as the asset value of firms does not change). Indeed, Greenwald, Lettau, and Ludvigson (2019) find that a reallocation of income from labor to shareholders can account for a large share of the rise in equity valuations from 1989 to the present.⁴⁸

In addition, while a fall in worker rent-sharing power should not have any implication for firms' underlying markups (which are determined by their product market power), it does have implications for *measured* markups. This is because measures of aggregate markups used in recent literature depend on firms' costs, including firms' labor costs – even if the labor costs partly represent rents accruing to labor as well as the true marginal cost of production.⁴⁹ This

⁴⁷ Note that monopsony power and worker power are distinct concepts in our framework. The term “monopsony power” is sometimes used to refer to a broader conception of employer power than we use here: for example, in some bargaining models, firm monopsony power might be considered the exact inverse of worker power (the wage is partly determined by the firm's and worker's relative bargaining power over the match surplus). We distinguish between monopsony power and worker power for two reasons. First, in our framework, worker power is not necessarily simply the inverse of employer wage-setting power: worker power enables workers to claim a share of the rents produced within the firm, potentially raising their wage above the marginal product in their labor market. This can occur even in a world of no labor market concentration or search frictions, where labor supply to the firm is completely elastic. Second, the source of the change in wage-setting power matters for diagnosis and policy solutions: a decline in worker power caused by a decline in unionization implies a different policy solution as compared to a rise in employer power caused by an increase in labor market frictions or concentration. The two concepts of worker power and monopsony power *are*, however, linked in the sense that worker power operates as countervailing power to firm monopsony power. As worker power declines, firms' ability to exercise their monopsony power rises without the underlying elasticity of labor supply to the firm having changed (as described in, for example, Erickson and Mitchell 2007).

⁴⁸ Specifically, they find that a series of “factor share shocks” have reallocated rewards to shareholders and away from labor compensation, accounting for 43% of the increase in equity valuations since 1989. They do not take a stance on the cause of these factor share shocks, but note that they could be due to changes in industrial concentration, worker bargaining power, offshoring and outsourcing, or technological change.

⁴⁹ The production function approach used by De Loecker, Eeckhout, and Unger (2019) estimates markups as a function of the (estimated) elasticity of output with respect to variable inputs, and the ratio of sales to variable costs – which include some labor costs. The rise in measured markups in the U.S. is mostly due to an increasing ratio of sales to variable costs, which could be a result of falling labor costs as labor rents fell. The user cost approach of

implies that markups, as they have been measured in recent papers, *cannot* be used to distinguish between a story of rising product market power and a story of falling worker power: a rise in measured markups could reflect a fall in worker rent-sharing power just as much as it could reflect a rise in true markups and firms' monopoly power.

III.A. Accounting decomposition, based on Farhi and Gourio (2018)

This implies that rising monopoly power, rising monopsony power, and falling worker power could each in theory account for the changes in factor shares, profits, and markups. But is the magnitude of the decline in labor rents consistent with these trends? To calibrate the plausibility of the declining labor rents explanation, we build on the accounting decomposition in Farhi and Gourio (2018). Farhi and Gourio extend the neoclassical growth model to account for six major recent macroeconomic trends, including the decline in the labor share, increases in valuation ratios, and moderate increases in profitability alongside a declining risk-free rate. Using this model, they identify a role for rising monopoly power in explaining these macro trends (alongside roles for unmeasured intangibles and rising risk premia). They estimate that average economy-wide markups rose from 8% to 15% over 1984-2016.

Their model, however, assumes competitive labor markets with no rent-sharing. We replicate their accounting decomposition, with one alteration: we hold the degree of monopoly power (markups) fixed, and instead introduce a rent-sharing parameter to allow workers to share in monopoly profits. We incorporate this in the simplest way possible: the monopolistic representative firm maximizes profits as before, but then shares the rents or 'pure profits', with share π_L going to labor. This reduced-form approach is similar to that adopted in much of the literature on rent-sharing (as reviewed in Card et al (2018)). It can be micro-founded with a strongly efficient bargaining model where workers, seeking to maximize total pay to labor, and shareholders, seeking to maximize their profits, jointly bargain over the firm's production decisions (MacDonald and Solow 1981).

Gutiérrez and Philippon (2017) estimates markups as the ratio of sales to costs, which are calculated as operating expenses plus an imputed cost of capital. Operating expenses include labor costs. Again, this means that changes in measured markups could be due to changes in labor costs as a result of falling labor rents. (See online appendix F for more details on this). It would in theory be feasible to take these approaches and apply them only to non-labor costs to estimate markups, but there is no publicly available data of sufficiently good quality to do this across the entire set of industries. We note that Anderson, Rebelo, and Wong (2019) estimate markups across the U.S. in retail trade, using the markup of the price of each good sold over its replacement cost (i.e. *not* including labor costs), and find no secular increase in markups over 1979-2014.

Farhi and Gourio carry out their decomposition targeting nine empirical moments for the U.S. private sector over 1984-2016: gross profitability, the gross capital share, the investment-capital ratio, the risk-free rate, the price-dividend ratio, population growth, TFP growth, the growth rate of investment prices, and the employment-population ratio. They estimate nine parameters: the discount factor, the probability of a disaster, the depreciation rate of capital, the Cobb-Douglas parameter in the aggregate production function, population growth rate, TFP growth, the growth rate of investment-specific productivity, labor supply, and the markup.

We target the same nine moments and estimate eight of the same nine parameters – but, instead of estimating the markup, we estimate the rent-sharing parameter with labor, holding the markup fixed at the level that Farhi and Gourio estimate for the period 2001-2016 (1.15). Identification is nearly recursive in the Farhi/Gourio decomposition, with many parameters estimated tightly by their near-equivalent moments. Identification in our approach is therefore nearly identical to that in Farhi and Gourio: it has different implications for only two of the nine empirical moments – the gross capital share $\frac{\Pi}{Y}$ and gross profitability $\frac{\Pi}{K}$ (equivalent in the Farhi/Gourio model to the marginal product of capital). The equations below show the difference between the two approaches: in the Farhi/Gourio model, the rent-sharing parameter π_L is implicitly set to be constant at zero, and the markup μ is allowed to vary. In contrast in our model, the markup μ is set to be constant at 1.15, and π_L is allowed to vary.

$$\begin{aligned} \text{Capital share} \quad \frac{\Pi}{Y} &= \frac{\alpha + (1 - \pi_L)(\mu - 1)}{\mu} \\ \text{Profitability of capital} \quad \frac{\Pi}{K} &= \frac{\alpha + (1 - \pi_L)(\mu - 1)}{\alpha} (r^* + \delta + g_Q) \end{aligned}$$

By construction of the recursive identification process in the decomposition, our model returns exactly the same parameter estimates as Farhi/Gourio for 6 of the 9 parameters estimated. Table 2 below shows only the parameter estimates which differ between the Farhi/Gourio model (“FG”) and our model (“SS”). To fit the data best, Farhi/Gourio estimate a rise in the average economy-wide markup from 1.08 to 1.15 over the period. When we hold the markup constant at 1.15, but allow the rent-sharing parameter to vary, we estimate instead that the rent-sharing

parameter fell from 0.44 to 0.02 over the period.⁵⁰ Our model also has slightly different implications for the Cobb-Douglas parameter α and TFP growth g_Z : our model suggests a somewhat smaller slowdown in TFP growth over the period, and a slight fall in the Cobb-Douglas parameter α (implying a small degree of labor-complementing technological change).

Table 2: Estimated parameters and changes over time
(only parameters where our estimates differ from Farhi and Gourio's estimates are shown)

Parameter		Model	First sample (1984-2000)	Second sample (2001-2016)	Difference
Markup	μ	FG	1.079	1.146	0.067
		SS	<i>Fixed: 1.15</i>	<i>Fixed: 1.15</i>	--
Rent-sharing with labor	π_L	FG	<i>Fixed: 0</i>	<i>Fixed: 0</i>	--
		SS	0.441	0.022	-0.419
Cobb-Douglas parameter	α	FG	0.244	0.243	-0.001
		SS	0.260	0.244	-0.016
TFP growth	g_Z	FG	1.298	1.012	-0.286
		SS	1.233	1.010	-0.223

Note: in the "SS" estimation, markup μ is held constant at 1.15. In the "FG" estimation, rent-sharing parameter π_L is implicitly held constant at 0. The "FG" estimates in this table correspond to the baseline parameter estimates in Table 2 of Farhi and Gourio (2018).

What does the estimated fall in the rent-sharing parameter imply for total labor rents? The rise in markups estimated by Farhi and Gourio, from 1.08 to 1.15, imply a rise in the "pure profit" share of output from 7.3% in the 1980s-90s to 12.8% in the 2000s-10s. Since we hold the markup at 1.15 throughout the 1980s-2010s in our estimation, the pure profit share of our economy is 12.8% throughout 1982-2016. The estimated fall in the rent-sharing parameter therefore implies that the share of gross private sector output which was labor rents fell by 5.3 percentage points, from 5.6% to 0.3%, over the period. This is quite similar to our estimate of the decline of labor rents in Section II: we estimated that labor rents fell by 5.1 percentage points of gross value added in the nonfinancial corporate sector over 1982-2016 (corresponding to a fall of 4.1 percentage points of gross business sector value added). There is no necessary reason why these two estimates should line up so closely: the estimate of the fall in labor rents from the Farhi/Gourio model comes from the best fit of 9 parameters to 9 macro moments in each of the two periods, while our estimate of the fall in labor rents comes from our estimated union, industry, and firm size wage premia using CPS data. (Note that, to match Farhi and Gourio's results, we set up our calibration such that labor rents must equal zero in the second period.

⁵⁰ A rent-sharing parameter of 0.44 is quite plausible when compared to the range of estimate from studies of rent-sharing. See Appendix Section D2 for details.

Therefore, the percentage point change in the share of output represented by labor rents is a more appropriate comparator than the levels.)

We see this accounting exercise as suggesting that, (1) the degree of the fall in rent-sharing with labor which is required to be consistent with a number of key macro moments over 1982-2016 is both relatively consistent with our empirical estimates of the actual fall in rent-sharing with labor, and relatively consistent with estimates of rent-sharing elasticities from the micro literature; and (2) despite the differential implications for investment of a rise in monopoly power vs. a fall in rent-sharing, when incorporated into a full general equilibrium model it is possible to reconcile a fall in labor rent-sharing (in an efficient-bargain type framework) with the data on capital and investment, without implausible implications for other macro variables.

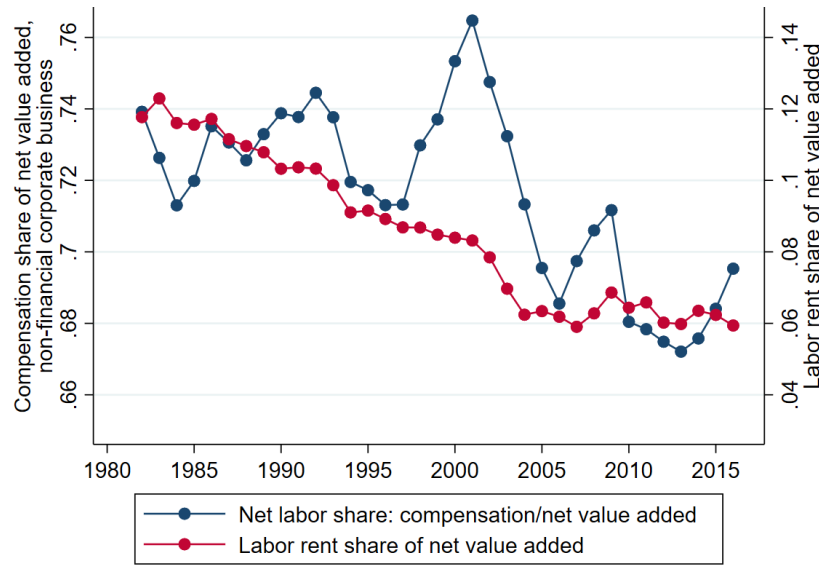
III.B. Aggregate and state-level evidence: factor shares

Next, we compare our estimates of the decline in the labor rent share of value added with aggregate changes in factor shares. The net labor share in the nonfinancial corporate sector (compensation over net value added) fell by 4.4 percentage points over 1982-2016.⁵¹ Our measure of the labor rent share of net value added in the nonfinancial corporate sector fell by almost 6 percentage points over the same period. This suggests that the decline in imputed labor rents as estimated from industry, union, and firm size wage premia can more than fully explain the decline in the net labor share over the period (as shown in Fig. 7): that is, the entirety of the shift in the functional income distribution in the nonfinancial corporate sector could be explained by a redistribution of rents from labor to capital.

The other side of the coin of the fall in the labor share is the rise in the capital share. Since our measure of labor rents can be interpreted as a measure of the firm's profits which go to labor, with the rest of the firm's profits going to capital, we can define the "Total profit share" of value added as the share of value added accounted for by capital income *plus* labor rents. While the capital share of net value added has risen over 1982-2016, our imputed measure of the *total* profit share has stayed roughly constant or even fallen slightly (Fig. 8) – consistent with the interpretation that the total profitability of firms (and their monopoly power) has not risen over the period, but that these profits instead partly been redistributed from labor to capital.

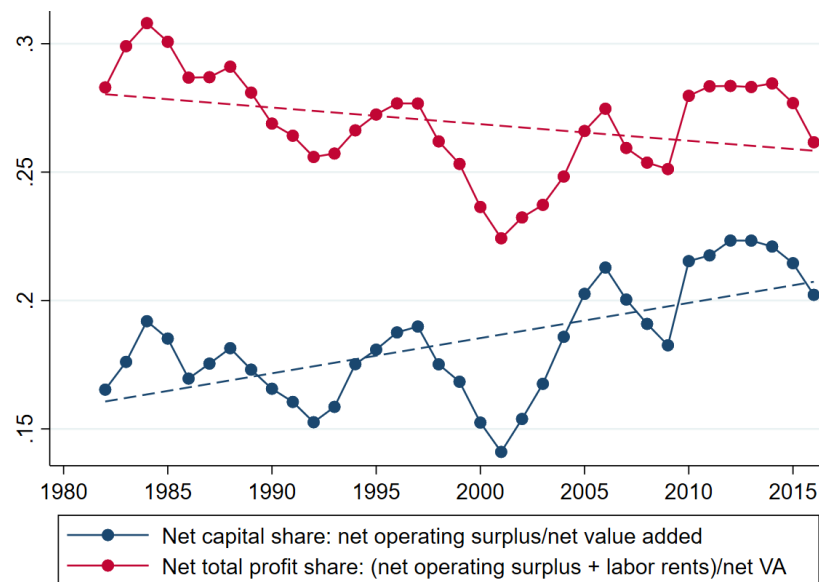
⁵¹ Following Bridgman (2018) and others, for our main results at the aggregate and industry levels we use the labor share of value added net of depreciation, as the depreciation rate has risen over the period.

Figure 7: Net labor share and imputed labor rent share, nonfinancial corporate



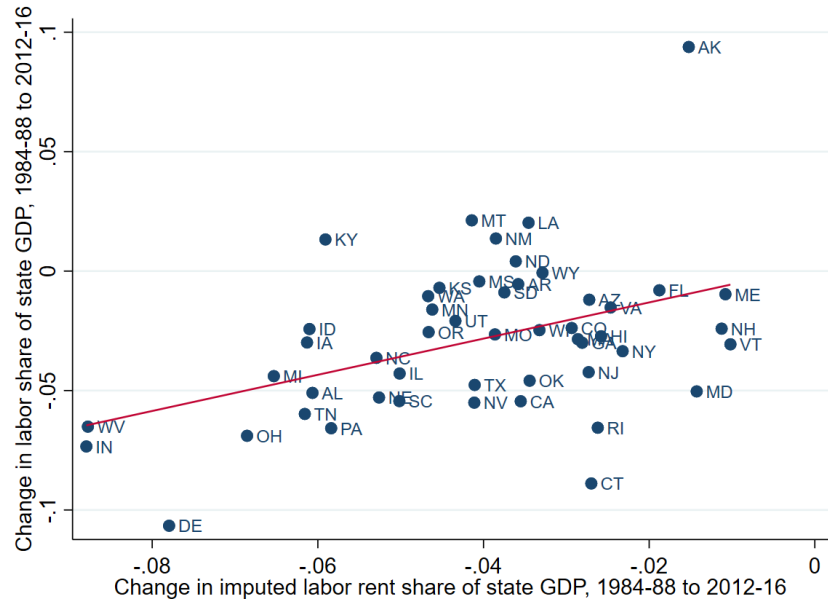
Notes: Net labor share in the nonfinancial corporate sector is calculated as compensation over net value added, using BEA NIPA data. Our measure of the imputed labor rent share of net value added is calculated as described in Section II.

Figure 8: Net capital share & imputed profit share, nonfinancial corporate



Notes: Net capital share in the nonfinancial corporate sector is calculated as net operating surplus over net value added. Our measure of the net total profit share is calculated as the net operating surplus plus our measure of imputed labor rents (explained in Section II), divided by net value added. Dashed lines are lines of best fit.

Figure 9: Changes in state-level labor share and labor rent share, 1984-88 to 2012-16



Note: Imputed labor rent share of state GDP calculated from estimated union, firm size, and industry wage premia, state-level unionization rates (estimated in CPS), and compensation by industry (from BEA Regional Economic Accounts). Labor share of state GDP defined as state-level compensation over GDP.

Table 3: State-level regressions of labor share on measures of labor power

Panel A: Regression of labor share of state GDP on imputed labor rent share of state GDP, 1984-2016				
Imputed labor rent share of state GDP	0.94** (0.14)	1.09** (0.28)	0.69** (0.06)	0.52** (0.13)
Fixed effects	<i>None</i>	<i>Year</i>	<i>State</i>	<i>Year, State</i>
Observations	1,650	1,650	1,650	1,650
Panel B: State-level regression of labor share on imputed union rent share, 1984-2016				
Imputed union rent share of state GDP	1.76** (0.48)	1.46* (0.68)	1.98** (0.24)	1.04* (0.40)
Fixed effects	<i>None</i>	<i>Year</i>	<i>State</i>	<i>Year, State</i>
Observations	1,650	1,650	1,650	1,650

*Robust standard errors, clustered at state level, in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.*

We observe a similar pattern with state-level data. Estimating state-level labor rent shares in the same way as we estimate the aggregate labor rent share, we show that states with bigger declines in their imputed labor rent share also saw bigger declines in their labor share over 1984-2016 (Fig. 9).⁵² This strong relationship persists in regressions at the annual level, with year and

⁵² The coefficient in a regression of the change in the state labor share over 1984-88 to 2012-16 on the change in the labor rent share over the same period is 0.76, with a p-value of 0.002 and an R-squared of 0.19. We calculate the

state fixed effects, as shown in Table 3 (both for the labor rent share, and for the union rent share component of it).⁵³

III.C. Industry-level evidence

Next, we estimate labor rents at the level of 51 industries over 1987-2016.⁵⁴ We analyze the relationship between industry-level changes in labor rents and changes in the labor share, profitability, and Q. Since a number of recent papers have highlighted the link between industrial concentration and changes in labor shares and profitability, we also incorporate product market concentration, using measures of industry level top 20 import-adjusted sales concentration calculated from Compustat and Census data by Covarrubias, Gutiérrez, and Philippon (2019).^{55,56}

Our analysis shows that, over 1987-2016, industries with larger falls in their imputed labor rent share also saw substantially larger falls in their labor share (Fig. 10).⁵⁷ There is a negative, though somewhat weaker, relationship between changes in the labor share and average top 20 import-adjusted sales concentration (Fig. 11).

labor share as state-level compensation over GDP, and calculate labor rents as a share of state GDP, using data from the BEA Regional Economic Accounts. We start in 1984 because it is the first year for which we can estimate state-level unionization and union wage premia. More details are in Appendix Section B4.

⁵³ Similarly, Hazell (2019) finds that right-to-work laws (which reduce union power) reduce state-level labor shares.

⁵⁴ Our industry definitions are very close to the BEA industry codes (roughly NAICS 3-digit). (See Appendix Section G for more details on industry definitions). For consistency with the previous section, we do not analyze industries in finance, insurance, and real estate. We also follow Covarrubias, Gutiérrez, and Philippon (2019) in omitting the industry management of companies and enterprises. Our calculation of industry rents and union rents follows the description in Section II closely, with the exception that it is comprised only of union rents and industry rents (and not firm size rents), as we do not have data on compensation shares by firm size class and industry (See Appendix Section B5 for more details). Note that for industry rents, the wage premium is estimated relative to the lowest-wage large industry, which is Food Services and Drinking Places.

⁵⁵ We are grateful to Germán Gutiérrez and Thomas Philippon for sharing with us the measures of concentration they constructed for Covarrubias, Gutiérrez, and Philippon (2019). Covarrubias et al (2019) construct top 4, 8, 20, and 50 import-adjusted sales concentration ratios for each of the 53 BEA industries. They use two data sources: Compustat data on publicly-listed companies, re-weighted to reflect the composition of the underlying economy, and Census data on all firms. The Compustat concentration ratios are available annually for our whole sample period (1987-2016). The Census concentration ratios are available for the years 1997, 2002, 2007, and 2012. They adjust for imports by multiplying the domestic sales concentration ratio by the share of U.S. produced goods in total domestic sales in that industry. More details on the construction of these variables are available in Covarrubias, Gutiérrez, and Philippon (2019). Note that the Compustat measure only covers publicly-traded firms, and trends in publicly-traded firms have not always been representative of aggregate trends within individual industries (see e.g. Davis, Haltiwanger, Jarmin, and Miranda 2006).

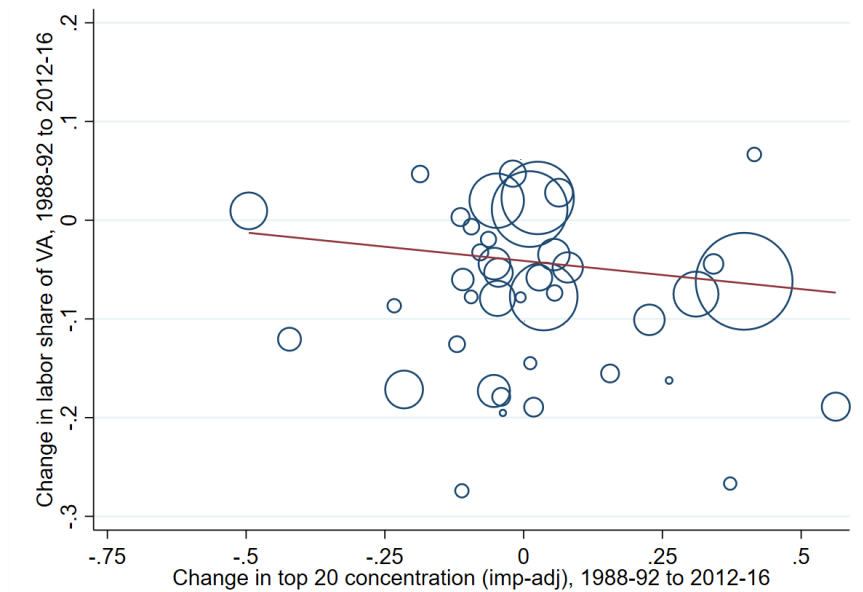
⁵⁶ Concentration is an imperfect measure of firms' market power (see e.g. Berry, Gaynor and Scott Morton 2019 and Syverson 2019). We use concentration in this paper because recent literature has noted the rise in concentration, alongside rising markups and falling labor shares, and has often interpreted this as rising monopoly power.

⁵⁷ A similar relationship exists for changes in the industry-level unionization rate. See Appendix Section C7.

Figure 10: Change in labor share and imputed labor rent share, by industry



Figure 11: Change in labor share and top 20 sales concentration (imp-adj), by industry



Notes to Figs 10-11: Each bubble is an industry (at BEA industry code level). Bubble size represents industry average employment over 2012-2016. The red line is an employment-weighted line of best fit. Concentration data calculated from Compustat by Covarrubias et al (2019). Imputed labor rent share is our calculation.

We regress the gross and net labor share on the imputed labor rent share of industry value added, and on product market concentration, at the annual level over 1987-2016, including different combinations of year and industry fixed effects (Table 4, panels A and C). Coefficients

on the labor rent share are large, positive, and highly significant, and coefficients on concentration are negative and mostly significant.

What is the explanatory power of the decline in labor rents relative to the rise in concentration? Over 1997-2012 (the period for which we have the more accurate Census-based concentration data, and in which Covarrubias et al (2019) argue concentration has led to rising monopoly power) the average industry saw a fall in its labor share of 5.2 percentage points. Using the coefficient from the specification with industry and year fixed effects, the average industry's fall in their labor rent share over 1997-2012 was associated with 4.3 percentage points fall in the labor share. The average industry-level increase in import-adjusted top-20 sales concentration was associated with a 0.5 percentage point fall in the labor share. This suggests that declining labor rents can explain the majority of the average fall in labor shares at the industry level, whereas the average increase in concentration can explain only around 10%.⁵⁸

Next, we analyze our measures of labor power alongside three measures of profitability at the industry level over 1987-2016: the gross profit rate (defined as gross operating surplus over fixed assets), as well as two measures of Tobin's Q calculated from firm-level Compustat data by Covarrubias et al (2019): the weighted average Tobin's Q across publicly-listed firms within an industry ("aggregate Q"), and the median firm Q.⁵⁹ Figures 12 and 13 illustrate that over the whole period, falling labor rent shares were associated with rising gross profitability, while rising concentration was associated with rising profitability. In horse-race regressions of profitability measures on our measures of imputed labor rents and industrial concentration (Table 4, Panels B and D), coefficients on the imputed labor rent share are almost all negative and, for the 1987-2016 regressions, mostly statistically significant.⁶⁰ Coefficients on the concentration measures on the other hand are mostly not significant, and often negative (the opposite sign than would be predicted if rising monopoly power was causing higher profitability). The coefficient from the regression over 1987-2016 with industry and year fixed effects suggests that the average increase

⁵⁸ The relative explanatory power of the worker power measures vs. concentration measures is similar if we use other measures of concentration (top 4, 8, or 50 sales ratios, and using measures from Census vs. Compustat). The comparison of coefficient magnitudes is even starker over 1987-2016: the average fall in the labor rent share was associated with 10.1pp fall in the labor share, while the average increase in import-adjusted top 20 sales concentration over this period was associated with 0.1pp fall in the labor share. The average industry's fall in the labor share over this period was 5.2 percentage points.

⁵⁹ Results are very similar when we use the simple average Q across firms, rather than the weighted average.

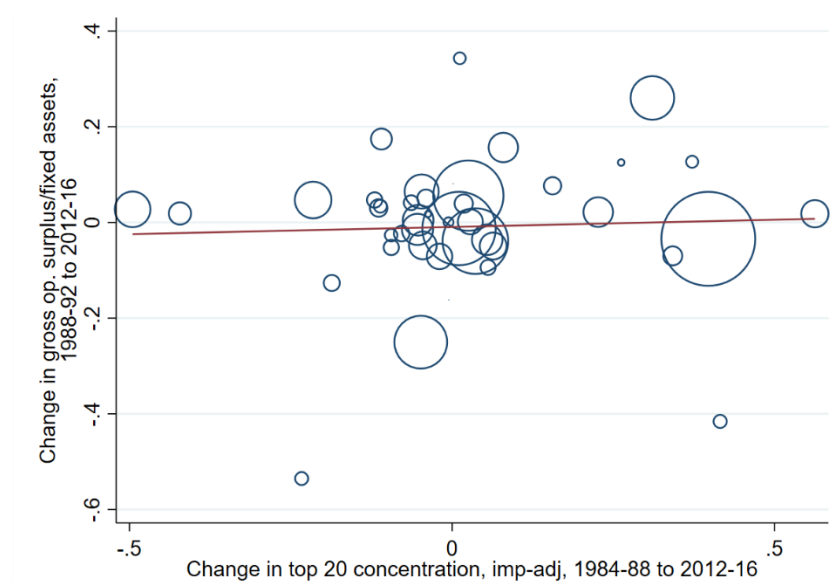
⁶⁰ This is consistent with Salinger (1984), who argued that in the 1980s, Q was low in industries with high monopoly power because unionized workers received the monopoly rents.

in top-20 import-adjusted sales concentration over 1987-2016 was associated with 0.003 points increase in the median firm Q at the industry level, while the average fall in the labor rent share was associated with 0.06 points increase in median Q (although neither are significantly different from zero with industry and year fixed effects). The median industry saw an increase in its median firm Q of 0.34 over the period – suggesting again that the decline in worker power has more explanatory power than the rise in concentration for changes in industry-level profitability.

Figure 12: Change in gross profitability and imputed labor rent share, by industry



Figure 13: Change in gross profitability and top 20 sales concentration (imp-adj), by industry



Notes to Figs 12-13: Each bubble is an industry (at BEA industry code level). Bubble size represents industry average employment over 2012-2016. The red line is an employment-weighted line of best fit. Concentration data calculated from Compustat by Covarrubias et al (2019). Imputed labor rent share is our calculation.

Table 4: Industry-Level Regressions – Labor shares, profitability, and investment-to-profits

Panel A: Regressions of labor shares and investment-profit on labor rent share and Compustat concentration. N = 1,189 (41 industries, 1987-2016)												
<i>Dependent variable:</i>	Labor share of gross value added				Labor share of net value added				Investment to profit ratio			
Imputed labor rent share of gross value added ^a	2.24** (0.50)	2.44** (0.64)	1.81** (0.16)	2.22** (0.26)	2.40** (0.39)	2.62** (0.47)	2.56** (0.32)	3.65** (0.44)	3.12** (1.12)	3.78* (1.47)	2.26** (0.68)	5.74** (1.30)
Avg top 20 sales concentration, imp-adj (Compustat)	-0.23** (0.06)	-0.23** (0.07)	-0.05 (0.05)	-0.05 (0.05)	-0.19* (0.08)	-0.21* (0.08)	-0.06 (0.09)	-0.07 (0.07)	0.25 (0.19)	0.24 (0.20)	-0.15 (0.22)	-0.16 (0.20)
<i>Fixed effects</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>
Panel B: Regressions of profitability on labor rent share and Compustat concentration. N=1,189 (41 industries, 1987-2016)												
<i>Dependent variable:</i>	Gross profit rate				Aggregate Q				Median Q			
Imputed labor rent share of gross value added	-0.80 (0.55)	-1.03 (0.71)	-0.60* (0.28)	-1.93** (0.55)	-3.66** (1.14)	-3.16* (1.33)	-3.17** (0.93)	1.58 (1.51)	-3.22** (0.99)	-2.46* (1.16)	-4.43** (0.86)	-1.24 (1.36)
Avg top 20 sales concentration, imp-adj (Compustat)	-0.11 (0.10)	-0.10 (0.10)	0.02 (0.13)	0.04 (0.12)	0.02 (0.12)	0.01 (0.13)	-0.31 (0.32)	-0.31 (0.30)	0.19 (0.13)	0.18 (0.13)	0.15 (0.20)	0.16 (0.20)
<i>Fixed effects</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>
Panel C: Regressions of labor shares and investment-profit on labor rent share and Census concentration. N = 174 (45 ind. for 1997, 2002, '07, '12)												
<i>Dependent variable:</i>	Labor share of gross value added				Labor share of net value added				Investment to profit ratio			
Imputed labor rent share of gross value added ^a	1.88** (0.65)	1.95** (0.72)	2.18** (0.37)	2.67** (0.42)	2.45** (0.49)	2.56** (0.54)	3.14** (0.43)	3.76** (0.48)	4.32* (1.76)	4.52* (1.91)	5.29+ (2.89)	7.24+ (4.29)
Avg top 20 sales concentration, imp-adj (Census)	-0.51** (0.09)	-0.52** (0.09)	-0.24* (0.11)	-0.28* (0.11)	-0.45** (0.12)	-0.46** (0.12)	-0.40* (0.18)	-0.45** (0.16)	0.49 (0.42)	0.48 (0.42)	-0.85 (0.68)	-0.88 (0.78)
<i>Fixed effects</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>
Panel D: Regressions of profitability measures on labor rent share and Census concentration. N = 174 (47 ind. for 1997, 2002, '07, '12)												
<i>Dependent variable:</i>	Gross profit rate				Aggregate Q				Median Q			
Imputed labor rent share of gross value added	-0.75 (0.81)	-0.84 (0.85)	-1.35* (0.58)	-2.84** (0.55)	-1.79 (1.52)	-2.15 (1.62)	0.52 (2.20)	-2.22 (3.06)	-0.79 (1.16)	-0.22 (1.14)	-3.25* (1.48)	-1.56 (1.95)
Avg top 20 sales concentration, imp-adj (Census)	-0.45 (0.33)	-0.44 (0.33)	0.35 (0.29)	0.45 (0.31)	-0.47* (0.22)	-0.43+ (0.22)	-1.49+ (0.86)	-0.89 (0.71)	-0.09 (0.16)	-0.10 (0.16)	-0.91+ (0.47)	-0.39 (0.42)
<i>Fixed effects</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Yr, Ind</i>

Robust standard errors, clustered at industry level, in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

^aImputed labor rent share of gross value added is used for gross labor share and investment-profit regressions. Imputed labor rent share of net value added is used for net labor share regressions. Note also: Investment-profits are 98% winsorized. Regressions are for 41/45 industries because we do not have concentration data for all 51 non-financial industries.

IV. Unemployment, inflation, and the Phillips Curve

Recent decades in the U.S. have seen a substantial decline in the trend unemployment rate, without inflationary pressure. The unemployment rate was below 5%, the level previously thought to have been the NAIRU, for nearly half of the twenty-three years from 1997 to 2020, and was below 4% from May 2018 until February 2020, at levels not reached since the 1960s. At the same time, inflation has been low and has shown little sign of accelerating. These facts suggest that there has been a fall in the NAIRU (Crump et al 2019, Tuzemen 2019, Blanchard et al 2015). In this section of the paper, we argue that falling worker power could account for these broad features of the unemployment and inflation experience.

On a theoretical level, the fall in the NAIRU could be explained by a fall in worker power. Almost all models of worker insider power or rent-sharing power would predict that as worker bargaining power falls, the NAIRU would also fall. The mechanisms – and their welfare implications – vary according to the model. First, a fall in worker bargaining power may reduce the marginal cost to a firm of increasing its employment, reducing unemployment (see e.g. Mortensen and Pissarides 1999, Figura and Ratner 2015). Blanchard and Giavazzi (2003) model the implications of worker power *and* monopoly power jointly: in their model falling worker power leads to lower unemployment as the incentive for firms to hire rises, while rising monopoly power leads to higher unemployment as firms reduce their output.⁶¹ Second, this effect may be reinforced or magnified by a reduction in the distinction between insiders and outsiders in wage-setting (see e.g. Blanchard and Summers 1986, Calmfors and Driffil 1988, Gali 2020). Third, a reduction in the availability of high wage jobs at, for example, unionized firms may reduce the incentives for “wait unemployment”, where unemployed workers search for longer to try to get a high wage job, or “rest unemployment”, where unemployed workers in high-rent sectors with temporary downturns wait for jobs to return (e.g. Hall 1975, Bulow and Summers 1986, Alvarez and Veracierto 1999, Alvarez and Shimer 2011).⁶² Past empirical

⁶¹ More specifically, their model predicts that in the short run (with no entry of firms), falling worker power reduces the labor share with no effect on unemployment, but in the long run (where all firms pay entry costs and there are no positive rents), falling worker power reduces unemployment with no effect on the labor share. If the world is always somewhere between the pure short run and pure long run – there is some entry, but there are still some positive rents – then falling worker power in their model would predict a falling labor share *and* falling unemployment.

⁶² On the other hand, in very frictional labor markets where a low elasticity of labor supply to the firm enables a large wage markdown, aggregate unemployment could fall as worker bargaining power rises (Manning 2003).

evidence suggested that areas and industries with higher rates of unionization have tended to have higher unemployment rates, and unionized firms have tended to see lower employment growth.⁶³ More recently, Erickson and Mitchell (2007), Figura and Ratner (2015) and Krueger (2018) have argued that the fall in labor power would lower the NAIRU, and Leduc and Wilson (2017) and Ratner and Sim (2020) have argued that a fall in worker bargaining power could have caused the flattening of the Phillips Curve.⁶⁴

It is less clear how to reconcile trends in the NAIRU with rising globalization, technological change, or monopoly power: the other main explanations for the trends in the labor share and corporate profitability we examine in this paper. While increased globalization and technological change may have led to disinflationary pressure in the U.S. economy, their effect on the NAIRU would be ambiguous: disinflationary pressure as a result of lower input costs may reduce the NAIRU, but the job displacement associated with both of these phenomena may increase it.⁶⁵ And it is not possible to explain the substantial fall in the NAIRU as a result of an increase in aggregate monopoly power. While theoretical models differ on whether rising monopoly power should increase unemployment or leave it constant, there is no a priori reason to believe that an increase in monopoly power would reduce unemployment; and at the same time, an increase in monopoly power may be a source of inflationary pressure.⁶⁶ Neither of these appear obviously compatible with the trends of falling unemployment and low and stable inflation that have characterized the last three to four decades (as noted by Van Reenen 2018, Basu 2019 and Syverson 2019).⁶⁷

⁶³ See e.g. Freeman and Medoff (1984), Summers (1986), Montgomery (1989), Blanchflower, Millward, and Oswald (1991), Leonard (1992).

⁶⁴ A number of other drivers have been posited for the fall in the NAIRU, including the changing demographic composition of the workforce (Shimer 1998, Tuzemen 2018), changes in productivity growth (Ball and Mankiw 2002), improvements in job matching (Katz and Krueger 1999), and, most recently, the decline in job destruction and reallocation intensity and the aging of workers and firms (Crump et al 2019).

⁶⁵ See, for example, Kohn (2005).

⁶⁶ In some models of monopoly power, the employment rate is reduced with no effect on the unemployment rate. In other models, rising monopoly power leads to rising unemployment. Manning (1990), for example, shows that rising monopoly power combined with increasing returns to scale can lead to higher unemployment. Blanchard and Giavazzi (2003), Geroski, Gregg and Van Reenen (1996), and Ebell and Haefke (2009) show that monopoly power plus some non-zero worker bargaining power can lead to higher unemployment. In terms of inflation: Higher markups would likely imply a higher price level (in the presence of some downward nominal wage rigidity), and therefore an increase in the inflation rate during the transition from one steady state to a new, higher-markup steady state (see, for example, Phelps (1968)). An increase in markups, acting as a cost-push shock, would tend to imply a higher level of inflation for a given degree of labor market slack.

⁶⁷ Note also that increasing monopsony power would tend to be associated with less hiring and increased labor market frictions, and so also does not provide a natural explanation for a declining NAIRU.

IV.A State-level evidence

The theory discussed above suggests that falling worker power could explain the aggregate decline in unemployment seen in the U.S. in recent decades. State-level trends in unemployment and labor rents are consistent with this. Figure 14 shows that states with bigger falls in their imputed labor rent share over 1984-2016 also had bigger falls in their state unemployment rate.⁶⁸ Regressing the state unemployment rate on the state imputed labor rent share at the annual level, with various combinations of industry and year fixed effects, we find a consistently large, positive, and significant relationship between the two variables: higher state labor rent shares are associated with higher unemployment, with the coefficient in the specification with year and state fixed effects suggesting that a 1 percentage point lower labor rent share of GDP is associated with 0.15 percentage points lower unemployment (as shown in Table 5).⁶⁹

IV.B Industry-level evidence

Industry-level patterns in unemployment and labor rents are also consistent with the hypothesis that declining worker power has lowered the NAIRU. As we found at the state level, industries which saw larger declines in their imputed labor rent share saw larger declines in their industry-level unemployment rate (Fig. 15).⁷⁰ Regressions of the annual industry-level unemployment rate on the imputed labor rent share and imputed union rent share, with industry and year fixed effects, have positive and significant coefficients (Table 6), with the magnitude in the specification with industry and year fixed effects suggesting that a 1 percentage point lower imputed labor rent share is associated with a 0.1 percentage point decline in industry unemployment.⁷¹

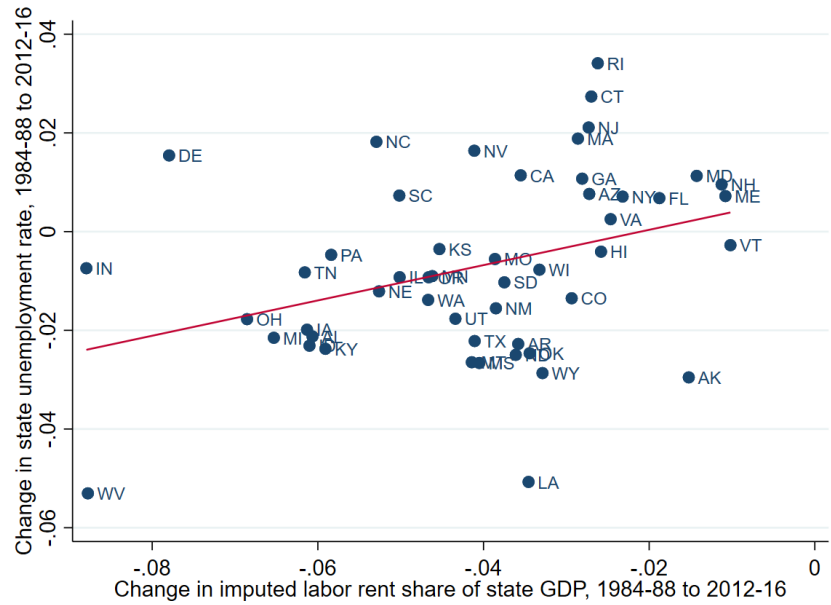
⁶⁸ The coefficient on the line of best fit is 0.36, and the p value is 0.01. The R-squared is 13%.

⁶⁹ Disaggregating the unemployment rate by age and gender, the large, statistically significant relationship between state-level labor rents and unemployment rates holds for workers aged 25-54, and 16-24, for both men and women, but not for workers aged 55 to 65. The estimated coefficients are particularly large for all workers aged 16 to 24 and for women aged 25-54, consistent with Bertola, Blau, and Kahn's (2007) cross-national findings.

⁷⁰ We measure industry unemployment in the CPS, defining it as the unemployment rate amongst all workers who reported having worked in a given industry in their current job (if employed) or most recent job (if unemployed).

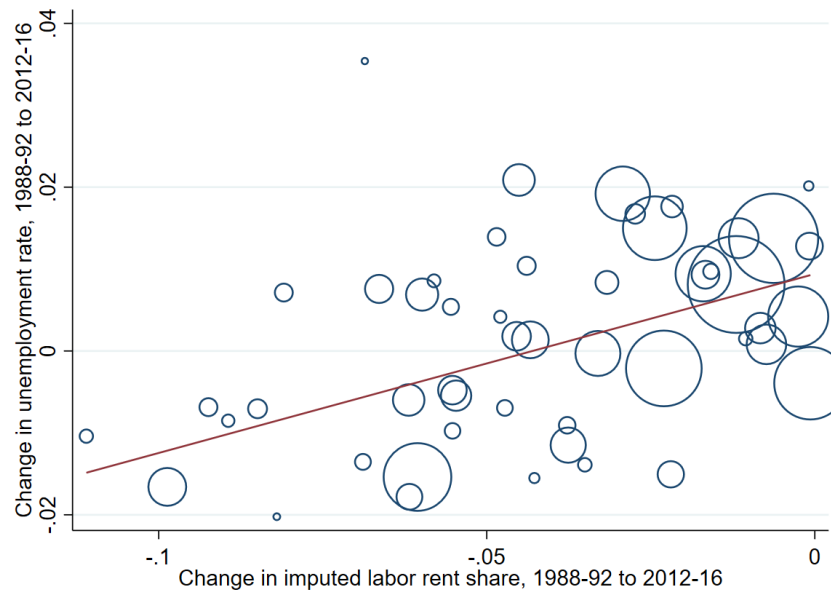
⁷¹ Supplementing this analysis, we also show in Appendix Section C9 that there is a significant relationship between industry-level unemployment and unionization rates, and between industry-level labor market tightness, labor rent shares, and unionization rates. Note that, in contrast, regressions of the annual industry-level unemployment rate on measures of industrial concentration show no significant relationship, and the coefficients are positive.

Figure 14: State-level changes in unemployment and labor rents, 1984-88 to 2012-16



Note: The red line is a line of best fit. State unemployment rate is calculated from CPS. Labor rent share of GDP is our calculation.

Figure 15: Change in unemployment and imputed labor rent share, by industry



Notes: Each bubble is an industry (at the BEA industry code level), where the size of the bubble represents industry average employment over 2012-2016. The red line is an employment-weighted line of best fit.

Table 5: State-level regressions of unemployment on measures of labor power

Panel A: State-level regression of unemployment on imputed labor rent share, 1984-2016				
Imputed labor rent share of state GDP	0.14* (0.06)	0.22* (0.09)	0.08+ (0.04)	0.15* (0.06)
Fixed effects	<i>None</i>	<i>Year</i>	<i>State</i>	<i>Year, State</i>
Observations	1,650	1,650	1,650	1,650
Panel B: State-level regression of unemployment on imputed union rent share, 1984-2016				
Imputed union rent share of state GDP	0.56** (0.18)	0.60* (0.24)	0.50** (0.16)	0.54* (0.24)
Fixed effects	<i>None</i>	<i>Year</i>	<i>State</i>	<i>Year, State</i>
Observations	1,650	1,650	1,650	1,650

*Robust standard errors, clustered at state level, in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.*

Table 6: Industry-level regressions of unemployment on measures of labor power

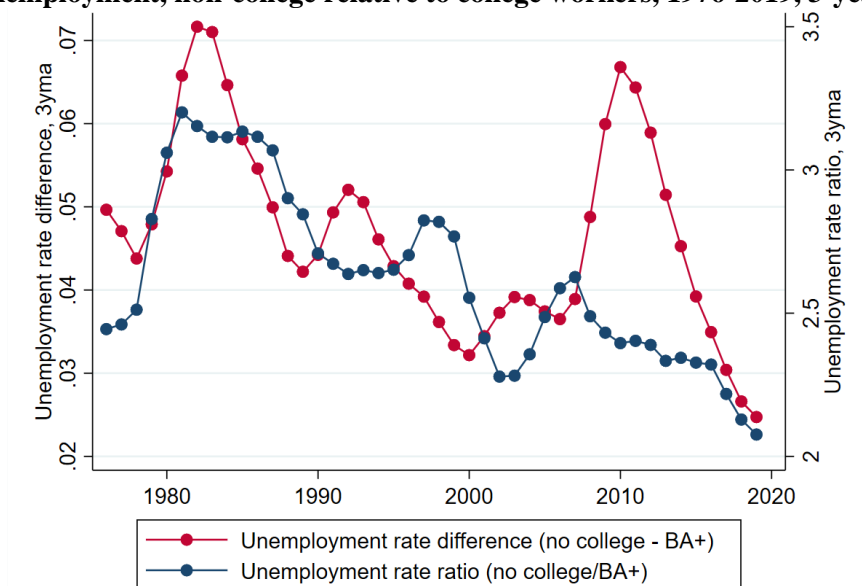
Panel A: Industry-level regression of unemployment on imputed labor rent share, 1987-2016 (51 ind.)				
Imputed labor rent share of gross value added	-0.16** (0.05)	-0.16** (0.05)	-0.03 (0.03)	0.10** (0.03)
Fixed effects	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Year, Ind</i>
Observations	1,530	1,530	1,530	1,530
Panel B: Industry-level regression of unemployment on imputed union rent share, 1984-2016 (51 ind.)				
Imputed union rent share of gross value added	-0.27* (0.10)	-0.23+ (0.12)	-0.21* (0.08)	0.20** (0.06)
Fixed effects	<i>None</i>	<i>Year</i>	<i>Ind</i>	<i>Year, Ind</i>
Observations	1,530	1,530	1,530	1,530

*Robust standard errors, clustered at industry level, in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.*

IV.C. Unemployment for college and non-college workers

In Section II.A., we decomposed the decline in labor rents for workers with and without a college degree (BA+) over 1984-2016, and showed that while both groups saw a decline in their labor rents, the decline was substantially larger for non-college workers. If declining labor rents leads to a lower NAIRU, one might expect to see larger declines in average unemployment for non-college workers than for college educated workers over the same period. This has been the case: the unemployment rate of workers without a four-year college degree has fallen substantially relative to the unemployment rate of workers with a bachelors' degree, as shown in Figure 16.

Figure 16: Unemployment, non-college relative to college workers, 1976-2019, 3-year moving avg.



Note: BA+ and non-college unemployment rates calculated from CPS. Unemployment rate difference is defined as non-college unemployment rate minus BA+ unemployment rate. Unemployment rate ratio is defined as non-college unemployment rate divided by BA+ unemployment rate. “Non-college” refers to people with no or some college education; “BA+” refers to people with a bachelors’ degree or more. Points are 3-year moving averages.

IV.D. Quantitative implications for the NAIRU

Can we say anything about whether the magnitude of the decline in worker power is big enough to account for the decline in the NAIRU? One recent study on this topic is Figura and Ratner (2015), who study the decline in worker power as proxied for by the decline in the labor share of income. They show that industries and states with bigger falls in their labor share over 2001-2014 saw bigger increases in their vacancy/unemployment ratio (labor market tightness). They argue that this is consistent with a decline in worker bargaining power increasing the incentive for firms to create jobs, and that the decline in the labor share of income could have led to a two-thirds of a percentage point fall in the NAIRU.⁷² We can similarly use our state-level and industry-level estimates to back out a naïve extrapolation of the aggregate relationship between worker power and unemployment. Applying the coefficients from the state-level regressions in Table 5 to our estimate of the fall in labor rents in the nonfinancial corporate sector over 1982 to 2016 (a fall of 5.1 percentage points) would have predicted a three-quarters of a percentage point fall in the NAIRU. We have reason to believe that both the Figura and

⁷² More formally, they argue that the negative relationship they find between the labor share and the V/U ratio is consistent with a counter-clockwise rotation in the Job Creation curve in a standard DMP search model. After estimating the slope of the Beveridge curve, they can then estimate the degree to which a decline in worker bargaining power may affect equilibrium unemployment.

Ratner (2015) estimate and our estimate of the effect of the decline of worker power on the NAIRU may be underestimates of the true effect, since they are based on state/industry-level variation which may miss some aggregate effect, and since the imperfection of the labor share (in the case of Figura and Ratner) or the imputed labor rent share (in our case) as proxies for the decline in worker power is likely to cause attenuation bias.⁷³

V. Possible Objections and Further Considerations

V.A. Investment

Investment has been falling over recent decades relative to measures of corporate profitability such as operating surplus and Tobin's Q, as well as relative to GDP and fixed assets (Gutiérrez and Philippon 2017, Alexander and Eberly 2018, Crouzet and Eberly 2019). These trends have been a major motivator of the monopoly power argument (see e.g. Gutiérrez and Philippon 2017, Eggertsson et al 2018). One might argue these trends in investment are hard to reconcile with our argument that there has been a macroeconomically important decline in worker power: some models predict that a decline in worker power, reducing the marginal cost of production, would lead to an increase in investment.⁷⁴ To what extent are the facts on investment compatible with our argument of declining worker power?

First, we note that it is not clear that investment, properly measured, *has* declined substantially relative to value added or fixed assets. The relative price of investment goods has declined, meaning that while there has been a decline in net investment relative to net value added in nominal terms, there has been no decline in net real fixed investment relative to net real value added in the nonfinancial corporate sector (as shown in Fig. 17).⁷⁵ And Crouzet and Eberly

⁷³ While a full model-based investigation of the degree to which the decline in worker power may have affected the NAIRU is beyond the scope of this paper, we carry out four back-of-the-envelope exercises in Appendix Section E. These illustrate that, in simple models with plausible parameter values, it is possible for the decline in worker power that we have seen to generate very large changes in the NAIRU.

⁷⁴ As argued by Eggertsson et al (2018), for example.

⁷⁵ Net investment to net value added is calculated using data on gross nonresidential investment and the consumption of nonresidential fixed capital by nonfinancial corporate business, from the Fed Z1 accounts, and gross value added in the nonfinancial corporate business sector from BEA NIPA. For the ratio of real net investment to real net value added, investment is deflated by the implicit price deflator for nonresidential fixed private sector domestic investment from the BEA, and value added is deflated by the implicit price deflator for nonfinancial corporate business, from the BLS.

(2019, 2020) show that a rise in intangible investment could account for the majority of the apparent decline in investment relative to fixed assets.

Second, we note that the theoretical predictions of declining worker power for investment are actually ambiguous. It is possible that a decline in worker power leads to less investment: by reducing the marginal cost of labor to firms, declining worker power may lead to the substitution of labor for capital (or at least, less substitution of capital for labor), reducing investment relative to a scenario where worker power had not declined.

Third, the fall in investment relative to measures of corporate profits can be explained by our declining worker power hypothesis. In efficient bargain models of worker rent-sharing (our model in section III.A., for example) the degree of worker power does not affect the firm's investment decision. The firm optimally maximizes profits, then distributes the rents between labor and capital. To understand if investment has fallen relative to the underlying profitability of firms, we must therefore measure both profits to capital and profits to labor. Defining the ratio of investment to total profits as follows:

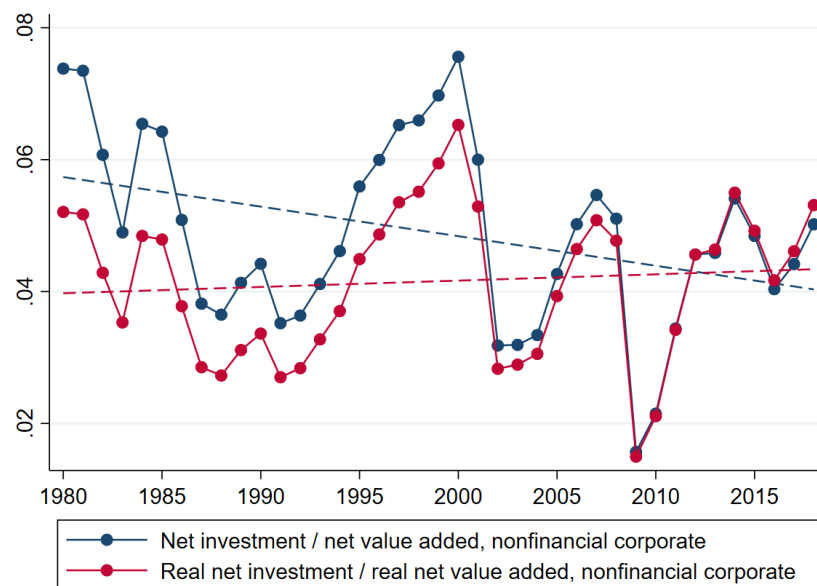
$$\frac{\text{Investment}}{\text{Total profits}} = \frac{\text{Investment}}{\text{Net operating surplus} + \text{imputed labor rents}}$$

we show in Figure 18 that while net investment over net operating surplus (*profits to capital*) has fallen substantially over the last thirty years in the nonfinancial corporate sector, average net investment over our measure of net *total profits* has only declined very slightly. That is, even nominal investment has not weakened much relative to our measure of firms' total profitability.⁷⁶ The relationship between labor power and investment-to-profits also holds at the industry level: industries with larger declines in their imputed labor rent share saw larger declines in the ratio of investment to operating surplus, even in annual regressions when controlling for a variety of industry and year fixed effects (Table 4).⁷⁷

⁷⁶ Crouzet and Eberly (2020) attribute a share of the growing weakness of investment relative to Q to product market rents. Our explanation could be compatible with this: instead of the product market rents arising from increased monopoly power, they may have been rents that were previously paid to labor so did not show up in Q.

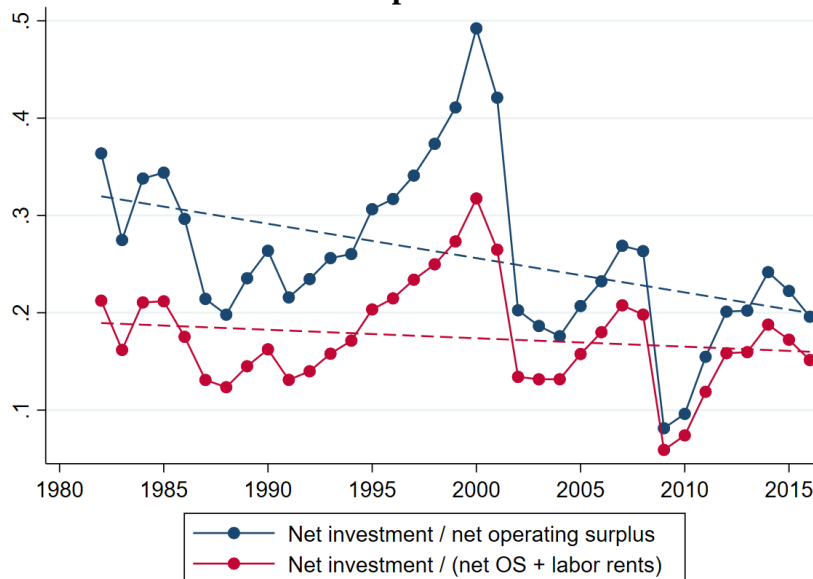
⁷⁷ In contrast, coefficients on average top 20 sales concentration are noisy (see Table 4), and there is no apparent relationship between the change over 1988-2016 in the average top 20 sales concentration ratio and the investment-to- gross operating surplus ratio (see Appendix Section C10).

Figure 17: Real and nominal net investment over net value added, nonfinancial corporate sector



Notes: Gross nonresidential investment and consumption of fixed capital for nonfinancial corporate sector are from Fed Z1 accounts. Gross value added for nonfinancial corporate business is from BEA NIPA. Deflator for investment is implicit price deflator for nonresidential fixed private sector domestic investment from BEA; deflator for value added is implicit price deflator for nonfinancial corporate business from BEA.

Figure 18: Net investment to profits to capital, and imputed total profits, nonfinancial corporate



Notes: Investment is measured as gross fixed investment in nonresidential structures, equipment, and intellectual property products for nonfinancial corporate business, from Federal Reserve Z1 Flow of Funds Account. We obtain net investment by subtracting the consumption of fixed capital for the nonfinancial corporate sector (also from the Fed Z1 accounts) from gross investment. Gross nonresidential investment and consumption of fixed capital for nonfinancial corporate sector are from Fed Z1 accounts. Gross operating surplus for nonfinancial corporate business is from BEA NIPA. Labor rents measure is constructed as described in Section III.

V.B. Firm-level dynamics: labor shares, and markups

Our analysis in this paper is primarily at the industry and aggregate level. Recent research has emphasized the role of firm-level dynamics in trends in labor shares, markups, and wages. First, several papers find a large role for between-firm reallocation in the decline of the labor share and rise in measured markups. Second, research with matched employer-employee data suggests that the dispersion of average earnings at the firm level has risen. Can we reconcile our results with this firm-level evidence on labor shares, markups, and wages?

Labor share and markups: Autor et al (2020) find that two-thirds of the decline in the aggregate labor share can be explained by between-firm reallocation, with one-third explained by within-firm falls in the labor share. The median firm saw no decline in their labor share, while firms with initially low labor shares saw their labor shares fall still further. Kehrig and Vincent (2020) find similar dynamics in manufacturing, showing that the decline in the labor share is driven by establishments which are growing in size and at the same time see falling labor shares. De Loecker, Eeckhout and Unger (2020) find that the rise in the aggregate measured markup results largely from a reallocation of activity to high-markup firms, the median markup did not change, and markups for already high markup firms increased.

It is clear that our proposed mechanism – a fall in labor rent-sharing power – could explain *within-firm* declines in labor shares and increases in measured markups. It is also possible to reconcile our proposed mechanism with the portion of the decline in the labor share (or rise in measured markups) that results from the *reallocation* of economic activity across firms. First, it could simply be the case that firms which experienced bigger falls in worker power also grew faster for some exogenous reason. Second, it is possible that this faster growth itself is at least partly a result of falling worker power. To see this, note that (1) if workers receive a competitive wage plus some portion of a firm's rents, then unit labor costs are higher at high-rent firms than at low-rent firms, but (2) unless workers' share of rents in high-rent firms is higher than the aggregate labor share, high-rent firms will still have lower labor shares than low-rent firms. Therefore, as workers' rent-sharing power declines, unit labor costs fall disproportionately more at high-rent, low-labor-share firms than at low-rent, high-labor-share firms. This improves the competitive advantage of high-rent firms, creating an incentive for them to expand. This would lead to a reallocation of economic activity from high labor share to low labor share firms.

Firm wage effects: There has been an increase in the dispersion of average wages at the firm level over recent decades, which has led to suggestions that this could indicate a divergence in firm-level rents (see e.g. Barth et al 2016). This might be seen as supporting the hypothesis of rising monopoly power, rather than declining worker power. In fact, the evidence is more consistent with declining worker power. Song et al (2019) use matched employer-employee data to decompose the variance of U.S. wages into firm effects, worker effects, and the covariance of the two, following Abowd, Kramarz, and Margolis (1999) (“AKM”). The firm effects indicate the firm-specific pay premium, holding worker “quality” constant, and can be interpreted as some combination of rent-sharing and compensating differentials (Sorkin 2018, Card et al 2018). Song et al (2019) show that the increase in the variance of firm-level average wages over 1980-2013 was entirely due to an increase in the *sorting* of high-wage workers into high-wage firms, and not an increase in the dispersion of the firm *premia* paid to equivalent workers (Song et al 2019). In fact, they find a small decline in the variance of firm effects over the period. These trends are consistent with a decline in rent-sharing: the decline in the variance of firm fixed effects could reflect declining wage premia in formerly high-wage firms, and the increase in the sorting of high-wage workers into high-wage firms (and vice versa) could reflect the fissuring of the workplace. On the other hand, if an increase in monopoly power had caused total rents to increase, holding constant the initial degree of rent-sharing with workers, one would have expected firm effects to become more dispersed rather than less (if rents increased more for already high-rent firms).

Note that the decline in the variance of firm fixed effects estimated by Song et al (2019) has been substantially smaller than the decline we estimate in the variance of industry fixed effects. There are two ways to reconcile these. First, note that a large decline in the variance of industry wage premia, but a small decline in the variance of firm wage premia, would be consistent with an aggregate decline in labor rents as a result of the fissuring of the workplace, as an increasing share of workers work at firms with low rents (and fewer at firms with high rents).⁷⁸ Second, evidence from Lachowska et al (2020), who carry out an AKM decomposition in Washington state over 2002-2014, suggests that the underlying secular decline in the variance

⁷⁸ Following the suggestion of Christina Patterson in her remarks at the Spring 2020 BPEA meetings, we note that the relationship between firm and industry effects can be written as $\gamma_{ind} = \sum_j \frac{E_j}{E_{ind}} \gamma_j$, where γ_{ind} and γ_j denote industry and firm wage effects, respectively.

of firm fixed effects over recent decades may have been larger than that estimated by Song et al (2019). Specifically, the decline in the variance of firm fixed effects for *hourly wages* over 1980-2013 may have been larger than that estimated by Song et al for annual earnings. Also, since the variance of firm fixed effects appears to be cyclical in Lachowska et al (2020), and the endpoint of the Song et al calculation – 2007-2013 – was a period with a historically weak labor market, one might have expected the variance of firm fixed effects in this period to be cyclically high.⁷⁹

V.C. Labor rents to the highly-paid: executive compensation, and finance

There has been roughly a doubling of the share of national income accruing to executives, managers, and supervisors in non-financial firms since 1979 (Bakija, Cole, and Heim 2012). High-earning financial sector workers have also seen large rises in their compensation. Could these reflect rising labor rents?⁸⁰

First, note that we estimate labor rents from the CPS, where the earnings data is top-coded, and non-response is high for people in the top tail of the income distribution. This means that estimate of the decline in labor rents should be considered to be the decline in rents for the *majority of workers*, but not including the highest-paid – and so, not including top executives, managers, or many financial sector workers.⁸¹

It is, therefore, plausible that some of the lost labor rents we measure were redistributed to top management and executives, rather than to shareholders. Indeed, this could be consistent with our evidence, since we estimate that the decline in the labor rent share of value added in the nonfinancial corporate sector (for the majority of workers) was *greater* than the actual decline in the labor share (which includes the executive compensation). Note, though, that the majority of the increase in executive compensation over this period accrued to executives and managers who

⁷⁹ Song et al (2019) find that over 1980-87 to 2007-13 there was a decline of about 3.5% in the variance of firm fixed effects. While they use different data sets, Lachowska et al (2020) and Song et al (2019) find very similar declines in the variance of firm fixed effects for annual earnings over the period they study in common (2002-2014), suggesting the two studies may be comparable. Lachowska et al find a much larger decline in the variance of firm fixed effects for hourly wages than annual earnings over this period, and they find large countercyclicality in the variance of firm fixed effects, with their estimates suggest that the variance of firm fixed effects will have been particularly high during 2007-2013 period (the endpoint of the comparison in Song et al (2019)).

⁸⁰ See Bivens and Mishel (2013) for evidence on the existence of rents in executive pay, and Phillippson and Reshef (2006) for evidence on rents in financial sector compensation.

⁸¹ Specifically: our baseline estimate of labor rents, for the nonfinancial corporate sector, will omit high-paid executives and managers because of CPS top-coding/non-response, and will omit all financial sector workers by construction. Our estimate of labor rents for the entire corporate sector will include many financial sector workers, but will omit increases in pay for the highest-paid financial sector workers because of CPS top-coding. See online appendix B2 for more details.

receive self-employment, S-corporation, or partnership income (Bakija, Cole, and Heim 2012; Smith, Yagan, Zidar, and Zwick 2019).⁸² Since it is ambiguous whether income from these sources should be considered capital or labor income, it is unclear whether to consider the rising income of executives and managers of S-corporations and partnerships as a redistribution of rents from workers' labor income to managers' labor income, or simply from labor to capital.⁸³

It is also plausible that some of the lost labor rents we measure were redistributed to high-paid financial sector workers. When estimating labor rents for entire corporate sector (including finance), we find a very similar decline in labor rents as we do for the nonfinancial sector – meaning that the inclusion of the *majority* of financial sector workers does not affect our conclusions. However, since the CPS earnings data is top-coded, our calculation will miss any increase in rents accruing to very highly-paid professionals in finance. In our CPS-ORG data, the share of workers in Finance, Insurance, and Real Estate who had top-coded earnings rose from 2% in 2000 to 9% by 2019. It is possible that these workers saw their labor rents increase over the period where the majority of workers saw labor rents decrease – but note that, since this is a relatively small group of workers, even rather drastic increases in rents for the top 5-10% of financial sector workers would not have made a major difference to the overall trend in labor rents for the entire corporate sector.⁸⁴

V.D. Occupational licensing

While unionization, industry wage premia, and firm size wage premia have fallen over recent decades, the extent of occupational licensing has risen. Have we overestimated the decline in labor rents by failing to consider occupational licensing? We believe that accounting for the rise of occupational licensing would not substantially change our results. First, note that for many professions in which occupational licensing has increased in recent years, occupational

⁸² Bakija et al (2012) estimate that the increase in the income share of top 1% managers, executives, and supervisors who work for closely-held businesses was around 2.2 percentage points over 1979 to 2005, while the increase in the income share of top 1% *salaried* managers, executives, and supervisors was only around 0.4 percentage points.

⁸³ Note also that Smith et al (2019) argue that the decline in the labor share has been overstated because of the increase in income accruing to the top 1% of earners which comes from pass-through enterprises. This income is booked as capital income but some may more appropriately be considered labor income. While the degree of the decline in the aggregate labor income share may be ambiguous as a result of the difficulties of imputing passthrough income to labor or capital (and imputing self-employment income), what is *not* ambiguous is that the share of total income going to the vast majority of workers has declined since the 1980s. For example, Piketty, Saez, and Zucman (2018) estimate that for the bottom 99% of people, for example, the share of total national income accounted for by labor compensation declined from 69% in 1978 to 59% in 2014.

⁸⁴ See Appendix Section B.2. for our estimates of labor rents in the entire corporate sector, and a discussion of the effect of top-coding of earnings on our calculation of labor rents in finance.

licenses are less likely to transfer rents worker to capital owners than they are to transfer rents from unlicensed workers to licensed workers, or from consumers to workers (for example, hairdressers, manicurists, and cosmetologists, real estate agents, or self-employed workers in the building trades). Recent work by Kleiner and Soltas (2019) estimates that 70% of the welfare loss of “marginal” occupational licensing is borne by workers. Even if we were to assume that *all* rents accruing to workers as a result of occupational licensing were obtained at the expense of capital, a back-of-the-envelope calculation suggests that the rise of occupational licensing could only have resulted in an increase in labor rents of 0.2-0.7 percentage points of value added: the share of the U.S. labor force required to have an occupational licence is estimated to have risen by around 7-12% from the 1980s until 2008 (Kleiner and Krueger 2013, Council of Economic Advisers 2015), and the wage premium for licensed workers in the U.S. appears to be in the range of 4-8% (Gittleman, Klee, and Kleiner 2017; Bryson and Kleiner 2019).

V.E. Further evidence on labor shares and concentration

In this section, we address a number of empirical trends which point to weaknesses in the arguments that globalization, technological change, and/or monopoly and monopsony power were the predominant drivers of the falling labor share and rising corporate profits.

First, we note that while technological change and globalization are ubiquitous, the extent of increases in inequality – both between capital and labor incomes, and within labor incomes – differ substantially across countries (see e.g. Gutiérrez and Piton 2019). This would tend to suggest a substantial role for country-specific factors in explaining the decline in the labor share – as argued by Philippon (2020) among others – pointing up the monopoly power or worker power explanations as candidates.

A large proportion of the decline in the U.S. labor share can be accounted for by the manufacturing sector. The centrality of the manufacturing sector in the decline in the U.S. labor share would tend to favor the declining worker power hypothesis over the rising monopoly power hypothesis: given the increases in international trade driven by the opening of low-wage economies to international markets, and reductions in transport costs and trade barriers, it seems unlikely that U.S. manufacturing has seen a substantial increase in product market power over recent decades. In contrast, the manufacturing sector saw large declines in unionization over recent decades and can account for a large share of our estimated decline in labor rents.

Our hypothesis, which emphasizes the relative power of labor and capital, can therefore fit the combination of cross-country and cross-industry facts better than hypotheses based on globalization, technological change, or monopoly power (given far more empowered shareholders and weaker unions in the U.S. than in the rest of the industrial world). In keeping with this, cross-country evidence from Kristal (2010) and Jaumotte and Osorio Buitron (2015) suggests that countries with bigger declines in unionization saw bigger declines in their labor shares and bigger increases in income inequality.⁸⁵

Second, while monopoly power and monopsony power are without doubt present in certain parts of the U.S. economy⁸⁶ – and our baseline framework in fact assumes the existence of both types of power – we also note that the direct evidence of a large aggregate *increase* in either monopoly power or monopsony power is unclear.

The large rise in industry-level sales concentration over recent decades has frequently been invoked as a likely driver of rising monopoly power (Grullon, Larkin, and Michaely 2019; Gutiérrez and Philippon 2017, 2019). Yet industrial organization economists point up a number of reasons to be skeptical that this increase in concentration reflects a large increase in aggregate monopoly power (see, for example, Shapiro (2018), Berry, Gaynor, and Scott Morton (2019), Basu (2019), Syverson (2019)). First, it is not clear whether this large aggregate increase is still present when defining markets appropriately; import-adjusted measures of sales concentration in manufacturing have fallen or risen only marginally since the 1980s (Covarrubias et al 2019), and in many service industries, where the relevant market is often smaller than the entire U.S. market, local-level sales concentration is actually falling, possibly even reflecting increased local-level competition as large firms spread their business into new markets (Rossi-Hansberg et al 2019). Second, industries may become more concentrated as efficient firms compete and win market share: several authors have documented a relationship between rising product market

⁸⁵ Bental and Demougin (2010) also argue that cross-country trends in the labor share may have been driven by an erosion of worker bargaining power, but as a result of improved monitoring technologies. Earlier work studying cross-country trends in labor shares includes Bentolila and Saint-Paul (2003).

⁸⁶ In terms of monopoly power: Covarrubias, Gutiérrez, and Philippon (2019) and Philippon (2020) for example document that since 2000, rising concentration has been associated with slower turnover of lead firms and rising prices, particularly in Telecoms, Airlines, and Banking, and present case studies of several products where prices are substantially higher in the U.S. than Europe. In terms of monopsony power: Berger et al (2019) estimate welfare losses of 5% of lifetime income arising from employers' power in the labor market (as indexed by workers' elasticity of labor supply); and Schubert et al (2020), and Arnold (2020) find sizeable negative effects on wages for workers in highly concentrated labor markets. See Sokolova and Sorensen (2020) for a review of the empirical evidence on the elasticity of labor supply to the firm.

concentration and rising productivity in certain sectors (Peltzman 2018, Autor et al 2020, Ganapati 2020, Crouzet and Eberly 2019). Third, even where concentration ratios have increased in well-defined markets, they are usually below levels which typically raise profit concerns (Shapiro 2018).⁸⁷ In addition, we note that the substantial decline in the large firm wage premium is the opposite of what one would expect to see if large firms were gaining more monopoly power.

Similarly, there is less direct evidence of a rise in labor market monopsony power – in terms of an increasingly inelastic labor supply curve to firms – than there is of a fall in worker power. It does not seem plausible that monopsony power has increased as a result of an increase in labor market concentration (Bivens et al 2018): local labor market concentration is low for most workers, particularly when considering the availability of jobs in other occupations or industries (Schubert, Stansbury, and Taska 2020), and has actually fallen, not risen, for most workers over recent decades (Rinz 2018). Berger, Herkenhoff, and Mongey (2019) estimate that the fall in local labor market concentration since the 1970s was large enough to predict a 3 percentage point *increase* in the labor share. And while the proliferation of non-compete clauses and occupational licensing requirements may have increased switching costs for some workers, the rise of the internet should at the same time have substantially reduced the costs of job search for workers and employers, so the net change in the degree of labor market frictions is unclear.⁸⁸ One piece of evidence which might indicate a rise in monopsony power is Webber (2018), who estimates a decline in the firm-level elasticity of quits to the wage over 2003-2011: more research would be valuable to identify whether this reflects a long-term trend or reflects the slow labor market recovery after the Great Recession.

⁸⁷ In recent years some authors have also argued that the rise in common ownership across firms, as documented by Azar, Schmalz, and Tecu (2018) among others, has led to reduced competition and increased monopoly power (Azar and Vives 2019). More research would be valuable in this regard; the theoretical links between common ownership concentration and monopolistic behavior by firms remain debated, and there does not yet appear to be a clear empirical consensus on the relationship between common ownership and industry-level outcomes like investment, prices, markups, and production (Schmalz 2018; Backus, Conlon, and Sinkinson 2019).

⁸⁸ On non-competes and no-poaching agreements, see Kleiner and Krueger (2013), Krueger and Ashenfelter (2016), Furman and Krueger (2016), Starr et al (2019). On the internet and job search, see Stevenson (2009), Kuhn and Mansour (2014), and Bhuller, Kostol, and Vigtel (2019). There has been a decline in the job-switching rate over time: this may either suggest an increase in the costs of job switching, consistent with higher monopsony power, or a decrease in the dispersion of job-specific rents, reducing workers' incentive to switch jobs (Molloy et al 2011).

VI. Concluding Remarks

The evidence in this paper suggests that the American economy has become more ruthless, as declining unionization, increasingly demanding and empowered shareholders, decreasing real minimum wages, reduced worker protections, and the increases in outsourcing domestically and abroad have disempowered workers – with profound consequences for the labor market and the broader economy. We argue that the reduction in workers’ ability to lay claim to rents within firms could explain the entirety of the change in the distribution of income between labor and capital in the United States in recent decades, and could also explain the rise in corporate valuations, profitability, and measured markups, as well as some of the decline in the NAIRU. We believe the declining worker power hypothesis has been substantially underemphasized as a cause of these macroeconomic trends, relative to other proposed causes: globalization, technological change, and rising monopoly or monopsony power.

An important set of issues which we do not explore in detail relate to inequality in labor income. It seems plausible that the same kinds of situations which encourage rent-sharing also encourage the compression of compensation relative to productivity: unions, generous benefit structures, formalized wage-setting processes and so forth. Consistent with this, in Section II.D we find that the decline in labor rents has been greater for workers without college degrees than for those with college degrees.⁸⁹ It is also plausible that the decline in the rent-sharing power of the majority of workers could explain some of the increase the income share of the top 1%. Over 1979 to 2014, the income share of the top 1% is estimated to have risen by between 4.9 and 9 percentage points (Auten and Splinter 2019, Piketty, Saez, and Zucman 2018). If we assume that all of the decline in labor rents we estimate in this paper represented redistribution from the bottom 99% to the top 1% (whether as labor or capital income), it could explain between 41% and 76% of the entire increase in the top 1% income share over the last forty years. If we assume instead that labor rents were redistributed as capital income across the entire income distribution, but in proportion to the actual distribution of capital income arising from firm ownership, then

⁸⁹ There is a large body of work consistent with this. Several authors document an important role for declining unionization in the rise in wage inequality (including DiNardo et al (1996), Card (1996), Farber et al (2018)); others document a role for the rise in outsourcing and the ‘fissuring’ of the workplace (including Weil 2014).

our estimated decline in labor rents could still account for 24%-45% of the increase in the income share of the top 1%.⁹⁰

In future research it would be valuable to more explicitly consider alternative bargaining models and their implications for wages and employment, and for total output and investment. A further promising avenue is distinguishing between the degree of product market monopoly power vs. labor market power in the U.S. economy by estimating markups on different types of inputs. With sufficiently detailed data on input costs, markups could be estimated on non-labor inputs and on labor inputs separately. Markups over labor and non-labor inputs following the same path would be consistent with a rise in monopoly power; markups over non-labor inputs staying constant while markups over labor rise would be more consistent with a fall in worker power or a rise in monopsony power.⁹¹

A fair question about the labor rents hypothesis regards what it says about the secular stagnation hypothesis that one of us has put forward (Summers 2013). We believe that the shift towards more corporate income, that occurs as labor rents decline, operates to raise saving and reduce demand. The impact on investment of reduced labor power seems to us ambiguous, with lower labor costs on the one hand encouraging expanded output and on the other encouraging more labor-intensive production, as discussed in Section V. So, decreases in labor power may operate to promote the reductions in demand and rising gap between private saving and investment that are defining features of secular stagnation.

Finally, it is worth highlighting that our hypothesis is perhaps more deeply threatening to existing thinking than the other prominent hypotheses for the causes of the decline in the labor share. The globalization or technological change perspectives would imply that any adverse distributional consequences have come alongside greater efficiency, which would have made Pareto-improving redistribution possible (at least in principle). The monopsony and monopoly perspectives suggest that the rise in inequality has come alongside the economy becoming less efficient, which allows economists to be in the congenial place of arguing for policies that simultaneously perfect markets, increase efficiency and promote fairness. In contrast, the declining worker power perspective would imply that the increased inequality we have seen over

⁹⁰ For details of our calculations, see Appendix Section C.11.

⁹¹ Though, finding differential trends in markups on labor inputs vs. non-labor inputs would not be conclusive evidence, because this could also be driven by technological change (Baqae and Farhi 2020).

recent decades may not have come alongside greater efficiency. And the policy implication if these trends are to be reversed – doing more to preserve rent-sharing – interferes with pure markets and may not enhance efficiency on at least some measures.⁹²

More profoundly, if declines in worker power have been major causes of increases in inequality and lack of progress in labor incomes, if policymakers wish to reverse these trends, and if these problems cannot be addressed by making markets more competitive, it raises questions about capitalist institutions. In particular, it raises issues about the effects of corporate governance arrangements which promote the interests of shareholders only, versus a broader set of stakeholders – a constantly simmering debate that has gained new prominence with the Business Roundtable's embrace of stakeholder capitalism. And it suggests that institutions which share rents with workers are likely to be necessary as a form of countervailing power (of the sort initially proposed by Galbraith (1952)).

⁹² The degree to which labor market rent-sharing institutions promote or reduce aggregate efficiency depends on the underlying degree of competition in the labor market, the availability of rents in the product market, and the nature of the rent-sharing institutions, as discussed by Manning (2003) and others.

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Online Appendix for:

The Declining Worker Power Hypothesis: An explanation for the recent evolution of the American economy

Anna Stansbury and Lawrence H. Summers

Brookings Papers on Economic Activity, Spring 2020

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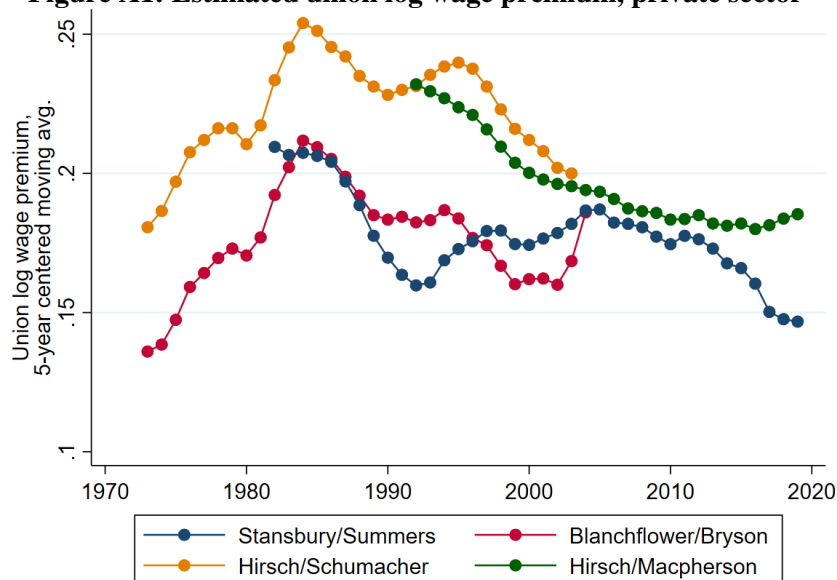
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Appendix A: Estimation of wage premia

A.1. Estimating the union wage premium in the CPS-ORG

Following Hirsch and Macpherson (2019), we estimate the union wage premium using the CPS-ORG over 1984-2019. All the CPS data sets used in this paper are downloaded from IPUMS (Flood et al 2020). We restrict the sample to private sector workers, and we also drop workers for whom wages were imputed in the CPS (following Bollinger and Hirsch (2006). We do this because the wage imputation procedure in the CPS does not take union status into account, which biases estimates of the union wage premium downwards). Our key variable of interest – union status – is a dummy variable which takes the value 1 if the worker was either a member of a union or covered by a collective bargaining agreement. We construct our dependent variable – hourly wage – as either the hourly wage reported by the worker, or the weekly earnings divided by usual hours worked at the respondent's main job (if hourly wage was not reported). We then regress the log hourly wage on union status and various control variables: age, age squared, male dummy, 6 race categories, Hispanic dummy, age # male, age squared # male, married dummy, married # male, state, dummy for central city, 6 education categories, education # age, education # age squared, education # male, dummy for full-time workers, dummies for 383 occupation categories, and for 250 industry categories (where # denotes an interaction). We run our regressions separately for each year, estimating a separate union wage premium for each year. Our estimates are shown in Figure A1 alongside estimates from Hirsch and Schumacher (2004), Blanchflower and Bryson (2004), and Hirsch and Macpherson (2019).

Figure A1: Estimated union log wage premium, private sector



A.2. Estimating firm size premia in the CPS ASEC

Following Song et al (2019) (and others), we estimate the firm size wage premium using the CPS-ASEC sample over 1990-2019 (the years for which the CPS-ASEC collected respondents' employer size). We restrict the sample to private sector workers. Our key independent variable is the size of workers' employer in the last year (variable *FIRMSIZE* in the IPUMS database, which indicates “the total number of persons who worked for the respondent's employer during the preceding calendar year, counting all locations where the employer operated”). We use four size classes: fewer than 100 employees, 100 to 499 employees, 500 to 999 employees, or 1000+ employees. The ASEC only collects workers' annual earnings, weeks worked last year, and usual hours worked per week last year, so we construct our dependent variable – hourly wage – from these variables (introducing measurement error if workers misremember or misreport any of these variables).

We then regress the log hourly wage on separate categorical variables for the different firm size classes, and a large set of control variables (the same controls as in the union wage premium regression, but also including union status): age, age squared, male dummy, 6 race categories, Hispanic dummy, age # male, age squared # male, married dummy, married # male, state, dummy for central city, 6 education categories, education # age, education # age squared, education # male, dummy for full-time workers, 383 occupation categories, 250 industry categories, and a dummy for union membership or coverage (where # denotes an interaction). The union membership/coverage variable is only available for one quarter of the ASEC sample each year, which makes our estimates of the firm size premium relatively noisy if we run them separately for each year (as the sample size is relatively small). So, we run our regressions over pooled 5-year periods: 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2010-2014, 2015-2019.

A.3. Estimating industry wage premia in the CPS-ORG

Following Katz and Summers (1989), we estimate industry wage premia from the CPS-ORG over 1982-2019. We restrict the sample to private sector workers, which gives us between 120,000 and 150,000 observations per year (for a total of 5.3 million observations over 1982-2019). Our independent variable of interest is the industry the worker is employed in. We estimate industry wage premia in separate regressions at three different levels of industry aggregation: 18 sectors (aggregated from the CPS IPUMS *ind1990* industry variable to sectors at the NAICS level, excluding “Management of Companies and Enterprises”), 56 industries

corresponding to BEA industry codes (roughly, NAICS 3-digit industries), and 228 detailed industries, which correspond to SIC industries (at the level of the *ind1990* codes in CPS-IPUMS). More details on how we allocated workers in each *ind1990* code to each NAICS sector and BEA industry are in Appendix Section G. Our dependent variable is the log hourly wage. As in the union wage premium regressions, this is either the hourly wage reported by the worker, or the weekly earnings divided by usual hours worked at the respondent's main job (if hourly wage was not reported).⁹³ We then regress the log hourly wage on separate categorical variables for each industry, and a large set of control variables (the same as in the firm size regression): age, age squared, male dummy, 6 race categories, Hispanic dummy, age # male, age squared # male, married dummy, married # male, state, dummy for central city, 6 education categories, education # age, education # age squared, education # male, dummy for full-time workers, 383 occupation categories, and a dummy for union membership or coverage (where # denotes an interaction). We run the regressions separately for each year over 1984-2019, and separately for each level of industry aggregation. Note that our baseline regressions do not control for firm size, since it is only available in the CPS ASEC from 1990 onwards. However, we replicate almost identical industry wage premia estimates, controlling for firm size, in the CPS ASEC from 1990 onwards.

A.4. Estimating industry wage premia in the CPS-ORG: longitudinal estimates

Our baseline estimates of industry wage premia are estimated cross-sectionally, as described in sections I.C. and A.3. We also estimate industry wage premia in the CPS-ORG longitudinally, as a robustness check. Restricting our sample only to the individuals who can be matched from one year to the next year (using the *cpsidp* variable available at CPS IPUMS), we have between 15,000 and 45,000 unique observations in each year. The industry fixed effects in a longitudinal regression, however, are estimated only from people who move jobs from one sector to another during the 12-month period between our two observations: this means that the industry fixed effects are estimated from a sample of only 2,600-10,000 observations per year (with a median number of industry switchers of 7,803 per year). The small sample size implies that, even when estimating the industry fixed effects only for our sample of 9 large SIC sectors

⁹³ Note that the CPS top-codes earnings data for high-earning individuals. The (weighted) share of respondents with top-coded earnings in the private sector varies as the top-coding threshold changes three times over our sample period: the lowest share is 1% in 2000 and the highest share is to just under 5% by 2019. Excluding CPS respondents with top-coded incomes makes no perceptible difference to our estimated sector wage premia or industry wage rents.

(or 18 NAICS sectors), estimates of the industry fixed effects are rather noisy. Measurement error of industry coding, which is well-documented in the CPS (see e.g. Kambourov and Manovskii 2008), may then lead to concerns of relatively serious attenuation bias. Nonetheless, we find that there is a strong and highly statistically significant relationship between the log wage fixed effects we estimate from the large cross-sectional samples, and the log wage fixed effects we estimate from the smaller longitudinal sample of industry movers. Averaging the wage effects over 5-year periods within sector, a regression of the cross-sectional wage effects on the longitudinal wage effects, weighted by industry compensation, gives a coefficient of exactly 2 (with a standard error of 0.1 and R-squared of 74%) – supporting our practice of halving the raw cross-sectional fixed effects to estimate the true industry wage premia.

Figure A2 shows estimated log wage fixed effects for each NAICS sector, relative to Retail Trade, where each point on the plot represents the average log wage fixed effect for a NAICS sector over a five year period (1982-1984, 1985-1989, 1990-1994, 1995-1999, etc.). There is an extremely close relationship between the estimated fixed effects from the cross-sectional data vs. from the longitudinal data. In addition, the decline in the standard deviation of the longitudinal industry log wage fixed effects is proportionally as large or larger than the decline in the standard deviation of the cross-sectional industry log wage fixed effects, as shown in Figure A3.

Figure A2: Correlation between cross-sectional and longitudinal industry wage fixed effects

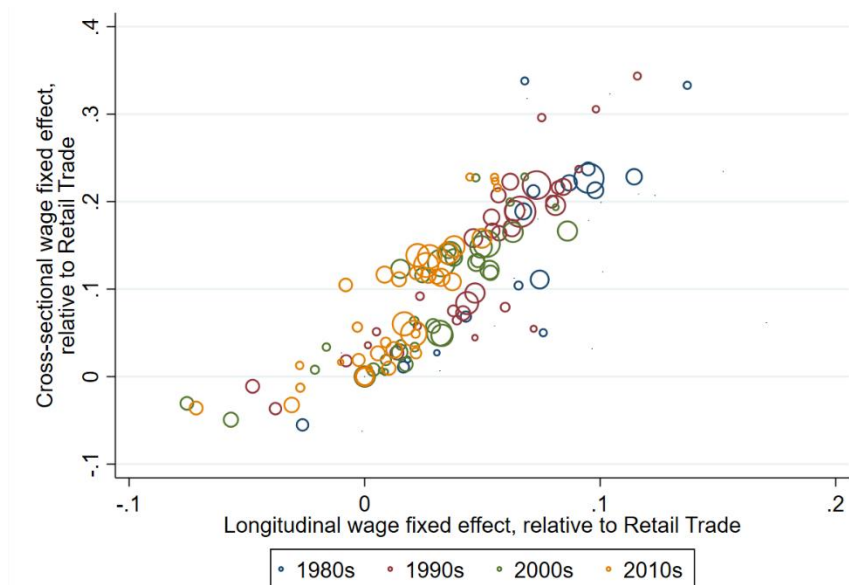
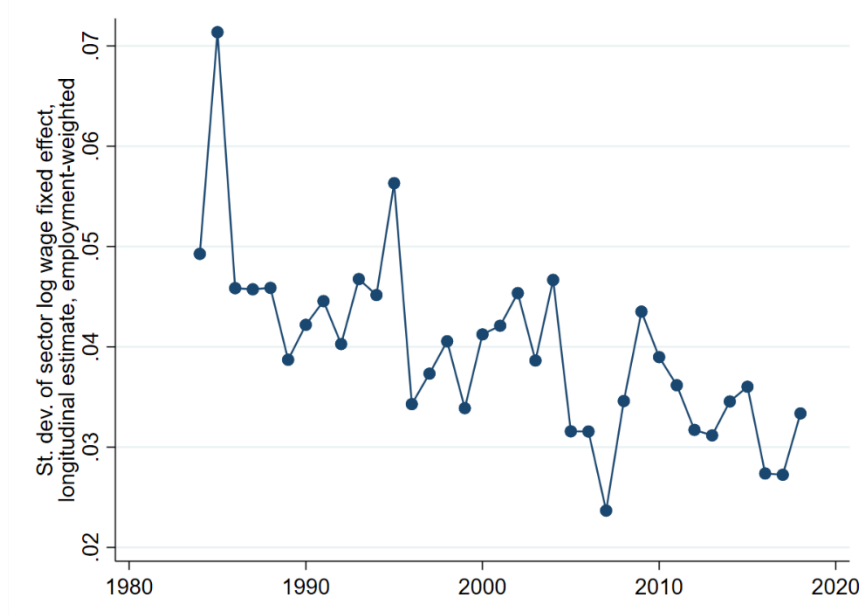


Figure A3: Employment-weighted standard deviation of industry log wage fixed effects, estimated longitudinally for NAICS sectors



A.5. Benchmarking our estimates of industry wage premia against the literature

Our estimates of industry wage premia involve (1) estimating industry log wage fixed effects cross-sectionally in the CPS across sectors, controlling for a large number of person- and job-level covariates; (2) rescaling these fixed effects relative to Retail Trade (which is set to have a wage premium of zero); and (3) cutting these estimates in half. There may be concerns, however, that our procedure of cutting the coefficients in half does too little – or too much – to account for unobserved productivity or for compensating differentials. Either unobserved productivity or compensating differentials could generate variation in industry fixed effects without rents being the underlying cause.

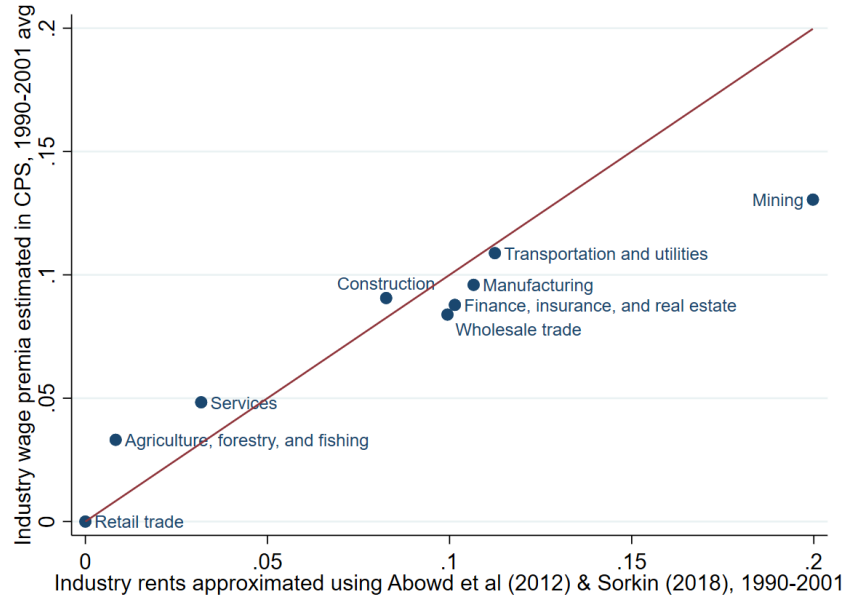
These concerns should be somewhat assuaged by the analysis in Appendix Section A4, which shows that estimates of sector wage premia from sector movers in the longitudinal component of the CPS – controlling for person-level fixed effects – are very highly correlated with our estimates from the cross-sectional CPS and are exactly half as big, on average. This gives strong support to our practice of using the cross-sectional effects and cutting them in half. (*We use the cross-sectional estimated effects, rather than the longitudinal ones, as the sample size is much larger so they are much less noisy*).

As an alternative check on our methodology of cutting the fixed effects in half to obtain wage premia, we also benchmark our estimates against estimates from Abowd et al (2012) and

Sorkin (2018), two papers which use employer-employee matched administrative data in the U.S. to study, respectively, the role of firm fixed effects in industry wage differences, and the role of rents in firm fixed effects. Abowd et al (2012) use an AKM decomposition to estimate firm and worker effects in different industries and provide data on the average firm fixed effect within each SIC 1987 industry for the period 1990-2001. Sorkin (2018) decomposes the degree to which the estimated firm fixed effects in an AKM model are due to rents versus compensating differentials and finds that around 1/3 of firm fixed effects are due to rents while 2/3 are due to compensating differentials.

We use these two papers to generate approximate estimates of industry wage premia which are due to rents, for each of the 9 SIC sectors. First, we take the Abowd et al (2012) estimates of the average firm effect across SIC industries, and aggregate these up to the level of 9 SIC sectors using a simple average. We then rescale these sector-level average firm effects relative to Retail Trade, setting the average firm effect for Retail Trade to be zero. We finally divide these estimates by three, reflecting Sorkin's (2018) finding that only 1/3 of estimated firm fixed effects reflect rents. We compare our estimates of industry wage premia due to rents, approximated using Abowd et al (2012) and Sorkin (2018), with our baseline estimates of industry wage premia estimated in the CPS over the same time period of 1990-2001. The comparison can be seen in Figure A4. For all sectors except Mining, there is a strikingly close relationship between the two estimates. That is, our estimates of industry wage premia from the CPS over 1990-2001 line up well with our back-of-the-envelope estimate of industry rents from Abowd et al (2012) and Sorkin (2018) – estimated using results from papers which explicitly remove the effects of unobserved productivity (through worker fixed effects) and compensating differentials (through the Sorkin (2018) procedure). This can give us some degree of confidence that our estimates of industry wage premia do primarily reflect rents.

Figure A4: Correlation between industry wage premia as estimated from CPS, and industry rents approximated from AKM models



A.6. Decline in the variance of industry wage premia: alternative weighting

Our estimation of the decline in the variance of industry wage premia may be sensitive to weighting choices we make, both in the estimation of the industry fixed effects in the wage regressions, and in the weighting across industries when constructing the standard deviation of the fixed effects. In our baseline scenario in section I.C. of the paper, we weight each person equally in the estimation of the industry wage fixed effects, and we weight each industry by its employment when calculating the standard deviation of the fixed effects. Here, we present three figures to show that the weighting decisions do not have a substantial impact on the estimated outcomes.

In Figure A5, we show the equal-weighted and employment-weighted standard deviations of the industry log wage effects estimated with equal weights across people. The similar trend in both equal-weighted and employment-weighted standard deviations is another way of illustrating the fact that the majority of the decline in the variance of industry wage premia occurred *within* industries. In Figure A6, we show the equal-weighted and employment-weighted standard deviations of the industry log wage effects, estimated with *log wage* weights across people in the initial regressions using the CPS data. In Figure A7, we show the equal-weighted and employment-weighted standard deviations of the industry log wage effects, but estimated with *wage* weights across people in the initial regressions. While the wage-weighted

estimates are noisier than the equal-weighted estimates, the pattern is very similar across all three figures. The industry wage premium estimates with the different weighting schemes are also very similar, as shown in Figure A8.

Figure A5: Decline in standard deviation of industry log wage effects: equal-weighted and employment-weighted

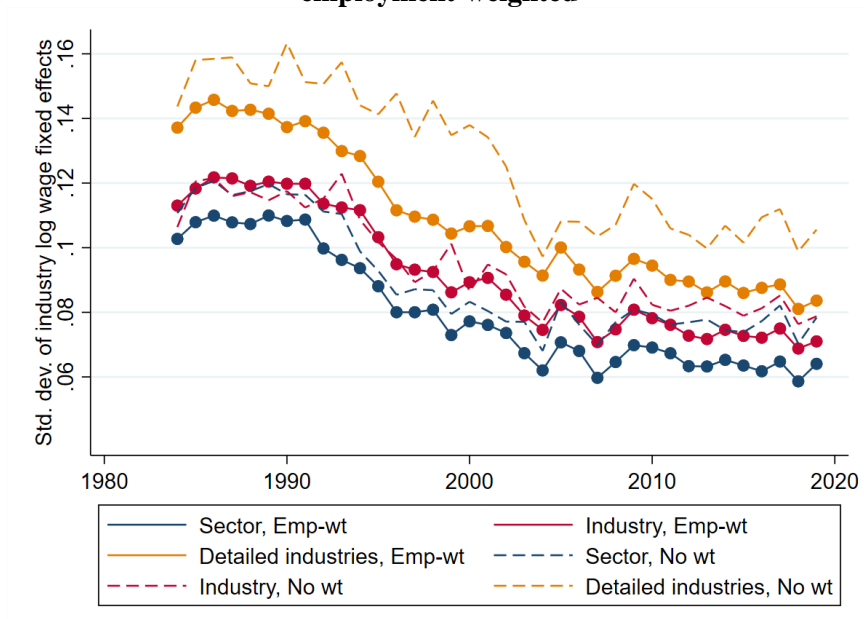


Figure A6: Decline in standard deviation of industry log wage effects, with log-wage weighting in underlying regressions

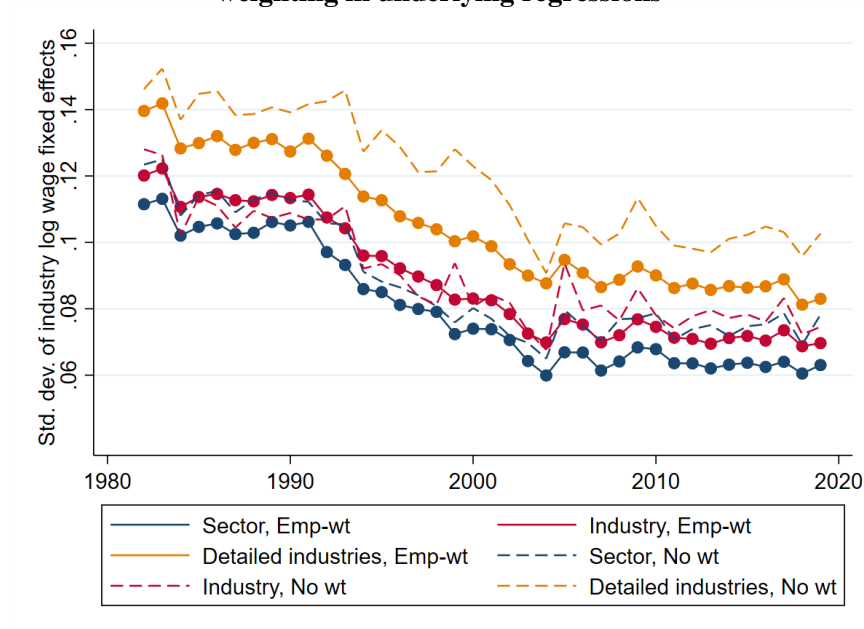


Figure A7: Decline in standard deviation of industry log wage effects, with wage weighting in underlying regressions

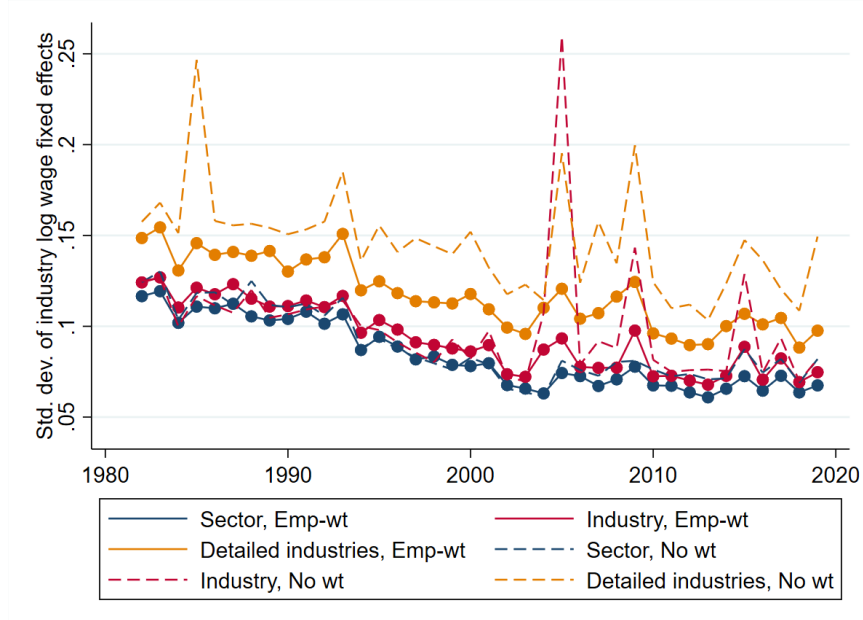
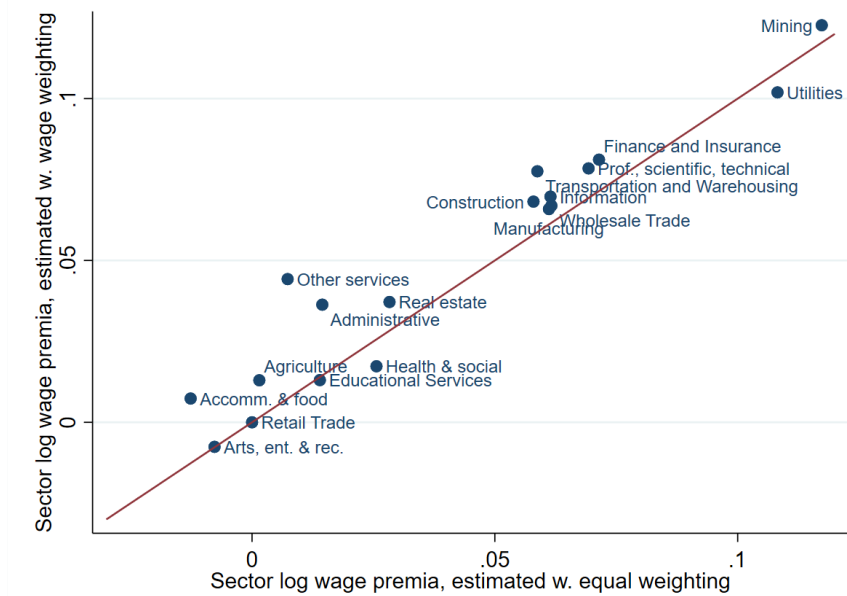


Figure A8: Comparison of estimated industry log wage premia, relative to Retail Trade (2016), estimated with equal weighting in regressions vs. wage weighting in regressions



A.7. Increasing variance of industry-level profitability

As we note in section I.C., even if we interpret industry wage premia as rents to labor, a decline in the dispersion of industry rents going to labor could be a result of (some combination) of three factors: (1) a fall in the rent-sharing coefficient holding total rents constant, meaning

total rents to labor fall, as workers at high-rent industries no longer do as well as they did before; (2) a reallocation of workers from industries with high labor rents (either because of high rent-sharing or high rents) to industries with low labor rents, which would mean that total rents to labor have fallen, but only because of structural changes in the economy; or (3) a fall in the dispersion of rents across industries, holding the rent-sharing coefficient constant, meaning total rents to labor may not have fallen. In Figures A9 and A10 below, we show that the dispersion of rents does *not* appear to have fallen across industries (*for BEA industries*); in fact, the dispersion of profits per worker and average Q appears if anything to have risen somewhat over the period.

Figure A9: Standard deviation of industry-level measures of Q

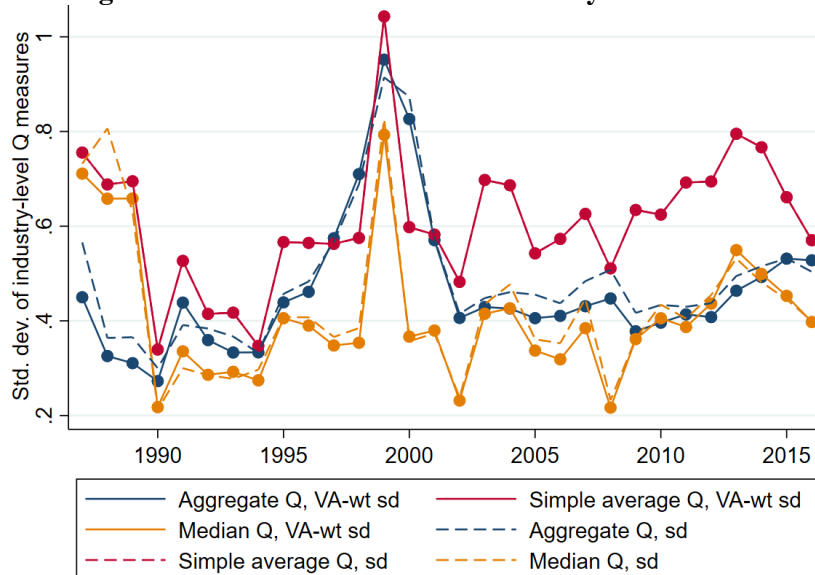
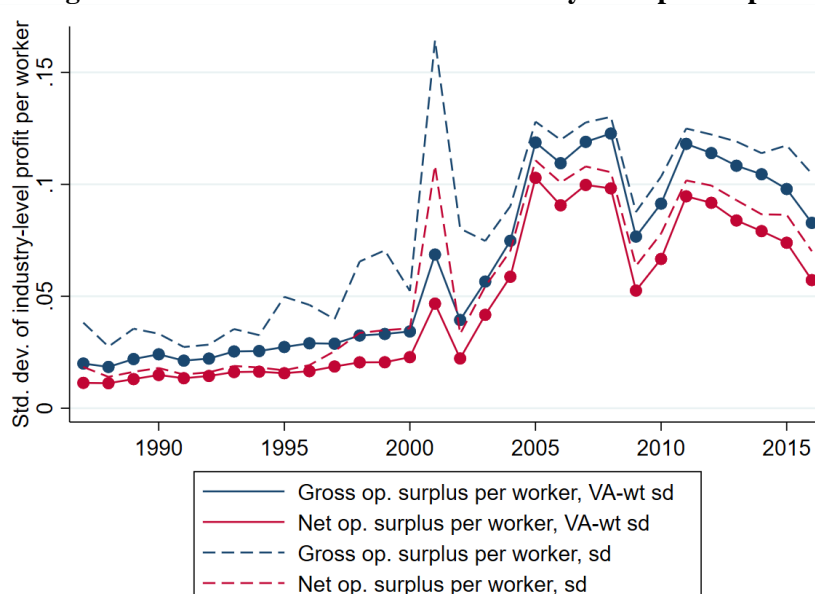


Figure A10: Standard deviation of industry-level profits per worker



Appendix B: Calculation of labor rents

B.1. Baseline: nonfinancial corporate sector

Industry rents: To create our series of sector-level wage premia, to use to calculate industry rents: For years 1984-2019, we use our estimates of sector-level wage fixed effects from the CPS-ORG as outlined in Appendix Section A3. We estimate these for SIC sectors and for NAICS sectors separately (See Appendix Section G for details as to how we crosswalk the *ind1990* industry code in the CPS IPUMS data into SIC and NAICS sectors). For years 1982-1983, we use estimates of sector-level wage fixed effects from the CPS-ORG, estimated without the union control (which is only introduced in 1984), and rescaled. Specifically, we rescale the estimated fixed effects for 1982-1983 using the ratio of the fixed effects without union controls to the fixed effects with union controls over 1984-2019 (in practice, the estimates are very similar).

We then convert these sector-level wage fixed effects into our estimated sector wage premia for each sector S by setting the wage premium for Retail Trade to zero, then taking half the difference between the fixed effect for sector S and the fixed effect for Retail Trade.

To calculate aggregate industry rents for years 1982-1986, we use BEA NIPA compensation by sector at the SIC level, along with our SIC level sector wage premium estimates. To calculate aggregate industry rents for each year from 1987 to 2016, we use BEA NIPA compensation by industry at the NAICS level, along with our NAICS level industry wage premium estimates.

For our baseline calculations for the nonfinancial corporate sector, we exclude the SIC sector “Finance, insurance, and real estate” (for 1982-1986) and we exclude the NAICS sectors “Finance and insurance” and “Real estate, rental, and leasing” (for 1987-2016). We also estimate industry rents for SIC industries for 1987 to 1997 to understand the degree to which the SIC-based and NAICS-based series are comparable. The series move almost identically together, but the SIC series is slightly higher than the NAICS series. To adjust for this, we take the average ratio of the NAICS labor rents series to the SIC labor rents series over 1987-1997, and scale the SIC series down by this ratio for the years 1982 to 1987.

We have the further issue that our BEA compensation by industry data is for the entire private sector, not just the corporate sector. We therefore then take our estimate of total industry

rents and scale it down by the ratio of total compensation in all private industries (excluding finance, insurance, and real estate) to total compensation in the nonfinancial corporate sector.

Union rents: We estimate the union coverage rate for all private sector workers in the CPS-ORG for years 1984-2019, excluding those in Finance, Insurance, or Real Estate. We extend this backwards to 1982 by applying the annual rate of change in the union coverage rate for all private sector workers (from unionstats.com) for 1982-83 and 1983-84. We estimate our own union wage premia from the CPS-ORG for years 1984-2019, as outlined in Appendix Section A.1. We then use the Blanchflower and Bryson (2004) series of union wage premia for the years 1982 and 1983. As shown in Figure A1, the series are very similar for the years that they overlap, and we use very similar controls to estimate the series, suggesting that this imputation is legitimate. We estimate total union rents for the nonfinancial corporate sector using the estimated union wage premia, estimates of the union coverage rate for nonfinancial private sector workers, and compensation for the nonfinancial corporate sector from the BEA NIPA.

Firm size rents: We estimate firm size premia from the CPS ASEC for years 1990-2019, as outlined in Appendix Section A.2. We use the Census Bureau's SUSB data set to calculate the total payroll share by firm size category in each year, for three categories: less than 100, 100-499, and 500+ workers. We then apply these payroll shares to total compensation for the nonfinancial corporate sector in each year, from the BEA NIPA, to obtain estimated shares of compensation in each firm size category. We estimate total firm size rents for the nonfinancial corporate sector for 1990-2019 using our firm size premia and these estimated compensation shares. To calculate firm size rents for the years 1982-1989, we refer to Levine et al (2002) who show estimates of the distribution of employment by firm size in 1979 and 1993 (their Table 4.1), and the estimated firm size log wage effect in 1979 and 1993 (their Table 4.3), for firms of 100-999 workers and 1,000+ workers. We estimate the change in firm size rent share over 1979-1993 which would be implied by their estimates, which is around 0.4 percentage points. We then note that in our data, the firm size rent share does not change much between 1990 and 1993. We therefore use the estimated decline in the firm size rent share of 0.4 percentage points to impute total firm size rents in 1979 to be equal to total firm size rents in 1990 + 0.4 percentage points. We linearly interpolate the firm size rents in each intervening year 1980-1989.

B.2. Alternative calculation: corporate sector

Our baseline estimates in Section II (and described above in Appendix Section B.1.) are for the nonfinancial corporate sector. Here we replicate our calculation for total labor rents, but for the entirety of the corporate sector: that is, the calculation includes the finance industry. We do not find a substantially different pattern for the corporate sector relative to the nonfinancial corporate sector, as shown in Figure B1. Figure B2 breaks out the differences in the series by source, showing that union rents are slightly higher as a share of nonfinancial corporate value added as compared to corporate value added, but industry rents slightly lower.

Figure B1: Labor rents as share of corporate business value added

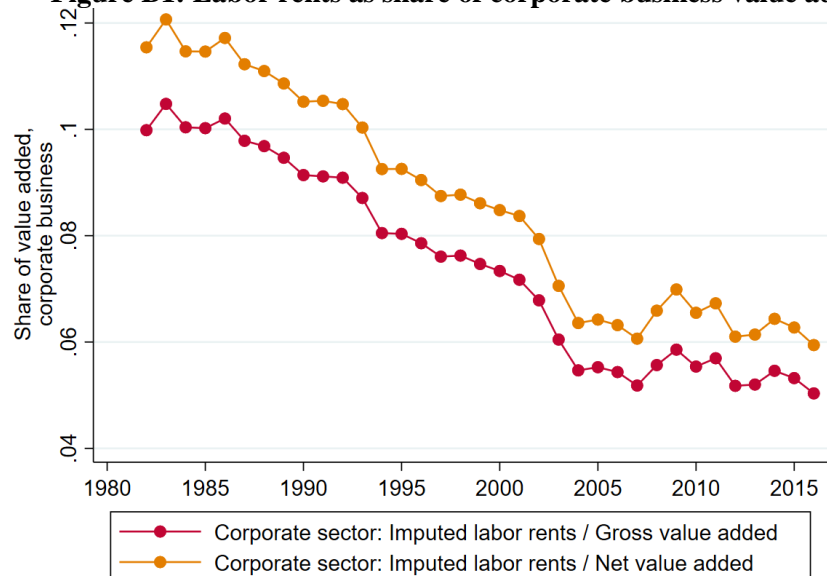
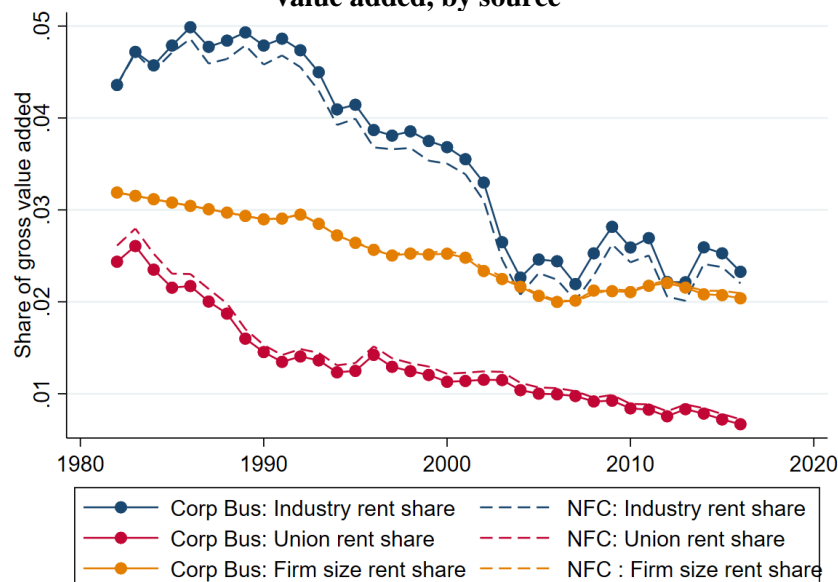


Figure B2: Labor rents as share of corporate and nonfinancial corporate business (“NFC”) value added, by source



Differences between the corporate sector and nonfinancial corporate sector estimates of labor rents are as follows:

1. **Union rents:** The nonfinancial corporate sector series uses our estimate of the unionization rate excluding finance, insurance, and real estate. The corporate sector series uses the unionization rate across all private industries. Because unionization in finance, insurance, and real estate is lower than average, this means that union rents as a share of value added in the corporate sector is slightly lower than union rents as a share of value added in the nonfinancial corporate sector.
2. **Industry rents:** Our estimate of industry rents for the nonfinancial corporate sector excludes any rents in finance, insurance, or real estate. Our estimate of industry rents for the corporate sector includes labor rents in finance, insurance, and real estate (though the magnitude of estimated industry rents in real estate is too small to affect the overall calculation much). There are three forces operating on our series for industry rents in the corporate sector: (1) industry rents in finance were lower than the average industry rents outside of finance for our whole sample period, acting to make the level of total industry rents as a share of value added lower for the corporate sector as a whole than for the nonfinancial corporate sector; (2) the share of finance in value added and compensation grew from the 1980s to the 2010s; and (3) industry rents fell much more slowly in the financial sector than in non-financial sectors, which would operate to make the decline in overall industry rents as a share of value added less steep for the corporate sector than the nonfinancial corporate sector.⁹⁴
3. **Firm size rents:** Firm size rents as a share of value added is by definition the same in both sectors, as we use the same methodology for both sectors (see Appendix Section B.1.).

Top-coding and high earners in the financial sector: One major caveat to these estimates of labor rents in the nonfinancial corporate sector is that – since the CPS earnings data is top-coded

⁹⁴ Industry rents in finance – as we estimate them from the CPS – fell very gradually in the 1980s and 1990s, and then levelled off at around 1.5% of financial sector value added in the 2000s. Industry rents in non-financial sectors fell much more sharply in the 1980s and 1990s, and then levelled off at around 2% of nonfinancial sector value added in the 2000s. Over the same period, the financial sector grew as a share of both compensation and value added: in the BEA NIPA Industry Accounts data, the share of total compensation (in private industries) in finance, insurance, and real estate rose from around 9% in the late 1980s to around 11% by the 2010s.

(e.g. at \$2,885 per week for the 2000s and 2010s) – we will not pick up the very large increases in compensation for the highest earning financial sector workers over the period, which may well reflect rents (see, e.g. Phillipon and Reshef 2006). This means that our series of industry rents should be thought of – as discussed in Section II – as a series measuring industry rents that flow to the *majority* of workers.

Because the top-coding thresholds jump, the share of CPS respondents who are top-coded varies over time. In our CPS-ORG data, the (weighted) share of workers in Finance, Insurance, and Real Estate who had top-coded earnings rose from 2% in 2000 to 9% by 2019. (The share in the overall data for private sector rises from 1% in 2000 to just under 5% by 2019). If the finance wage premium for high-earning financial professionals is growing over time over the 2000s and 2010s even as it slightly declines for the majority of finance sector workers – which seems possible – then our estimates of labor rents *overestimate* the decline in labor rents going to all workers, but are a good estimate of labor rents going to *the majority* of workers.

A quick counterfactual estimate, however, suggests that the degree to which the exclusion of top-earning workers in finance might affect our calculations is relatively limited. Assume for example that a rise in rents going to top earners drastically changed the average wage premium in Finance and Insurance, meaning that it rose from 11% to 15% over 1987-2016, rather than falling from 11% to 8%. In this case, our estimate of total industry rents as a share of value added in the corporate sector would have fallen from 3.9% to 2.3%, rather than from 3.9% to 2.0%. over 1987-2016.

B.3. Labor rents for college and non-college workers

In Section II.D. we estimate labor rents for college and non-college workers separately. Our estimates go from 1984-2016 (rather than 1982-2016 for the aggregate calculation) because we are only able to obtain estimates of union wage premia and unionization rates by education group for 1984 onwards. We estimate that labor rents to non-college workers, as a share of net value added in the nonfinancial corporate sector, fell substantially over 1987-2016, while labor rents to college workers rose slightly. This, however, is the result of two effects: a compositional effect as the share of the labor force without a college education fell over this period, and a within-group effect as labor rents fell by more for college workers than for non-college workers (Figure B4).

Industry rents: For industry rents, we estimate sector wage premia in the CPS separately for workers with a four year college degree and for workers without a four year college degree. We also use the CPS to estimate the total share of earnings by education group within each sector in each year. Using these earnings shares and the BEA NIPA Industry Economic Accounts, we estimate total compensation by education group and sector, and apply our sector-by-education-by-year wage premia.

Union rents: We estimate union wage premia and union coverage rates in the CPS separately for workers with a four year college degree and for workers without a four year college degree. We also use the CPS to estimate the total share of earnings by education group in each year. We use these, and total compensation for the nonfinancial corporate sector from the BEA NIPA, to estimate total union rents for college and non-college workers for each year.

Firm size rents: We estimate firm size wage premia in the CPS separately for workers with a four year college degree and for workers without a four year college degree. We also use the CPS to estimate the total share of earnings by education group and firm size class in each year. We use these, the payroll shares by firm size class from the Census Bureau SUSB, and the total compensation for the nonfinancial corporate sector from the BEA NIPA, to estimate total firm size rents for college and non-college workers for each year from 1990 onwards. We are unable to calculate our own estimates of firm size rents for years pre-1990. However, our estimates of firm size rents as a share of total compensation for each education group, for the years 1990-2019, show very consistent and strongly divergent trends, so we interpolate these same trends backwards through 1984 (as shown in Figure B5) and use these trends to impute firm size rents for years 1984-1989. This imputation is consistent with our imputation of firm size rents at the aggregate level using data from Levine et al (2002), as described in Appendix Section B.1. (in terms of the change in total firm size rents as a share of value added).

Figure B3: Estimated labor rents as share of net value added, nonfinancial corporate sector, by education group (3-year moving average)

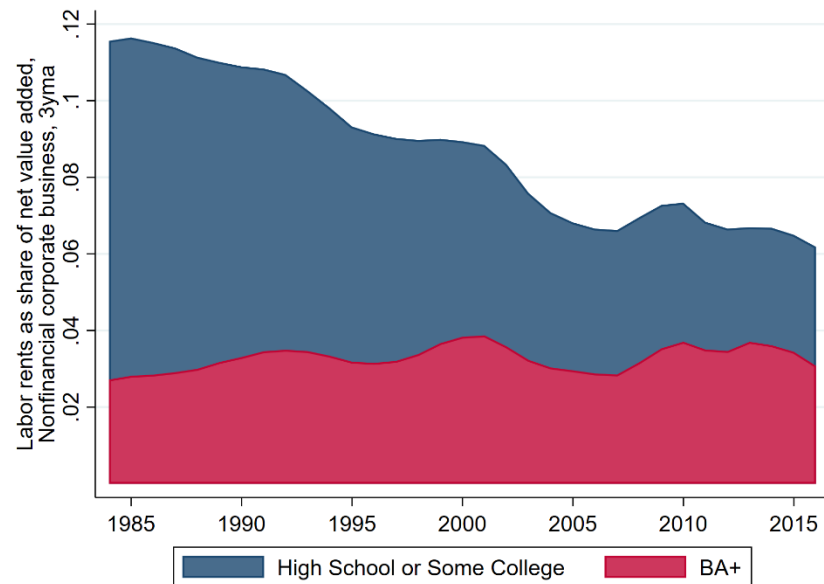


Figure B4: Estimated labor rents as share of compensation, by education group (non-financial corporate sector)

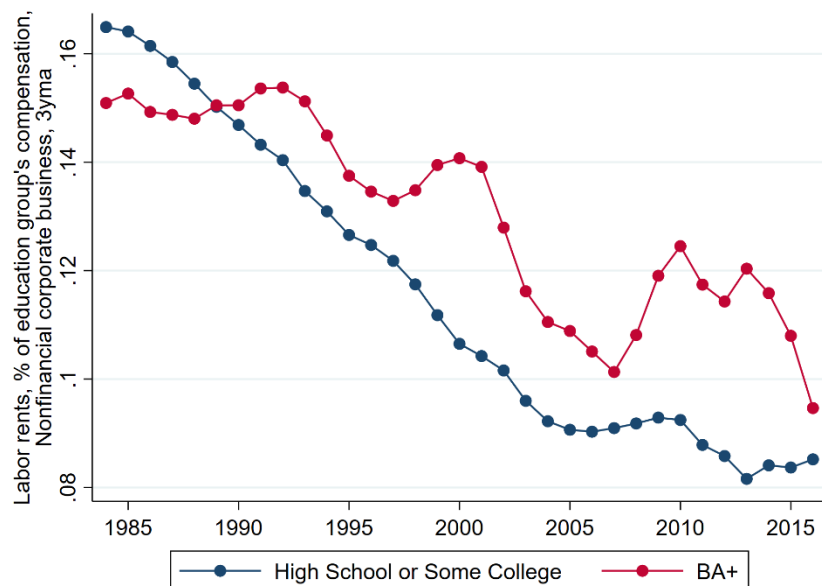
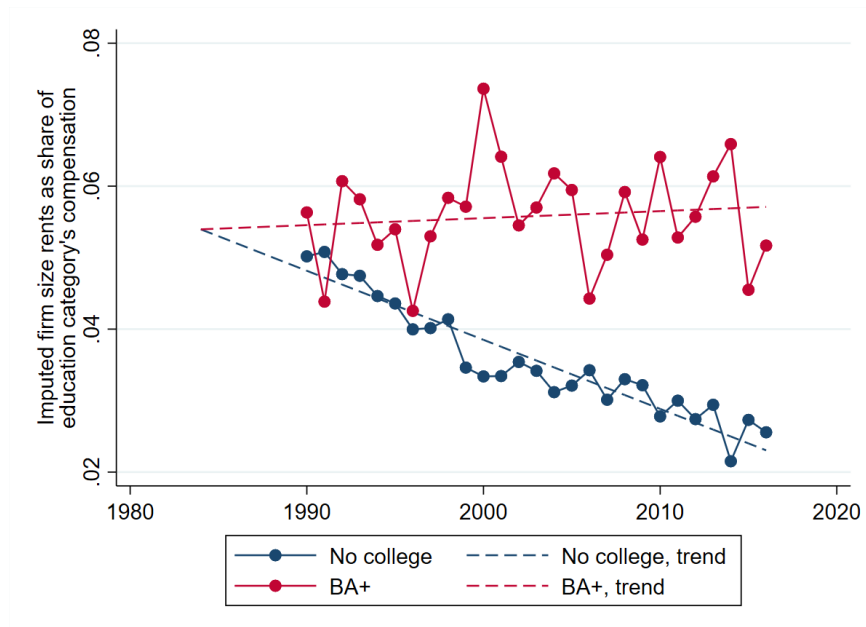


Figure B5: Firm size rents as a share of compensation, by education group: estimates and trend



B.4. State-level labor rents calculations

We estimate state-level labor shares using the Regional Economic Accounts from the Bureau of Economic Analysis. We use the state-level estimates of GDP and compensation for all Private Industries to calculate the labor share (compensation/GDP).

To calculate our labor rents measure at the state level, we first use the CPS-ORG data to estimate industry-by-state, firm size-by-state, and union-by-state wage premia for each year 1984-2019, using the full set of controls described in Appendix sections A.1.-A.3.

Industry rents: We estimate industry wage premia by state at both the NAICS sector level and the SIC sector level, using the crosswalk from Census industry codes to NAICS and SIC sectors described in Appendix Section G. We obtain state-level compensation at the industry level from the BEA Regional Economic Accounts data, which provides data on NAICS industries for 1997 onwards and for SIC industries for years up to and including 1997. We calculate industry rents with the formula in Section II of the paper, using NAICS compensation by industry and the industry wage premia estimated using NAICS codes for 1997-2017, and SIC compensation by industry and the industry wage premia estimated using SIC codes for 1984-1996. We then take the ratio of estimated industry rents at the state level using NAICS industries,

relative to the estimated industry rents using SIC industries, in 1997, and apply this backwards over 1984-1996 to create a roughly consistent series over time.⁹⁵

Union rents: We estimate the union coverage rate by state from the CPS, and calculate union rents using the state-level union coverage rate and union wage premium.

Firm size rents: We estimate the firm size wage premium by state from the CPS ASEC for years 1990-2019, use data on the distribution of payroll by firm size and state from the Census Bureau SUSB database to estimate payroll share by firm size class, and then apply this to compensation by state from the BEA Regional Economic Accounts to estimate firm size rents by state for each year from 1990-2016. To estimate firm size rents from 1984-1989, we use the data from Levine et al (2002), whose data suggests that firm size rents fell by 0.4% of value added from 1979 to 1993 at the national level. As in our national level estimates, we therefore apply a fall of 0.4% of state-level GDP to our firm size rents calculations for each state over 1979-1993, with a linear interpolation for each year between these dates.

B.5. Industry-level labor rents calculations

Our calculation of industry rents largely follows the methodology for the aggregate level outlined in Section B.1, with the notable exception that we do not calculate firm size rents as we do not have payroll data by firm size at the industry level.

Industry rents: We estimate industry wage fixed effects by state at the level of 51 industries (BEA industry code ~ NAICS 3-digit level), over 1987-2016, in the CPS-ORG. We then calculate the industry wage premium as half of the difference between the estimated fixed effect for each industry, relative to the lowest-wage large industry, which is Food Services and Drinking Places. This industry had 12.3 million employees as of February 2020, and average hourly earnings of \$15.25 as of October 2019 (the latest data available from the BLS at time of writing). We obtain industry-level compensation at the NAICS 3-digit level from the BEA Industry Economic Accounts, and aggregate this to the BEA industry code level.

Union rents: We use our estimates of the union wage premium at the national level, and estimate the union coverage rate by industry using the CPS. Our results are not sensitive to

⁹⁵ The state level calculations use all private industries' GDP and compensation as their baseline as we do not have state-level data on the nonfinancial corporate sector only. As such, we include industry rents for financial industries in this calculation.

estimating the union wage premium separately for each individual industry, rather than using the aggregate union wage premium.

Firm size rents: We do not include firm size rents in our measure of total labor rents by industry, because we do not have data on compensation by firm size class and 3-digit NAICS industry.

B.6. Were labor rents redistributed or destroyed? Cross-industry analysis

In Section II.E., we address the question: were labor rents redistributed or destroyed? We predict that, if the decline of labor rents is because rents in specific industries were destroyed as a result of globalization or increased competition, then one would expect (1) that returns to capital would fall alongside rents to labor, and (2) that the total rents in the industry – profits, plus labor rents – would be falling.

We look at 51 industries over 1987-2016 to establish whether this was the case (industries at the BEA industry code/roughly NAICS 3-digit level, as in the industry-level analysis in Sections III and IV of our paper).

We measure three items to answer these questions:

1. **The profit rate to capital**, which we measure as net operating surplus minus a rough measure of the cost of capital,⁹⁶ over fixed assets;
2. **The rent rate to labor**, for which we use our measure of labor rents, divided by fixed assets; and
3. **The total rent rate**, which is the sum of the profit rate to capital and the rent rate to labor.

We calculate these three statistics for each of the 51 industries under consideration and compare their average values in 1987-91 and 2012-16, the start and end of our sample period.⁹⁷

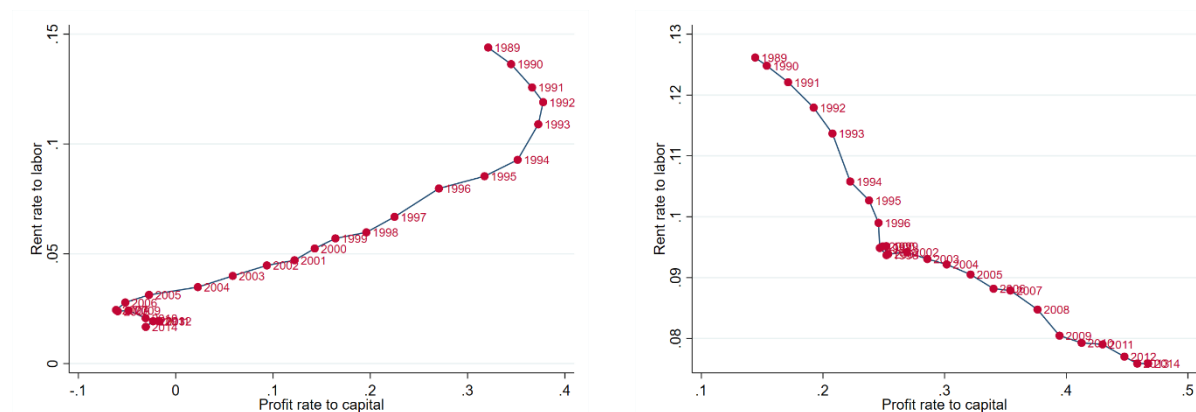
The industries of apparel manufacturing and wholesale trade give particularly striking examples of our heuristic to distinguish between rent destruction vs. rent redistribution, shown in Figure B5. In apparel manufacturing, the profit rate to capital and rent rate to labor both fell very substantially over 1987-2016 (*the figure shows 5-year centered moving averages*). This suggests that in apparel manufacturing, the dominant trend was a destruction of rents – as would accord

⁹⁶ We use the 3-month Treasury rate, plus a 5% fixed equity premium, minus a backward-looking measure of inflation expectations (a 3-2-1 weighted average of PCE inflation over the previous three years). This does not account for differential costs of capital in different industries, perhaps caused by differential risk across industries.

⁹⁷ This is the longest sample period for which we have industry-level data for consistently defined NAICS-based industry codes.

with the substantial rise in low-wage import penetration over the period. On the other hand in wholesale trade, the decline in the rent rate to labor was more than matched by an increase in the profit rate to capital over the period, suggesting that the dominant trend was a redistribution of rents from labor to capital.

Figure B5: Imputed profit rate to capital and rent rate to labor, Apparel manufacturing (left) and Wholesale trade (right)



We can analyze this more systematically by categorizing industries into groups based on the changes in the profit rate to capital and rent rate to labor over the period, as shown in Table B1. For each category, we show the number of industries in this category and the share of the private sector workforce in 2018 which was employed in these industries (which we calculate using the BEA NIPA employment by industry database).⁹⁸

We find that in 29 industries, employing around 30% of the private sector workforce, the profit rate to capital rose even while the rent rate to labor fell over 1987-2016. Together, these 29 industries were responsible for 73% of the total decline in labor rents over the period. Further, in the majority of these industries – 21 industries, employing around 24% of the private workforce – returns to capital rose *by more than* rents to labor fell over 1987-2016, implying that the total underlying profits generated by these industries rose, even as rents to labor fell (i.e., the total rent rate rose). These industries – those where the increase in profits to capital was greater than the decline in rents to labor – were responsible for 38% of the total decline in labor rents over 1987-2016. These calculations suggest a substantial role for redistribution in the decline in labor rents.

⁹⁸ Note that the totals do not add up to 100%, because this industry-level analysis excludes financial industries to be consistent with our main analysis in the paper.

Table B1: Industries, categorized by changes in profit rate to capital and rent rate to labor, 1987-2016

	Profit rate to capital rose	Profit rate to capital roughly the same⁹⁹	Profit rate to capital fell
Rent rate to labor rose	1 industries <1% of private sector workforce	0 industries	0 industries
Rent rate to labor roughly the same¹¹⁸	5 industries 13% of private sector workforce	0 industries	0 industries
Rent rate to labor fell	29 industries 29% of private sector workforce	2 industries 18% of private sector workforce	14 industries 30% of private sector workforce

Figures B6, B7, and B8 break down these statistics at the industry level, showing the profit rate to capital and rent rate to labor in each of 1987-91 and 2012-16.

Figure B6, showing manufacturing industries, shows that for the majority of manufacturing industries the total rent rate changed very little over the period, but the distribution of those rents changed substantially as rents were redistributed from labor to capital – see, for example, the cases of autos and transportation equipment (*Dur_transp*), plastics (*Nondur_plastic*), fabricated metal products (*Dur_fab_metal*), chemical products (*Nondur_chemical*), paper products (*Nondur_paper*), or printing (*Nondur_printing*). In some industries, total rents were destroyed, with both labor and capital seeing rent destruction: apparel and furniture manufacturing (*Nondur_apparel* and *Dur_furniture*) being the most prominent cases (and two of the most exposed to low-wage import competition over the period). A handful of sectors actually saw total rents rise substantially even as labor rents fell, in particular food, beverage and tobacco products (*Nondur_food*) and petroleum products (*Nondur_petro*).

Figure B7 shows the same statistics for Trade, Transportation, Construction, and Utilities industries. Here, the picture is more mixed (and note the different scale on the axis, relative to the manufacturing graph). Retail trade, trucking, and construction (*Retail_trade*, *Transp_truck*, *Construction*) saw relatively large decreases in their total rent rate over this period, but this decrease appeared to have been entirely borne by labor, with little decrease in the profit rate to capital (and even an increase in the profit rate to capital in the case of trucking). Mining

⁹⁹ We define “roughly the same” as being within 0.5 percentage points of its 1987-91 level in 2012-16.

industries (*Min_oil_and_gas*, *Min_ex_oil*), and passenger transportation (*Transp_passenger*) saw large increases in their profit rate without an increase in the rent rate to labor. Wholesale trade saw a large increase in its total rent rate *even as* the rent rate to labor substantially decreased.

Finally, Figure B8 breaks down the trends for service sector industries. It excludes financial and legal services, since their very low fixed assets means their ratios are off the scale on the graph. Particularly notable here are the substantial declines in the labor rent rates in administrative and support services (*Adm_support*), publishing (*Inf_publishing*), and data processing (*Inf_data*) – which came alongside large decreases in the total rent rate and the profit rate to capital. One industry bucking the trend is computer services (*Computer_serv*), which saw a large increase in the rent rate to labor over the period.

In Figure B9, we show the breakdown of the share of the total decline in labor rents accounted for by each industry. The majority of the decline in labor rents can be accounted for by industries in manufacturing, retail and wholesale trade, construction, utilities, and transportation industries.

Figure B6: Manufacturing industries – profit rate to capital and rent rate to labor, 1987-91 and 2012-2016

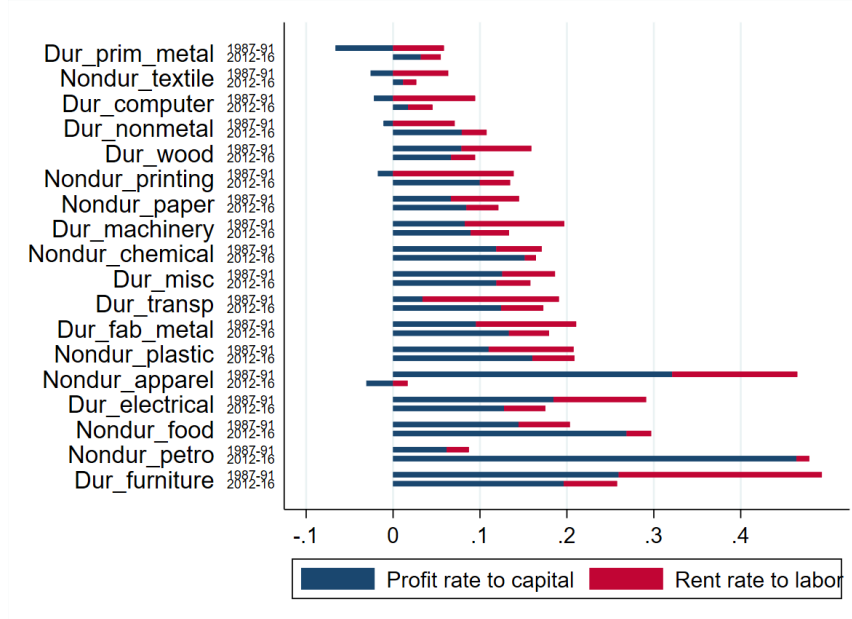


Figure B7: Trade, transportation, construction, and utilities – profit rate to capital and rent rate to labor, 1987-91 and 2012-16

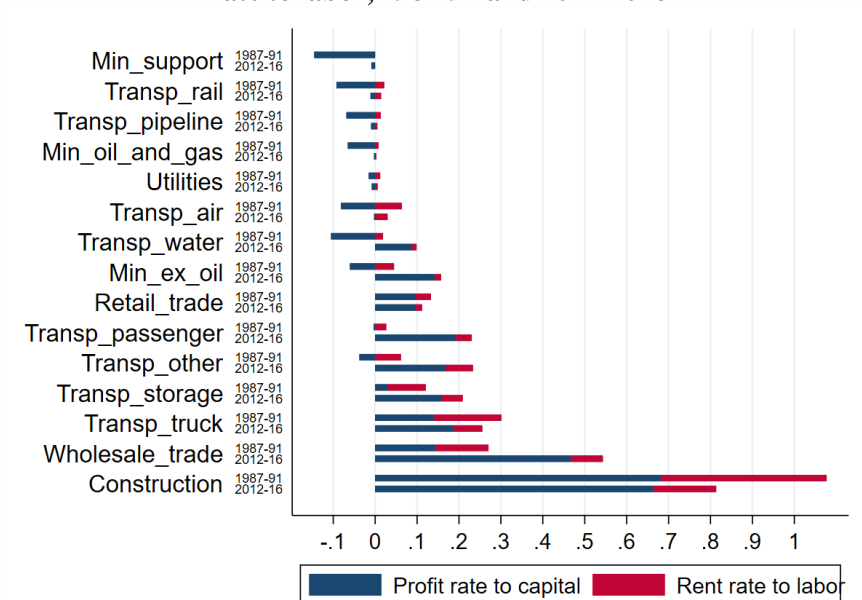


Figure B8: Services– profit rate to capital and rent rate to labor, 1987-91 and 2012-2016

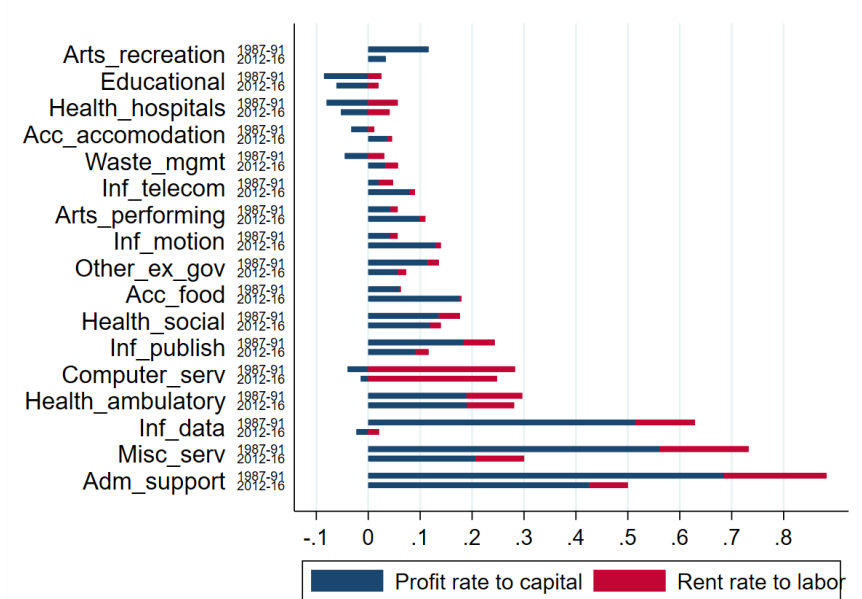
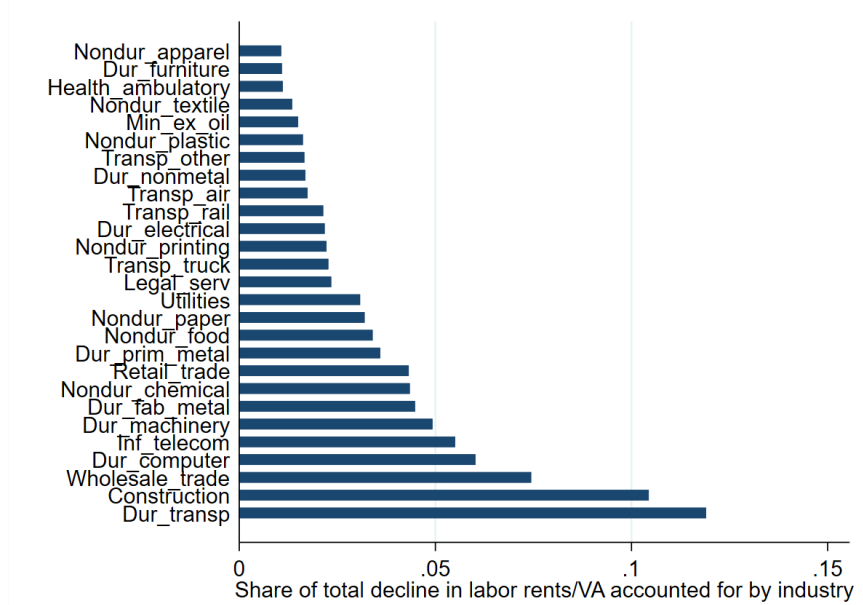


Figure B9: Share of total decline in labor rents as a share of value added, accounted for by each industry (over 1987-91 to 2012-2016)



This graph only shows industries responsible for 1% or more of the total decline in labor rents

B.7. Manufacturing industries, rents, and low-wage import penetration

In Section II.E., we show that manufacturing industries with bigger increases in low-wage import penetration over 1989-2007 *were not* the industries with the biggest drops in labor rents over the period, which would tend to cast doubt on the idea that globalization was primarily responsible for the decline in labor rents over this period. Our data on import penetration from low-wage countries over 1989-2007 is from Bernard, Jensen, and Schott (2006), updated by Peter Schott in 2011 and available on his website. Low-wage import penetration is calculated as the share of domestic sales within each industry represented by imports from low-wage countries, defined as countries with GDP per capita less than 5% of the U.S. level. We study 1989-2007 as this is the period for which we have consistently-defined data on low-wage import penetration. The data is at the NAICS 3-digit industry level, which corresponds to our 18 industry definitions in manufacturing.) with changes in profitability and the log industry wage premium, for 18 manufacturing industries

We report some additional correlations in the data here. First, as one would expect, the industries which saw bigger increases in import competition saw the biggest declines in the profit rate to capital (Fig. B10). Why, then, were they not the industries that saw the biggest declines in rents to labor? The answer is that the industries which saw the biggest rises in low-wage import

penetration over 1989-2007 were industries which for the most part already had relatively low labor rents in the late 1980s (Figure B11). Industries with high initial labor rent shares had more labor rents to lose over the 1989-2007 period, as shown in Figure B12 (though, as a percent of total labor rents, almost all manufacturing industries lost a relatively similar share: about 30%-50% of their labor rents over the period, as shown in Figure B13). Note, however, that even when controlling for the initial level of labor rents in 1989, there is still no significant relationship between the increase in low-wage import penetration and the change in labor rents over 1989-2007 (and the coefficient is in fact positive).

Figure B10: Profit rate to capital and import penetration, manufacturing, 1989-2007

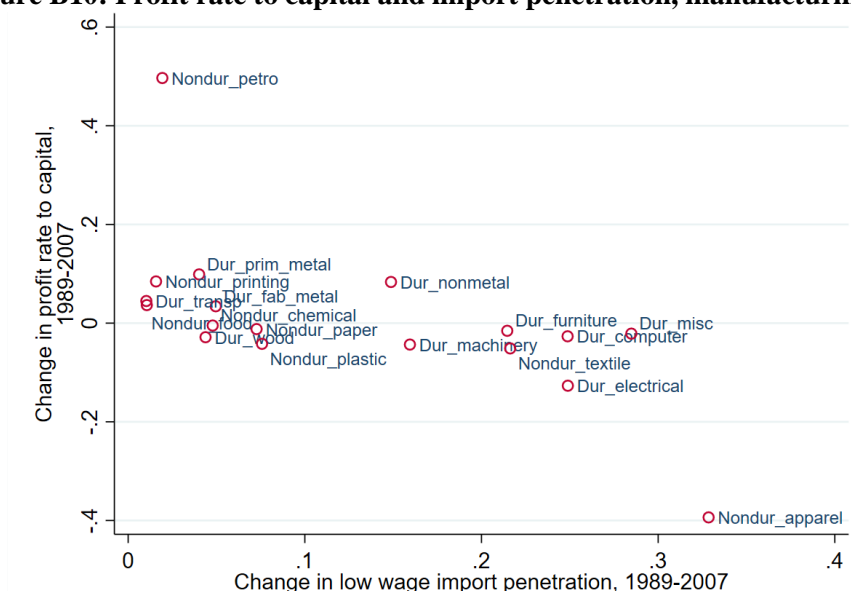


Figure B11: Initial rent share and change in import penetration, manufacturing, 1989-2007



Figure B12: Initial industry labor rent share and change in labor rent share, manufacturing, 1989-2007

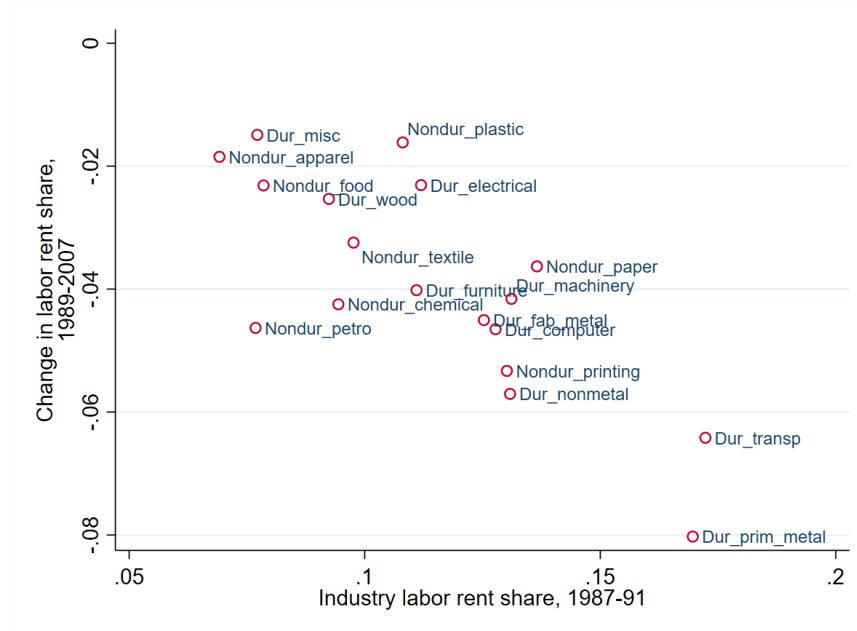
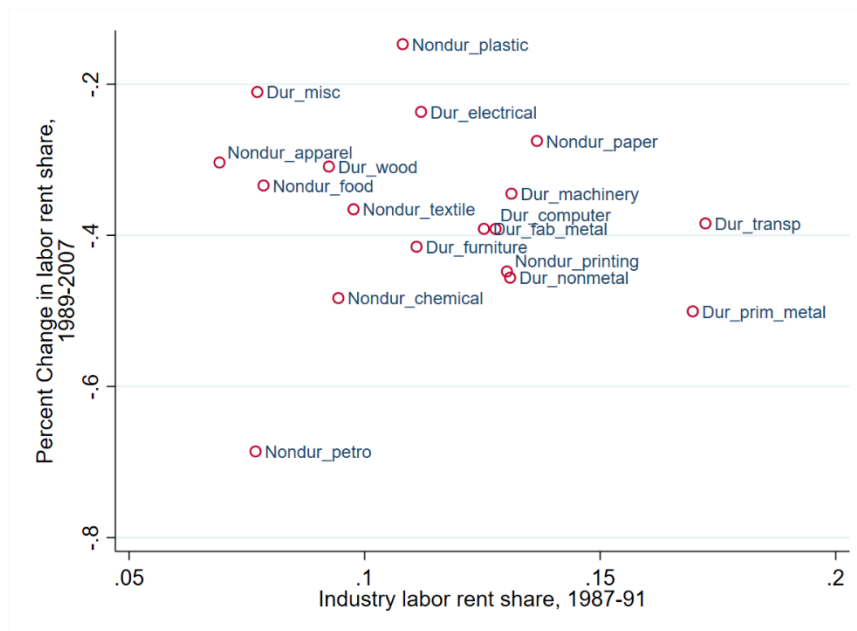


Figure B13: Initial industry labor rent share and percentage change in labor rent share, manufacturing, 1989-2007



Appendix C: Additional figures and tables

C.1. Decline in unionization by sector

We calculate unionization rates by SIC (1987) major sector in the CPS-ORG for each year from 1984 to 2019 inclusive. We show the raw declines in unionization by sector in Figure C1. Indexing the unionization rate in 1984-86 to 100, we show the 3-year moving average of the unionization rate over 1984-2019 in Figure C2. As can be seen, the proportional rate of decline in unionization was strikingly similar across almost all sectors – Mining, Manufacturing, Transportation and Utilities, Retail Trade, Wholesale Trade, and Construction – particularly until the mid-2000s. Note also that of the three sectors whose unionization rate did not decline as much – Agriculture, FIRE, and Services – Agriculture and FIRE had started with such low initial unionization levels that it would have been difficult to decline much further. Within Services, the arrest of the decline in unionization rates since 2000 was – compositionally – a result of slow decline in unionization in health, offset by an increase in unionization in education.

Figure C1: Decline in unionization rates by sector, 1984-2019 (3-year moving average)

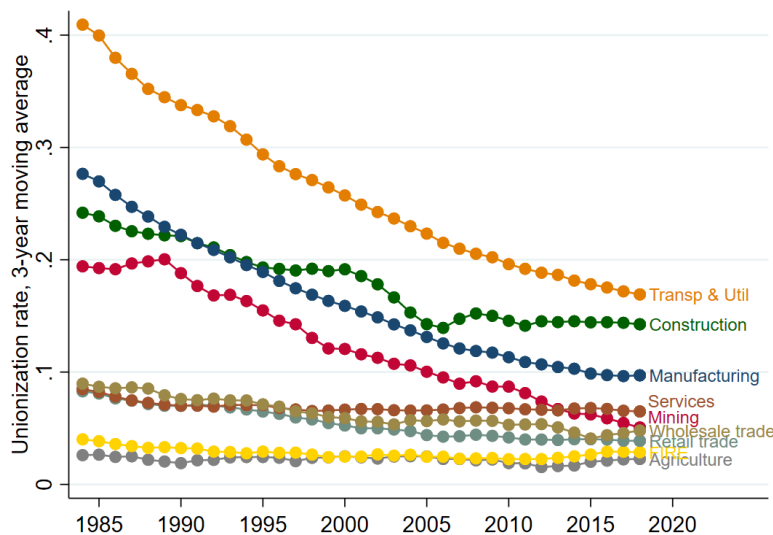
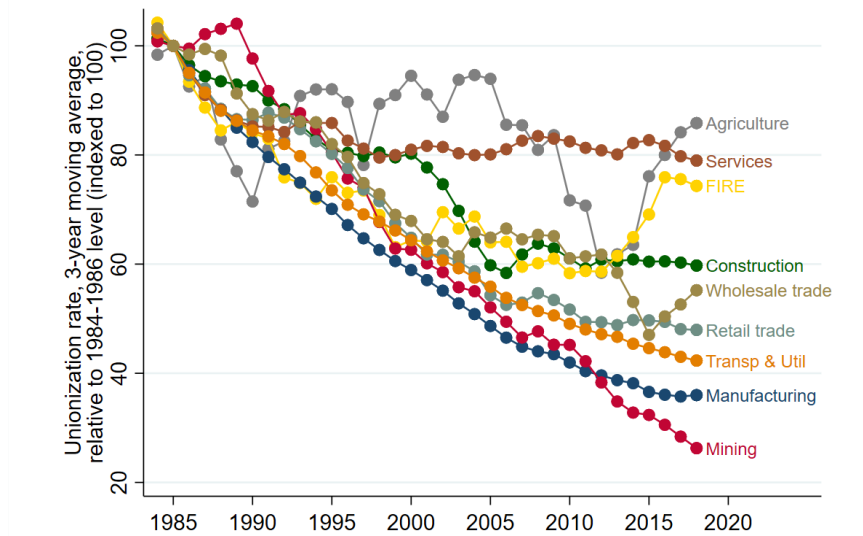


Figure C2: Decline in unionization rates by sector, 1984-2019 (3y ma, indexed to 1984-86)

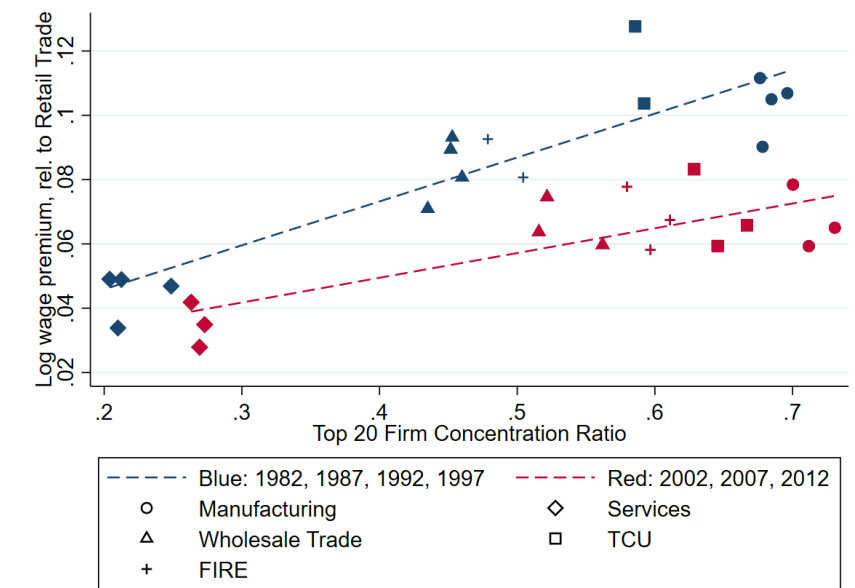


C.2. Relationship between wage premia and concentration

Figure C3 shows the correlation, at the SIC sector level, between average top 20 sales concentration and our estimated log wage premium, for 5-year periods over 1982 to 2012. As the dashed lines of best fit suggest, workers in more concentrated sectors receive higher wage premia on average, but this relationship appears to have weakened. The sector wage premium is calculated as half of the sector log wage fixed effect which we estimate from the CPS-ORG as detailed in Section I.C. Average concentration in the sector is defined as the (sales-weighted) average Top 20 Sales Concentration Ratio across SIC industries within each sector, 5-yearly from 1982 to 2012. The concentration data is calculated by Autor et al (2020) from Census data; we obtain it from their Figure 4 using WebPlotDigitizer (Rohatgi 2019). A similar relationship holds if we use the top 4 firm concentration ratio rather than the top 20 firm concentration ratio.

In regressions of concentration on wage premia at the level of our BEA industries (roughly NAICS 3-digit), we find smaller coefficients on concentration in the later period, but the difference is not statistically significant. (We use data on concentration from Covarrubias, Gutiérrez, and Philippon (2019), calculated from Compustat data for 1982-2016 and from Census data for 1997, 2002, 2007, and 2012.) Running a similar regression for the NBER CES manufacturing industries (NAICS 6-digit level) over 1997-2012 – regressing the level of top 20 sales concentration (import adjusted) on log average compensation per worker – we find that the coefficient also falls, but the change is once again not statistically significant.

Figure C3: Sector-level relationship between concentration and wage premium

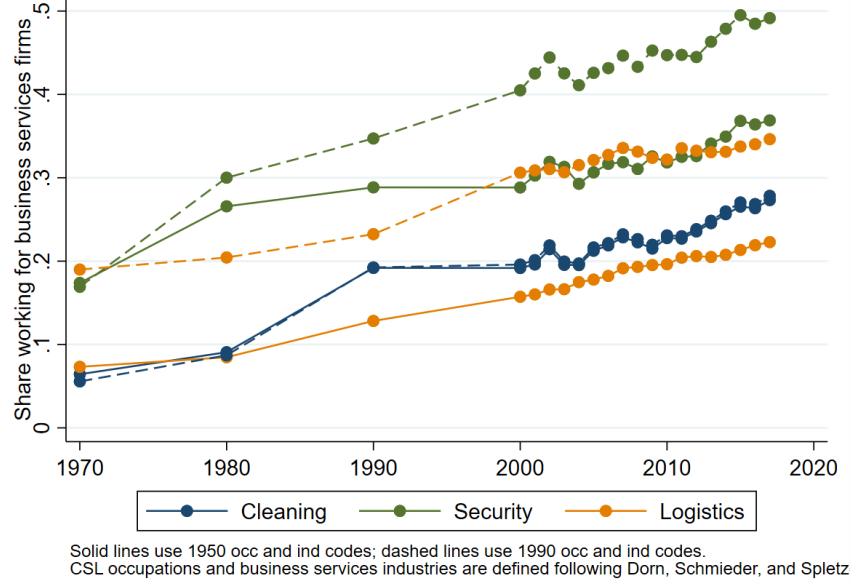


Notes: Each point is the sector average log wage premium relative to Retail Trade, calculated from the CPS-ORG, plotted against the average top 20 sales concentration ratio in the sub-industries of each major sector, calculated from Economic Census data by Autor et al (2019).

C.3. Quantifying the rise in outsourcing of cleaning, security, and logistics work

In Figure C4, we recreate Dorn, Schmieder, and Spletzer's (2018) estimates of the share of workers in cleaning, security, and logistics occupations who were working in the business services sector (indicating having had their work outsourced). Dorn, Schmieder, and Spletzer (2018) identify occupation and industry codes in the Census data which indicate outsourcing to business services, according to both the 1950 and the 1990 occupation and industry codes. Note that the series have different levels as they are calculated using 1950 and 1990 industry and occupation codes, but that the time series trend in both is similar.

Figure C4: Share of workers in cleaning, security, and logistics working for business services firms (*recreation of figure in Dorn, Schmieder, and Spletzer 2018*)



C.4. Allocation of workers to high-rent industries

If labor rents have declined, a natural question is whether workers are no longer working in the industries which produce rents. One way to visualize this is to show the share of workers working in industries with different degrees of profitability. Figure C5 shows the share of workers in industries with different levels of *median* Tobin's Q (as measured by Covarrubias et al 2019 for publicly-listed companies): there is a noticeable rightward shift, as the median Tobin's Q across industries has increased over the period.¹⁰⁰ Figure C6 shows the share of workers in industries with different values of gross operating surplus over fixed assets: this shows a slight downward shift, as gross operating surplus / fixed assets was lower in many industries over 2012-2016 than it was in 1987-1991. Both figures show a marked increase in the dispersion of industry profitability across workers.

One might think that part of the rise in inequality *within* labor as a group has been the result of a change in the distribution of workers across industries with high/low rents. There is suggestive evidence that workers with less education are more likely to work in firms with low rents now than in the past (because of the increased evidence of sorting between high fixed effect workers and high fixed effect firms from AKM models such as Song et al 2019). Does this also

¹⁰⁰ The pattern is very similar for the equal-weighted and value added-weighted Q across firms within each industry.

happen at the industry level? A preliminary analysis suggests it has not happened at the industry level. Figure C7 shows the share of college-educated or non-college educated workers employed in industries at each quartile of the distribution of median industry Q (as calculated from Compustat by Covarrubias et al 2019). Similarly, Figure C8 shows the share of college-educated or non-college educated workers employed in industries at each quartile of the distribution of profitability (gross operating surplus to fixed assets). By these metrics, it does not appear to be the case that there has been a sorting of lower education workers into lower-rent industries.

Figure C5: Allocation of employment by industry median Q, 1980-84 and 2013-17

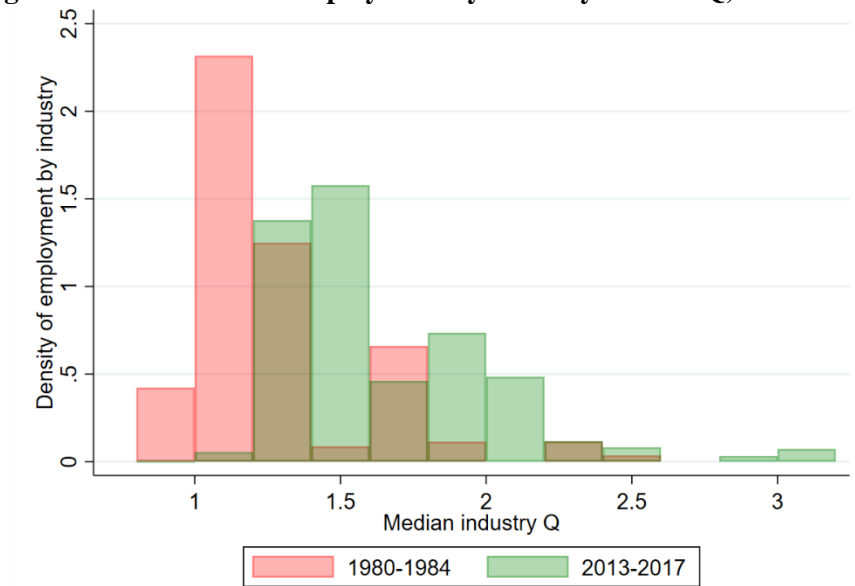


Figure C6: Allocation of employment by industry gross profit rate, 1980-84 and 2013-17



Figure C7: Employment of non-college and college educated workers, by industry median Q, 1980-84 and 2013-17

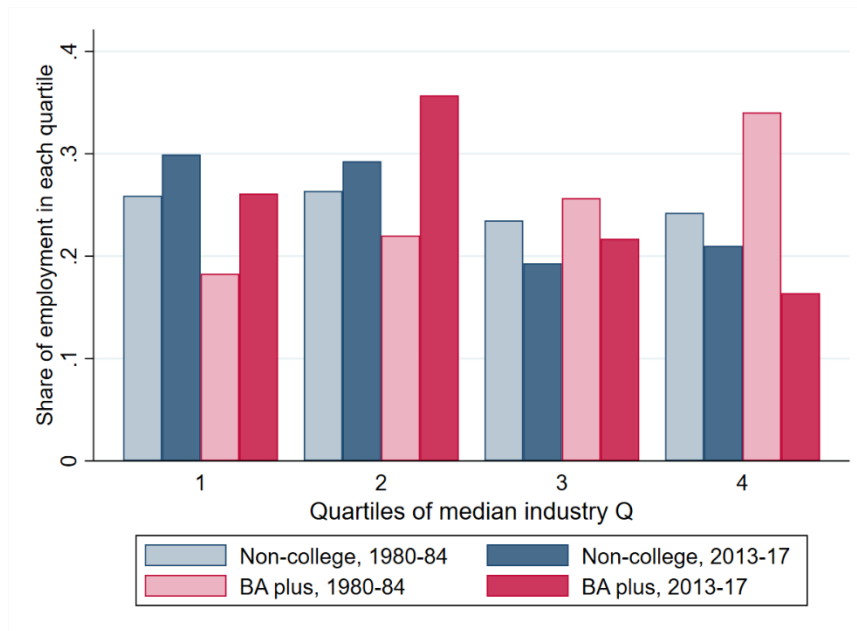
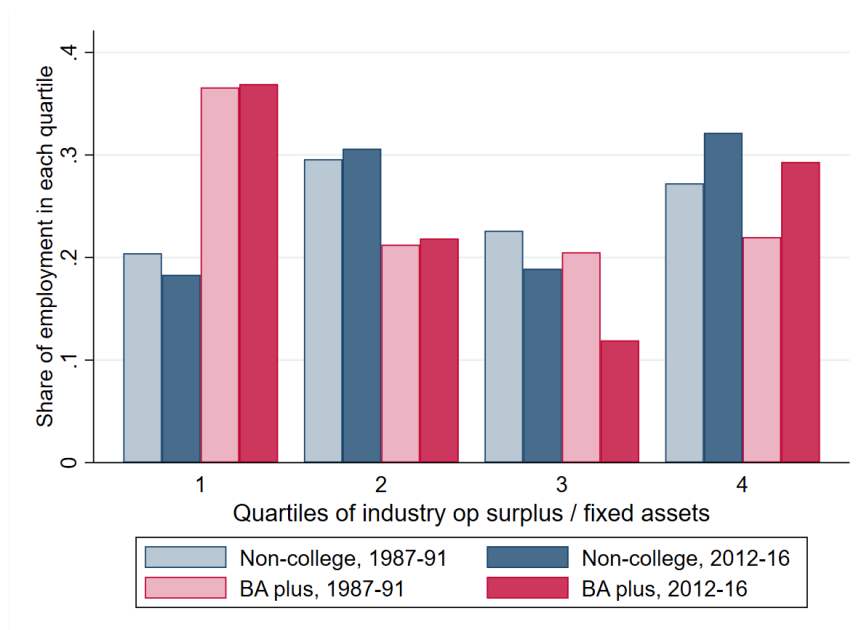


Figure C8: Employment of non-college and college educated workers, by industry gross profitability, 1987-91 and 2012-16



C.5. Labor rents by college/non-college

As we show in Section II.D., the decline in rent-sharing has affected non-college workers more than college workers. While industry rents declined in a relatively similar way for college and non-college workers, non-college workers were disproportionately affected by the fall in unionization and by the fall in large firm wage effects.

Figure C9 shows the private sector union coverage rate for workers with high school or with some college education, vs. workers with a four year college degree or postgraduate education. The decline has been much sharper for workers without college education. Figure C10 shows the estimated private sector union log wage premium for workers with no college vs. four-year college education (estimated from the CPS-ORG using the methodology described in Appendix section A1). Non-college workers have substantially higher union wage premia than college-educated workers, which makes the decline in unionization more costly for them.

Figure C11 shows the private sector firm wage effect, split by college and non-college workers. While the wage effect from medium sized firms (100-499 workers) stayed roughly constant for both groups over the period, the entire fall in the large firm wage premium (500+ workers) was concentrated on non-college workers.

Figure C12 shows that industry wage premia mostly moved in tandem for workers with and without college educations.

Figure C9: Private sector union coverage rates, by education group

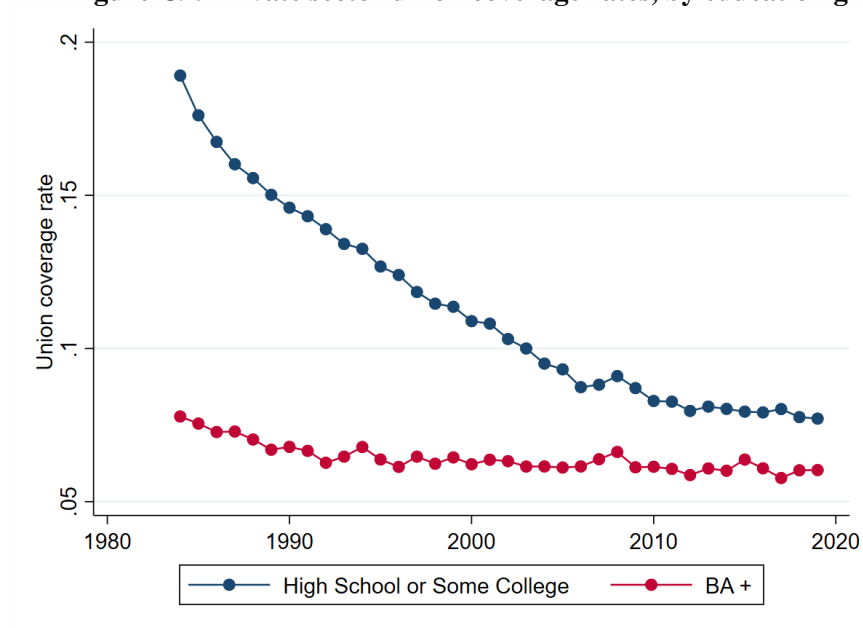


Figure C10: Private sector union log wage premium, by education group

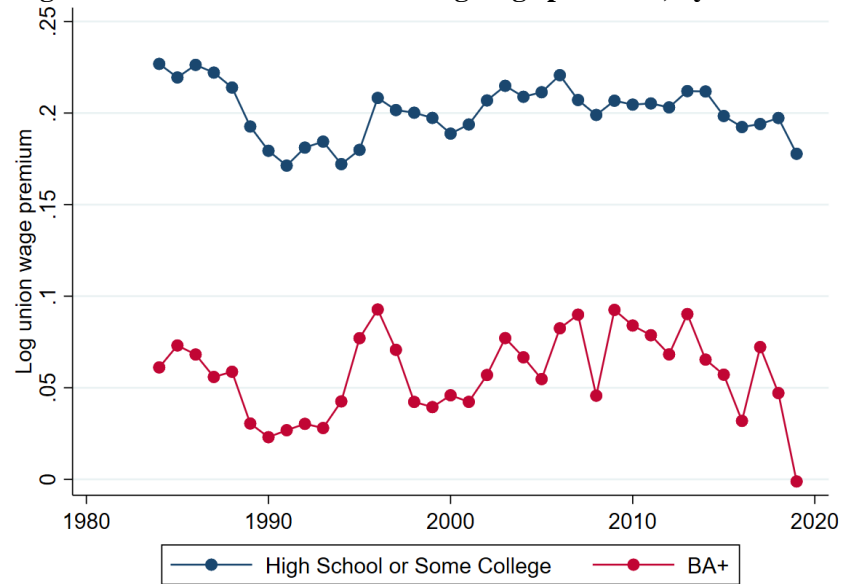


Figure C11: Private sector large firm wage effects, by education group

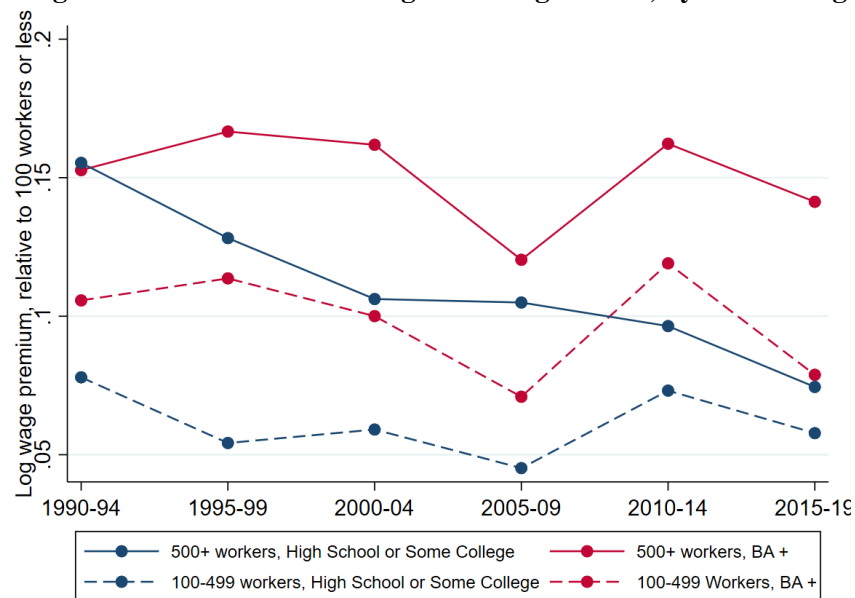
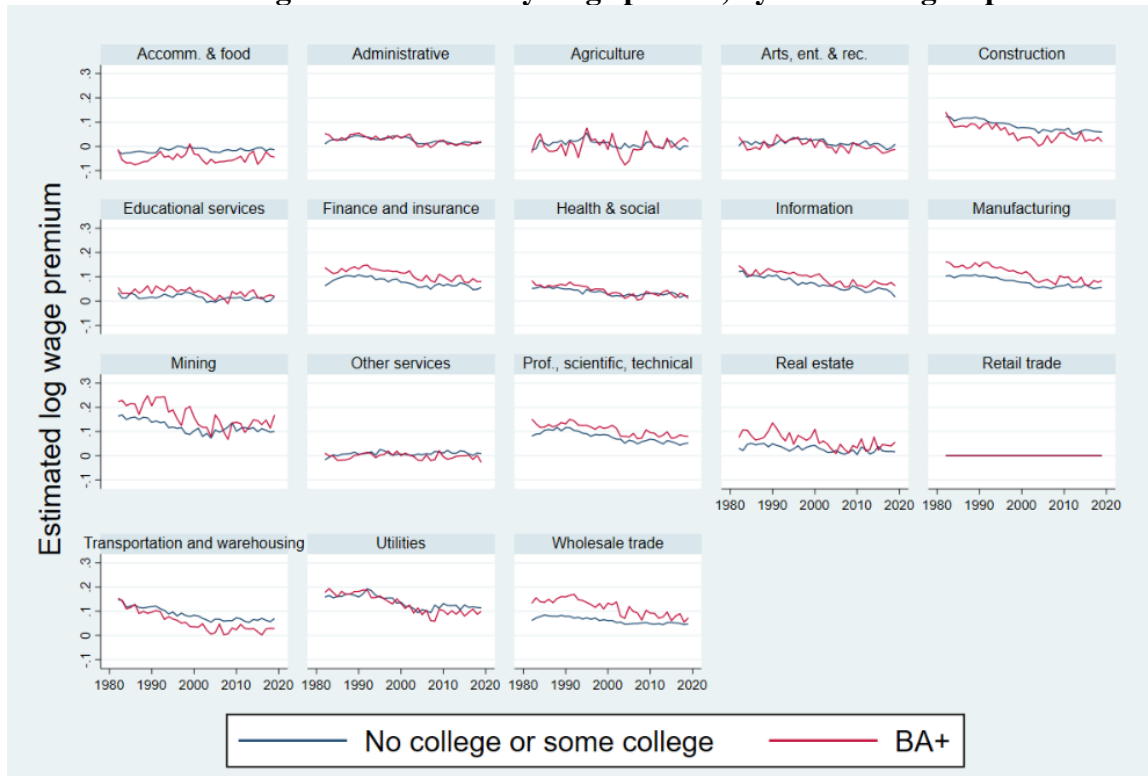


Figure C12: Industry wage premia, by education group



C.6. Decline in labor share, rise in capital share, and decline in investment-profits: gross measures

In the paper, we focus on measures of the labor share, capital share, and investment-profit ratio *net* of depreciation, for the nonfinancial corporate sector. Figures C13, C14, and C15 below replicate Figures 7, 8, and 18 in the paper, but for gross measures (without incorporating the effects of depreciation).

Figure C13: Labor rent share and compensation share of gross value added, nonfinancial corporate

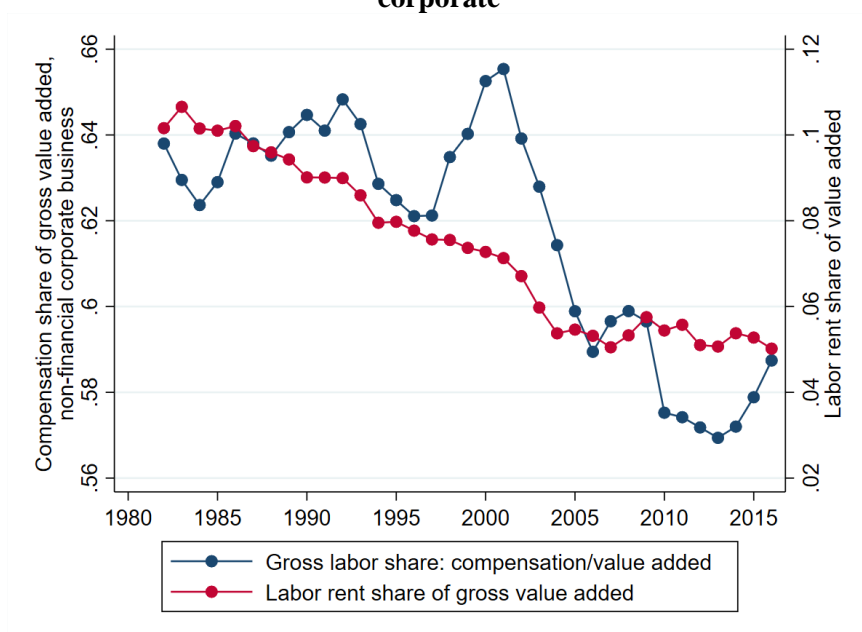


Figure C14: Capital share and “total profit” share of gross VA, nonfinancial corporate

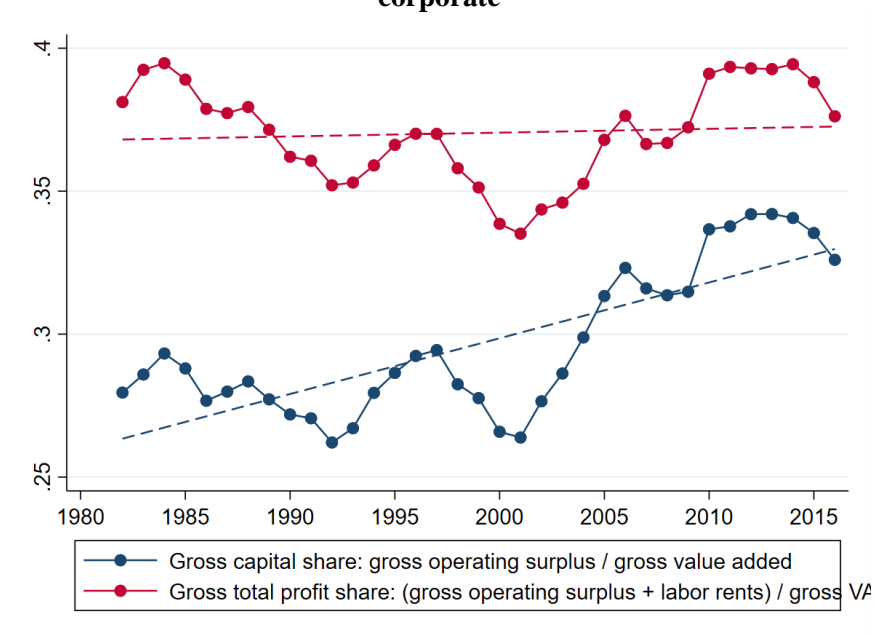
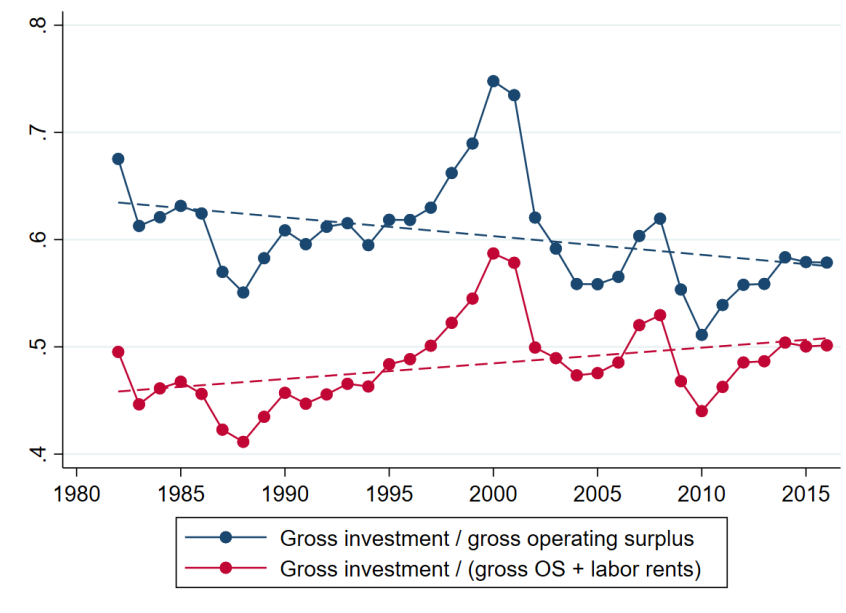


Figure C15: Gross investment to operating surplus, nonfinancial corporate



C.7. Industry-level analysis: unionization

In Table C1, we replicate Table 4 in the main paper, but using as our measure of worker power the industry unionization rate instead of our measure of imputed labor rents. The general pattern of results is similar to that in the main paper using labor rents.

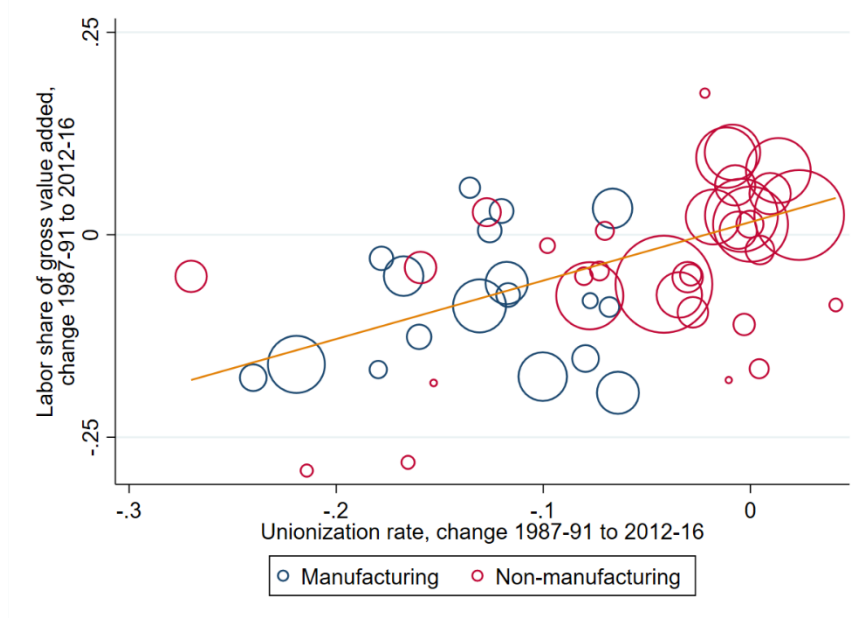
We note in particular that our regressions in Table C1 show a positive, relatively large, and statistically significant relationship between the industry unionization rate and labor share over 1987-2016. This is similar to the findings in Young and Zuleta (2017), albeit with a slightly different industry definition, timeframe, and regression specification.

Elsby, Hobijn, and Sahin (2013) find a positive correlation between the change in the union coverage rate and the change in the payroll share of value added over 1987-2011 across industries. They find that a 1 percentage point decline in the union coverage rate over the period was non-significantly associated with a 0.2 percentage point decline in the labor share, and argue that the point estimate suggests that the decline in unionization can only explain a small amount of the variation in the decline in the labor share. Since they do not emphasize the role of unions, based on their findings, it is worth comparing our results with theirs.

Therefore, we also carry out a very similar regression to Elsby et al (2013), over our slightly longer sample period – regressing the percentage point change in the compensation share

of gross and net value added from 1987-91 to 2012-16 on the percentage point change in the union coverage rate from 1987-91 to 2012-16 at the our BEA industry code level, weighting each observation by the industry's average share of value added over 1987-2016. The point estimates are 0.54 for the gross labor share, and 0.66 for the net labor share, both regressions with a p-value of 0.001 and R-squared of 0.19 – suggesting that nearly 20% of the variation in the industry-level labor share over the period can be explained by changes in unionization alone. This is visualized in Figure C16.

Figure C16: Change in unionization rate and change in labor share, by industry, 1987-2016



Bubble size represents industry share of value added, average over 1987-2016.

Table C1 Industry-level regressions, using unionization instead of imputed labor rents

This table is a replica of Table 4 in the main paper, but using the industry unionization rate instead of imputed labor rents as the measure of worker power at the industry level

Panel A: Regressions of labor shares and investment-profit on unionization and Compustat concentration. N = 1,189 (41 industries, 1987-2016)												
Dependent variable:	Labor share of gross value added				Labor share of net value added				Investment to profit ratio			
Industry unionization rate	0.09 (0.22)	0.03 (0.24)	0.43** (0.10)	0.05 (0.13)	0.24 (0.27)	0.19 (0.29)	0.58** (0.19)	0.27 (0.18)	0.15 (0.31)	0.14 (0.33)	0.31 (0.26)	0.34 (0.61)
Avg top 20 sales concentration, imp-adj (Compustat)	-0.20* (0.08)	-0.19* (0.08)	-0.05 (0.07)	-0.04 (0.07)	-0.13 (0.10)	-0.12 (0.10)	-0.11 (0.12)	-0.09 (0.13)	0.28 (0.21)	0.29 (0.22)	-0.17 (0.22)	-0.16 (0.23)
Fixed effects	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind
Panel B: Regressions of profitability measures on unionization and Compustat concentration. N=1,189 (41 industries, 1987-2016)												
Dependent variable:	Gross profit rate				Aggregate Q				Median Q			
Industry unionization rate	-0.30+ (0.15)	-0.33+ (0.17)	-0.02 (0.14)	-0.12 (0.16)	-1.45** (0.39)	-1.37** (0.41)	-0.93* (0.43)	0.55 (0.65)	-1.14** (0.31)	-1.01** (0.32)	-1.39** (0.42)	-0.02 (0.50)
Avg top 20 sales concentration, imp-adj (Compustat)	-0.07 (0.11)	-0.07 (0.11)	0.03 (0.13)	0.03 (0.13)	0.19 (0.15)	0.17 (0.15)	-0.31 (0.31)	-0.30 (0.31)	0.32* (0.15)	0.30+ (0.15)	0.15 (0.21)	0.16 (0.20)
Fixed effects	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind
Panel C: Regressions of labor shares and investment-profit on unionization and Census concentration. N = 174 (45 ind. for 1997, 2002, '07, '12)												
Dependent variable:	Labor share of gross value added				Labor share of net value added				Investment to profit ratio			
Industry unionization rate	-0.06 (0.25)	-0.10 (0.27)	0.43** (0.13)	0.43** (0.14)	0.05 (0.30)	0.01 (0.32)	0.76** (0.26)	0.90** (0.28)	-0.14 (0.89)	-0.25 (0.98)	1.36 (0.86)	1.58 (1.12)
Avg top 20 sales concentration, imp-adj (Compustat)	-0.46** (0.12)	-0.45** (0.13)	-0.34** (0.11)	-0.37** (0.11)	-0.33* (0.16)	-0.32+ (0.16)	-0.72** (0.16)	-0.80** (0.15)	0.61 (0.62)	0.65 (0.65)	-1.09 (0.68)	-1.16 (0.74)
Fixed effects	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind
Panel D: Regressions of profitability measures on unionization and Census concentration. N = 174 (45 ind. for 1997, 2002, '07, '12)												
Dependent variable:	Gross profit rate				Aggregate Q				Median Q			
Industry unionization rate	-0.70* (0.34)	-0.77* (0.38)	-0.08 (0.21)	-0.45* (0.20)	-0.96+ (0.53)	-1.22* (0.55)	1.08 (0.80)	-0.15 (1.00)	-0.96* (0.38)	-0.93* (0.40)	-0.64+ (0.36)	-0.67 (0.51)
Avg top 20 sales concentration, imp-adj (Compustat)	-0.29 (0.27)	-0.27 (0.27)	0.41 (0.28)	0.55+ (0.28)	-0.27 (0.28)	-0.16 (0.29)	-1.51+ (0.83)	-0.83 (0.72)	0.13 (0.21)	0.14 (0.22)	-0.76 (0.45)	-0.30 (0.40)
Fixed effects	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind	None	Year	Ind	Yr, Ind

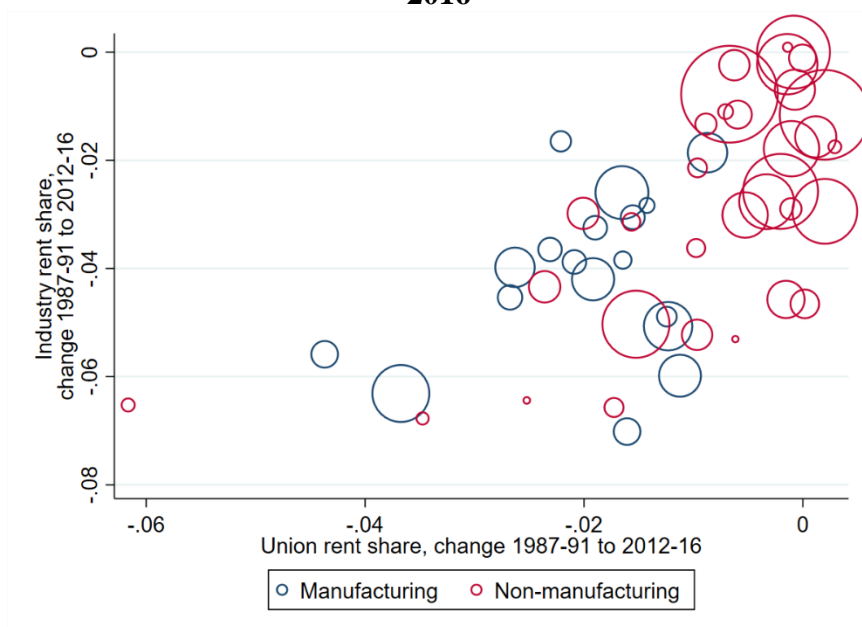
*Robust standard errors, clustered at industry level, in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$. Investment-profits are 98% winsorized.*

C.8. Relationship between industry, union, and firm size rents

We note in Section II that our measure of the union rent share only captures the direct effect of unions on unionized workers' wages, relative to non-unionized workers' wages. It is possible that our estimates of the industry and firm size rent shares pick up the “union threat effect”, by which the possibility of unionization, or norms set by unions, raise wages even at non-unionized firms.

Industry- and firm-level trends in industry, union, and firm size rent shares are consistent with this. Industries which saw bigger declines in their union rent share also saw bigger declines in their industry rent share (Figure C17). At the level of 52 BEA industries, regressing the change in the imputed industry rent share over 1987-91 to 2012-16 on the change in the imputed union rent share over the same period gives a coefficient of 1.01, with a standard error of 0.16 and an R-squared of 43%. This also holds when regressing the industry rent share on the union rent share at an annual frequency, controlling for industry and year fixed effects and with standard errors clustered at the industry level: the coefficient estimate is 0.84, with a standard error of 0.11.

Figure C17: Change in industry rent share and union rent share, by industry, 1987-2016



Bubble size represents industry share of employment, 2012-2016 average. Graph shows 52 industries at the BEA industry code level.

At the state level, we can perform similar analyses. Regressing the change in the imputed industry rent share over 1984-88 to 2012-16 on the change in the imputed union rent share over the same period gives a coefficient of 0.70, with a standard error of 0.23 and an R-squared of 16%. Regressing the change in the imputed firm size rent share over 1984-88 to 2012-16 on the change in the imputed union rent share over the same period gives a coefficient of 0.49, with a standard error of 0.12 and an R-squared of 25%. These results are visualized in Figures C18 and C19. Regressions of the industry and firm size rent share on the union rent share at an annual frequency, controlling for state and year fixed effects and with standard errors clustered at the state level, gives coefficients (standard errors) of 0.37 (0.15) and 0.28 (0.09) respectively.

Figure C18: Change in industry rent share and union rent share, by state, 1987-2016

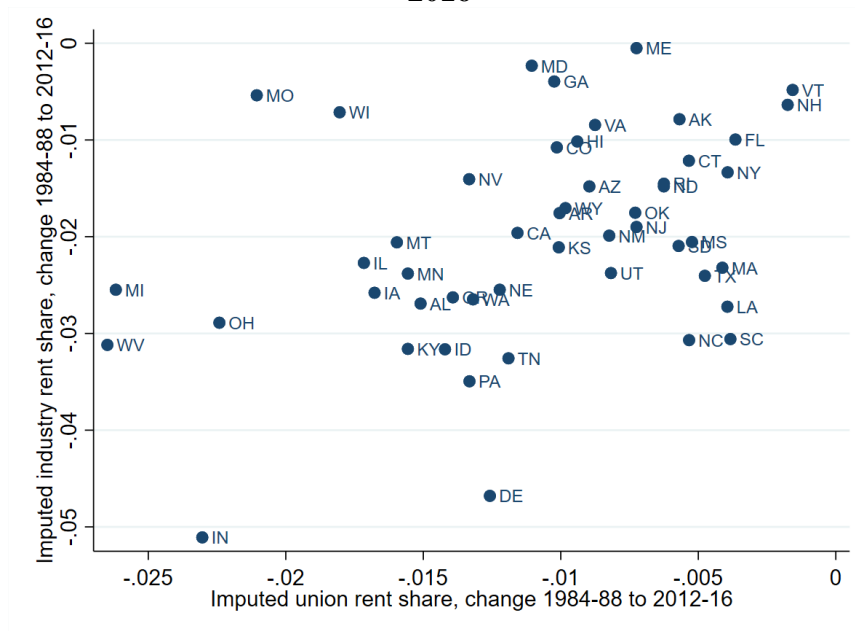
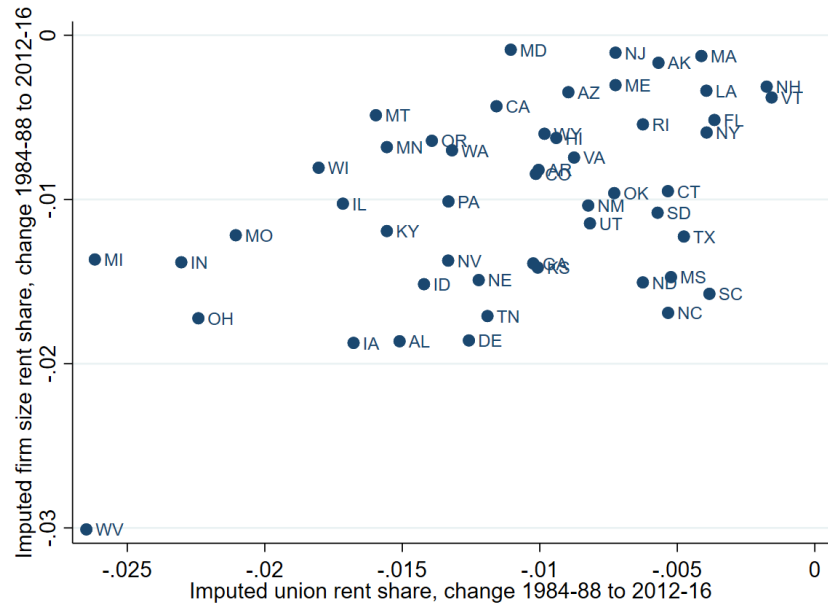


Figure C19: Change in firm size rent share and union rent share, by state, 1987-2016



C.9. Labor rents, unemployment, and labor market tightness

In Section IV we present evidence of a significant negative relationship between labor rents and unemployment at the state and industry level. Following Figura and Ratner (2015), we can also use JOLTS data on vacancy rates over 2000-2019 to test whether industries with bigger falls in our measures of labor power saw bigger increases in labor market tightness (vacancies/unemployment). The JOLTS database only reports data on relatively aggregated industries – 15 in total. As shown in Figures C20 and C21, the industries with the biggest falls in unionization rates over 2000/01-2018/19, or biggest falls in labor rent shares over 2000/01-2015/16, also saw the biggest increases in labor market tightness. (Note that 2000/01 and 2018/19 are particularly appropriate years to compare because aggregate V/U and unemployment was very similar in the two periods). In annual regressions of labor market tightness on measures of worker power over 2000-2016, with industry fixed effects, we similarly find that lower unionization rates or labor rent shares are significantly associated with higher vacancy-unemployment ratios. The coefficients suggest that the average fall in unionization was associated with a 10pp higher VU ratio, and the average fall in imputed labor rent share was associated with a 15.7pp higher VU ratio.

We also show in Figure C22 that industries with bigger falls in their unionization rate tended to see bigger falls in their unemployment rate over 1984-2019. (Analogous to Figure 15

in the main paper, which shows that industries with bigger falls in their imputed labor rent share tended to see bigger falls in their unemployment rate over 1988-2016).

Figure C20: Change in labor market tightness and the unionization rate, 2000-2019, by industry

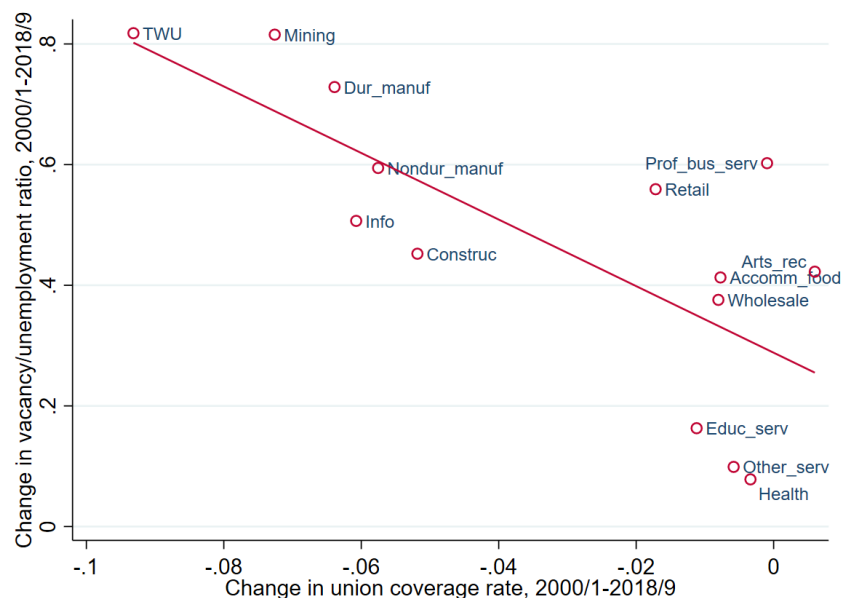
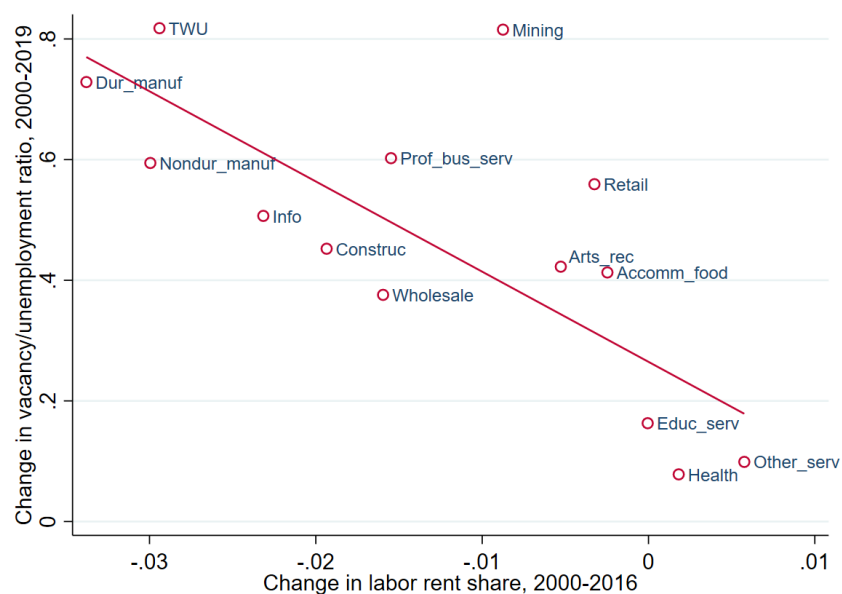
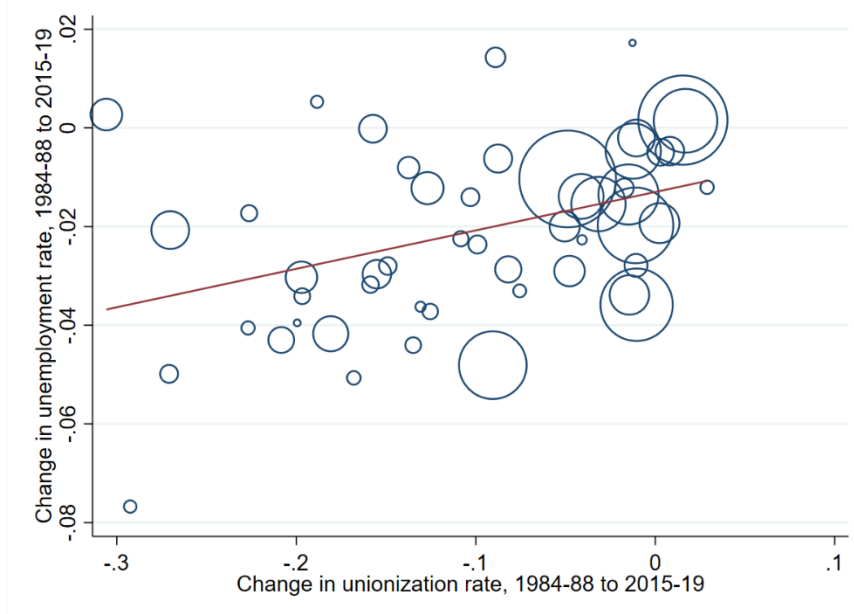


Figure C21: Change in labor market tightness and imputed labor rent share, by industry



Notes to Figs C20-C21: Each dot is an industry (at the level of 15 JOLTS industry categories). Note that the observations for 2000-2001 are averages of monthly data from December 2000-December 2001 inclusive, as the JOLTS data only starts in December 2000. The observations for 2018-2019 are averages of monthly data from January 2018 to October 2019 inclusive. Red line is an employment-weighted line of best fit.

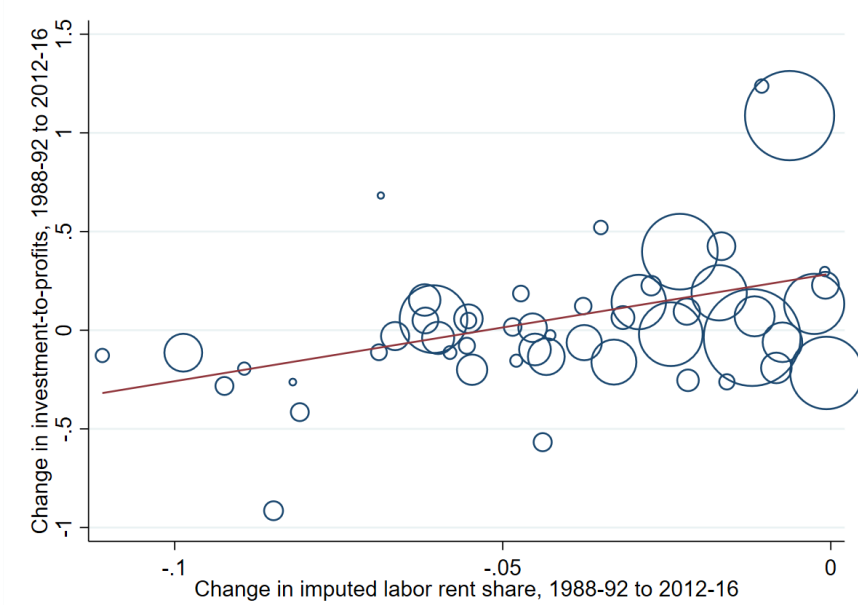
Figure C22: Change in unemployment and the unionization rate, by industry



C.10. Investment to profits and labor rents

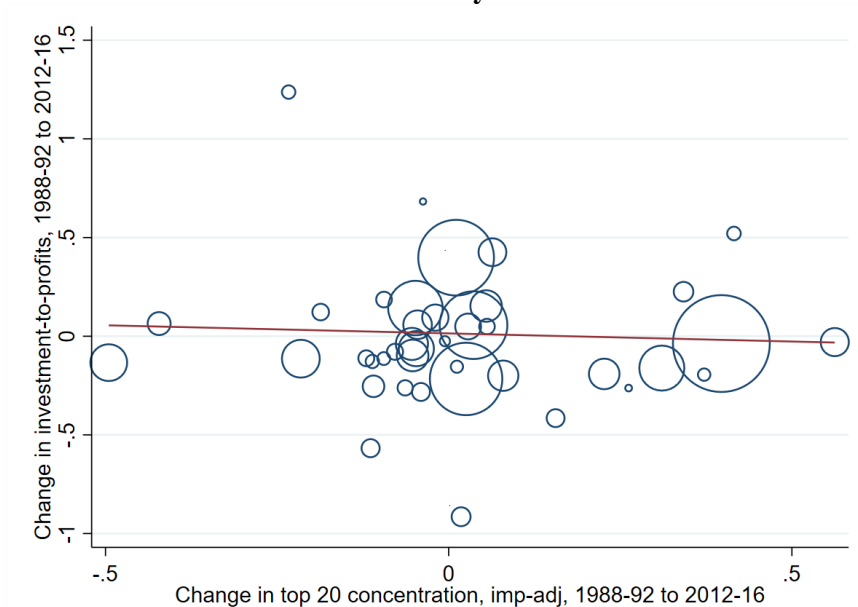
In section V we show that at the aggregate level, the decline in labor rents can explain the apparent decline in the ratio of investment to operating surplus in the nonfinancial corporate sector, and show that the ratio of investment to *total profits* – operating surplus, plus labor rents – has hardly declined at all. In Figure C23, we show that at the industry level, industries with larger declines in their labor rent share also saw larger relative falls in their investment-to-operating surplus ratio over 1988-2016. On the other hand, there is no relationship between top 20 import-adjusted sales concentration and the investment-to-profit ratio (Figure C24).

Figure C23: Change in investment-profits and imputed labor rent share, by industry



Notes: Each bubble is an industry (at the BEA industry code level), where the size of the bubble represents industry average employment over 2012-2016. The red line is an employment-weighted line of best fit.

Figure C24: Change in investment-profits and top 20 sales concentration (imp-adj), by industry



Notes: Each bubble is an industry (at the BEA industry code level), where the size of the bubble represents industry average employment over 2012-2016. The red line is an employment-weighted line of best fit.

C.11. Can the decline of labor rents account for the rise in the income share of the top 1%?

We calculate that labor rents as a % of gross value added in the nonfinancial corporate sector were 10.1% in 1982 and 5.0% in 2016. Nonfinancial corporate sector gross value added was a little less than 2/3 of national income over this period (65% in 1982, 58% in 2016, according to the BEA NIPA), which implies that labor rents declined by 3.7% of national income over 1982 to 2016.

Different authors come to quite different estimates for the magnitude of the increase in the income share of the top 1% over the last forty years, and the estimates are quite dependent on a number of methodological choices. Rather than take a stance on these choices, we use two of the most prominent recent estimates: Auten and Splinter (2019) estimate that the top 1% pre-tax income share rose by 4.9 percentage points over 1979 to 2014, while Piketty, Saez, and Zucman (2018) estimate that it rose by 9 percentage points.¹⁰¹

We perform two exercises with these data.

1. We assume that all labor rents that we measure accrued to the bottom 99% in the past, and were redistributed to the top 1% (whether as capital or labor income). In this case, our measure of the decline in labor rents could account for 3.7 of the 4.9 to 9 percentage points increase in the income share of the top 1%, so from 41% to 76% of the increase.

2. We assume that labor rents were redistributed as capital income across the entire income distribution (rather than just to the top 1%), in proportion to the distribution of capital income arising from firm ownership in 2016 (as estimated by Piketty, Saez, and Zucman 2018). Since the top 1% received 59% of total capital income in 2016, this would imply an increase in labor rents to the top 1% of income earners of $3.7 \times 0.59 = 2.2\%$ of national income, accounting for 24%-45% of the increase in the income share of the top 1% over recent decades.

Note that we are inclined to think our measure of the decline of labor rents in the nonfinancial corporate sector may be an *underestimate* of the decline of labor rents as a share of national income, since (a) labor rents may also have fallen in finance and in the non-corporate business sector, (b) union premia for non-wage compensation are greater than that for wages, but

¹⁰¹ Auten and Splinter (2019) note that, since top income shares are very cyclical, one should compare similar points in the business cycle when looking at long changes in top income shares. They therefore suggest comparing 1979 and 2014.

we applied the union wage premium to non-wage compensation, and (c) the evidence appears to suggest that the union threat effect has positive spillover effects on other non-union wages, and our estimates may not capture all of this. This would suggest that our calculations above may be underestimates of the degree to which the decline in labor rents could account for the rise in the top 1% income share.

Appendix D: Further details on modified Farhi/Gourio accounting decomposition

D.1. Detailed writeup of modified Farhi/Gourio accounting decomposition

This section contains a more detailed writeup of our modified accounting decomposition based on Farhi and Gourio (2018). We are grateful that Farhi and Gourio provided their replication data and code online, such that it was easy to carry out our modified version of their decomposition.

Farhi and Gourio (2018) document six stylized macro-finance facts over recent decades:

1. Falling real risk-free interest rates
2. Rising profitability of private capital
3. Increasing valuation ratios
4. Slight fall in investment/output and investment/capital ratios
5. Slowing TFP and investment-specific productivity growth, and falling employment-population ratio
6. Falling labor share

They then decompose the degree to which these can be explained by five different factors: rising market power, rising unmeasured intangibles, rising risk premia, increased savings supply, and a slowdown of technological progress. Their model is an otherwise standard neoclassical growth model which incorporates macroeconomic risk, monopolistic competition, and the potential for mismeasurement of intangible capital. Their framework, however, does not take into account the possibility that workers may share in some of the rents generated by product market power, and that the degree of rent-sharing may have changed over time.

We incorporate a simple version of rent-sharing into the baseline Farhi/Gourio accounting framework (which does not include intangible capital). Farhi and Gourio find that rising market power plays a role in explaining the macro-finance facts of recent decades, but they

implicitly hold the degree of worker rent-sharing constant in their analysis (at zero). We do the opposite: we hold the degree of firm output market power constant in our analysis (setting the average markup at 1.15, the level that Farhi/Gourio estimate for the 2001-2016 period), and allow the degree of worker rent-sharing to vary.

We incorporate rent-sharing between labor and capital in the simplest way possible: the monopolistic firm still maximizes profits as before, hiring labor and capital in a competitive market. It then shares the rents or ‘pure profits’ between capital and labor, with share π_L going to labor. A decline in rent-sharing is modeled by a decline in π_L . This reduced-form approach can be micro-founded with an efficient bargain type model (Solow and MacDonald 1981) where workers, seeking to maximize total pay to labor, and shareholders, seeking to maximize their profits, jointly bargain over the firm's production decisions. Alternatively, the firm could be considered to be jointly managed in the (weighted average) interests of workers and shareholders.

Firm production decisions are the same in our framework as they would be in the Farhi/Gourio model without rent-sharing. This means that only a few equations change relative to the Farhi/Gourio model. We show these below:

Equation (20), the labor share:

$$s_L = \frac{w_t N_t}{Y_t} + \frac{\pi_L (Y_t - w_t N_t - R_t K_t)}{Y_t} = \frac{1 - \alpha + \pi_L (\mu - 1)}{\mu}$$

Equation (21), the measured capital share:

$$s_K = 1 - s_L = \frac{\alpha + (1 - \pi_L)(\mu - 1)}{\mu}$$

The measured capital share can be decomposed into the share representing monopoly rents, s_Π , and the ‘true’ capital share corresponding to remuneration for capital ownership, s_C :

$$s_\Pi = \frac{(1 - \pi_L)(\mu - 1)}{\mu}$$

$$s_C = \frac{\alpha}{\mu}$$

Equation (24), Tobin's Q:

$$Tobin's Q = \frac{P_t}{K_t/Q_t} = (1 + g_T) \left(1 + (1 - \pi_L) \frac{\mu - 1}{\alpha} \frac{r^* + \delta + g_Q}{r^* - g_T} \right)$$

Equation (26), the marginal product of capital:

$$MPK_t = \frac{\Pi_t}{K_t/Q_t} = \left(\frac{(1 - \pi_L)(\mu - 1) + \alpha}{\alpha} \right) (r^* + \delta + g_Q)$$

Equation (27), the spread between the marginal product of capital and the risk-free rate:

$$MPK - r_f = \delta + g_Q + \frac{(1 - \pi_L)(\mu - 1)}{\alpha} (r^* + \delta + g_Q) + r^* - r_f$$

The implications of our modifications for the comparative statics are shown in Table D1. As can be seen, there are only two differences in *sign* for key measurable moments of the data: lower-rent sharing is not predicted to affect the investment-output or capital-output ratios, whereas higher markups cause them to fall. In the US data, the investment-output ratio has fallen only very slightly and the share of non-residential investment in GDP has not fallen at all over 1984 to 2016. Meanwhile, the capital-output ratio has risen slightly (see Farhi and Gourio Table 1).

Table D1: Different predictions of FG vs. SS

	Higher Markups μ	Lower rent-sharing π_L
Labor share	↓	↓
‘True’ capital share	↓	no change
Pure profit share	↑	↑
Investment-output ratio	↓	no change
Capital-output ratio	↓	no change
Spread between ret. on K and RF rate	↑	↑
Tobin’s Q	↑	↑

Farhi and Gourio estimate nine key parameters in their model, targeting nine key moments, for the periods 1984-2000 and 2001-2016. We denote their baseline accounting decomposition “FG”.

The parameters they estimate are:

1. β , the discount factor
2. p , the probability of an economic crisis or “disaster”
3. δ , the depreciation rate of capital
4. α , the Cobb-Douglas parameter

5. g_P , the growth rate of the population
6. g_Z , the growth rate of TFP
7. g_Q , the growth rate of investment-specific productivity
8. \bar{N} , the labor supply parameter
9. μ , the markup

These parameters are estimated targeting nine moments:

1. Gross profitability $\frac{\pi}{K}$
2. Gross share of income going to capital $\frac{\pi}{Y}$
3. Investment-capital ratio $\frac{I}{K}$
4. Risk-free rate RF
5. Price dividend ratio PD
6. Growth rate of population
7. Growth rate of TFP
8. Growth rate of investment prices
9. Employment-population ratio

We replicate the baseline Farhi/Gourio (“FG”) decomposition. We then modify the Farhi/Gourio approach to allow for changing rent-sharing between capital and labor, *instead* of changing total rents (monopoly power). To do this, we hold the markup constant at 1.15, which is the level of the markup that Farhi/Gourio estimate for the second period in their study (2001-2016). We instead allow the parameter governing rent-sharing with labor to change (π_L), and estimate this alongside the other 8 Farhi/Gourio parameters, targeting the same empirical moments. We denote this approach as “SS” going forward.

Identification in our modified accounting decomposition is nearly identical to that in Farhi/Gourio. As with theirs, the identification is nearly recursive. Some parameters are obtained directly, as their counterparts are assumed to be observed: population growth g_N , investment price growth (the inverse of g_Q), and the employment-population ratio \bar{N} . The growth rate g_Z is chosen to roughly match measured TFP (but also depends on α , the estimated Cobb-Douglas parameter). The depreciation rate δ is chosen to match $\frac{I}{K}$ using the balanced growth relation (eq. 18 in F/G), and the Gordon growth formula is used to infer the expected return on risky assets r^* .

Our approach differs from Farhi/Gourio *only* when we identify the parameters α and π_L , using our modified versions of equations (20) and (27) above. The labor share s_L and the marginal product of capital (approximated by average profitability of capital $\frac{\Pi}{K}$) are the observables, and we set the markup $\mu = 1.15$. Since we have estimates for r^*, δ, g_Q , we can identify α and π_L from this pair of equations.

Identification then continues as in Farhi/Gourio, using data on the risk-free rate to infer the equity premium, and separately inferring discount factor β , risk aversion θ , and quantity of risk ξ (making assumptions about these variables and the intertemporal elasticity of substitution exactly as in the paper). Note that these choices do not affect inferences about α or π_L .

Table D2 compares the parameter estimates in the Farhi/Gourio baseline model (“FG”) compared to our model (“SS”). (*Table 2 in the main paper is a truncated version of this table. In Table 2, we only show the parameters which were estimated to have changed*). Note that the majority of estimated parameters are identical or very similar across the two specifications, reflecting the recursive identification procedure described above. The only differences are in the rent-sharing parameter and markup parameter (by construction), and in the Cobb-Douglas parameter α and TFP growth parameter g_Z .

In the Farhi/Gourio model, the markup is estimated to rise from 1.08 in the period 1984-2000 to 1.15 in the period 2001-2016 (implicitly holding rent-sharing constant at zero in both periods). In our model, holding the markup constant at 1.15 in both periods, rent-sharing with labor is estimated to fall from 0.44 in the period 1984-2000 to 0.02 in the period 2001-2016. In contrast to the Farhi/Gourio model, our model also features a small decline in the Cobb-Douglas parameter α , suggesting a small amount of labor-biased technical change (FG estimates no change in α). Our model estimates a smaller decline in the rate of TFP growth than the FG model. Common to both models are an increase in the discount factor, reflecting higher savings supply; an increase in macroeconomic risk (disaster probability); and an increase in the rate of depreciation. Note that these factors are identical in both exercises by construction of our modification exercise.

Table D2: Estimated parameters and changes between samples

Parameter	Symbol	Model	First Sample (1984-2000)	Second Sample (2001-2016)	Difference
Discount factor	β	FG	0.961	0.972	0.012
		SS	0.961	0.972	0.012
Disaster probability	p	FG	0.034	0.065	0.031
		SS	0.034	0.065	0.031
Depreciation	δ	FG	2.778	3.243	0.465
		SS	2.778	3.243	0.465
Cobb-Douglas	α	FG	0.244	0.243	-0.000
		SS	0.260	0.244	-0.016
Population growth	g_P	FG	1.171	1.101	-0.069
		SS	1.171	1.101	-0.069
TFP growth	g_Z	FG	1.298	1.012	-0.286
		SS	1.233	1.010	-0.223
Investment in technical growth	g_Q	FG	1.769	1.127	-0.643
		SS	1.769	1.127	-0.643
Labor supply	\bar{N}	FG	62.344	60.838	-1.507
		SS	62.344	60.838	-1.507
Rent-sharing with labor	π_L	FG	—	—	—
		SS	0.441	0.022	-0.419
Markup	μ	FG	1.079	1.146	0.067
		SS	—	—	—

In Table D3 we show the estimated contribution of each parameter to changes in the model-implied moments, replicating Table 4 of Farhi/Gourio. For these decompositions we use the method that Farhi and Gourio use to estimate the contributions of each parameter to each change in the key moments. As Farhi/Gourio note: “because our model is non-linear, this is not a completely straightforward task; in particular, when changing a parameter from a first subsample value to a second subsample value, the question is at which value to evaluate the other parameters (for example, the first or second subsample value). If the model were linear, or the changes in parameters were small, this would not matter; but such is not the case here, in particular for the price-dividend ratio”. They therefore report the *average contribution* over all possible orders of changing parameters, as we move from the first to the second subsamples.

In both the “FG” and the “SS” case, the decline in the risk free rate is primarily explained by a rise in savings supply (decline in discount factor β) and an increase in disaster risk p . This increase in savings supply should, all else equal, decrease average profitability of capital $\frac{\pi}{K}$ by 2

percentage points. In reality, the average profitability of capital has risen a little. The baseline Farhi/Gourio model reconciles the rise in savings supply and small rise in average profitability of capital with a combination of higher macroeconomic risk and higher markups. In the “SS” case, instead, the two are reconciled with higher macro risk and lower rent-sharing with labor.

In the “FG” case, the change in markups accounts for the bulk of the increase in price-earnings ratios and in Tobin's Q over the period. In the “SS” case, this is instead achieved by the fall in rent-sharing with labor. The “SS” model accounts for the rise in the Price-Dividend ratio slightly differently as compared to the “FG” model, with a slightly larger role for the decline in the Cobb-Douglas parameter α and a slightly smaller role for the decline in TFP growth g_Z .

The increase in the share of income going to capital (the “measured capital share”) and its counterpart, the decline in the labor share, is entirely explained by higher markups in the “FG” case: higher markups create a wedge between the marginal product and the return for both labor and capital, pushing down the labor share and “pure” capital share, but increasing the “pure” profit share. In the “SS” case, the increase in the measured capital share/decline in the labor share is primarily explained by lower rent-sharing with labor; at the same time, the decline in the Cobb-Douglas parameter α acts to increase the labor share and reduce the capital share, partly offsetting the decline in the labor share that would have occurred from the estimated decline in rent-sharing alone.

Finally, in the “FG” case the capital-output ratio, investment-output ratio, and growth rates of output and investment are lower than they otherwise would have been if markups had not risen. In contrast in the “SS” case, the degree of rent-sharing between capital and labor in our model does not affect firms' production or investment decisions.

D.2. Plausibility of estimated rent-sharing parameter in Farhi/Gourio accounting decomposition

Our estimation suggests that the rent-sharing parameter was 0.44 in the 1980s-1990s. How plausible is this? To compare this to estimates from the literature, we need to translate it into the rent-sharing elasticities estimated in the empirical literature.

Following Card et al (2018), note that under certain assumptions the elasticity of wages with respect to an increase in total rents (pure profits), ξ_R , is equivalent to the share of labor rents in wages. Then, the elasticity of wages with respect to *value added* is $\xi_{VA} = \xi_R \cdot \frac{VA}{Rents}$.

In our accounting decomposition, the equilibrium share of rents in wages in the first period (1984-2000) is 0.09, implying an elasticity of wages with respect to rents of $\xi_R = 0.09$ and an elasticity of wages with respect to value added of $\xi_{VA} = 0.44$. These estimates are not implausibly high compared to the (few) well-identified empirical estimates of rent-sharing elasticities in the US (many of which are summarized in Card et al (2018)).

Blanchflower, Oswald, and Sanfey (1996), for example, found an elasticity of 0.01-0.06 for the transmission of industry-level profits per worker into wages in U.S. manufacturing industries. Estevao and Tevlin (2003) also studied U.S. manufacturing industries, instrumenting for shocks to industry demand using increases in output of large downstream sectors: they found a rent-sharing elasticity of 0.29 for value added per worker and 0.14 for profits per worker (as reported in Card et al (2018)). Barth, Bryson, Davis, and Freeman (2016) use the Longitudinal Business Database, instrumenting for demand shocks using output of the same industry in other regions, and find an elasticity of wages with respect to sales per worker of 0.16. Kline, Petkova, Williams, and Zidar (2019) use the granting of patents to firms as an instrument for a profit/rent shock, and estimate an average rent-sharing parameter of 0.3. Lamadon, Mogstad, and Setzler (2019) find that a 10% increase in firm value added results in 1.4% higher wages.

Table D3: Contributions of estimated parameters to model moments

	Model	Model-implied moments			Contributions of each parameter									
		1984-2000	2001-2016	Difference	β	p	δ	α	g_P	g_Z	g_Q	\bar{N}	π_L	μ
MPK-RF spread	FG	11.22	15.24	4.02	-0.66	2.39	0.68	0.00	0.00	-0.10	-1.05	0.00		2.76
	SS	11.22	15.24	4.02	-0.66	2.39	0.68	0.26	-0.00	-0.08	-1.05	0.00	2.48	
...of which, depreciation	FG	4.55	4.37	-0.18	0.00	0.00	0.47	0.00	0.00	0.00	-0.64	0.00		0.00
	SS	4.55	4.37	-0.18	0.00	0.00	0.47	0.00	0.00	0.00	-0.64	0.00	0.00	
...of which, market power	FG	3.39	5.55	2.17	-0.59	0.24	0.21	0.00	-0.00	-0.09	-0.35	0.00		2.73
	SS	6.05	5.68	-0.37	-0.76	0.31	0.28	0.34	-0.00	-0.09	-0.45	0.00	0.00	
...of which, risk premium	FG	3.15	5.23	2.08	-0.05	2.14	0.00	-0.00	-0.00	-0.01	-0.00	0.00		0.00
	SS	3.15	5.23	2.08	-0.05	2.14	0.00	-0.00	-0.00	-0.01	-0.00	0.00	0.00	
Equity return	FG	5.85	4.90	-0.96	-1.22	0.56	0.00	-0.00	-0.00	-0.19	-0.10	0.00		0.00
	SS	5.85	4.90	-0.96	-1.22	0.56	0.00	-0.04	-0.00	-0.15	-0.11	0.00	0.00	
Equity premium	FG	3.07	5.25	2.18	0.00	2.18	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	SS	3.07	5.25	2.18	0.00	2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Risk-free rate	FG	2.79	-0.35	-3.14	-1.22	-1.62	0.00	-0.00	-0.00	-0.19	-0.10	0.00		0.00
	SS	2.79	-0.35	-3.14	-1.22	-1.62	0.00	-0.04	-0.00	-0.15	-0.11	0.00	0.00	
Price-dividend ratio	FG	42.34	50.11	7.78	30.67	-13.19	0.00	-0.02	-1.86	-5.07	-2.76	0.00		0.00
	SS	42.34	50.11	7.78	30.56	-13.13	0.00	-0.96	-1.85	-3.97	-2.87	0.00	0.00	
Price-earnings ratio	FG	17.85	25.79	7.94	10.16	-4.57	-0.35	0.00	-0.59	-1.47	-0.34	0.00		5.08
	SS	17.85	25.79	7.94	10.11	-4.54	-0.35	0.23	-0.58	-1.15	-0.37	0.00	4.58	
Tobin's Q	FG	2.50	3.84	1.34	1.05	-0.48	0.11	0.00	-0.08	-0.28	-0.31	0.00		1.34
	SS	2.50	3.84	1.34	1.03	-0.47	0.11	0.09	-0.08	-0.22	-0.32	0.00	1.20	
Labor share	FG	70.11	66.01	-4.10	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00		-4.13
	SS	70.11	66.01	-4.10	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.00	-5.46	
'Pure' capital share	FG	22.59	21.24	-1.35	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00		-1.33
	SS	22.59	21.24	-1.35	0.00	0.00	0.00	-1.35	0.00	0.00	0.00	0.00	0.00	
'Pure' profit share	FG	7.30	12.76	5.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		5.46
	SS	7.30	12.76	5.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.46	
K/Y	FG	2.13	2.28	0.15	0.29	-0.12	-0.11	-0.00	-0.00	0.04	0.18	-0.00		-0.13
	SS	2.13	2.28	0.15	0.29	-0.12	-0.11	-0.13	0.00	0.04	0.18	-0.00	0.00	
I/Y	FG	17.28	16.50	-0.78	2.20	-0.90	0.23	-0.02	-0.16	-0.52	-0.59	-0.00		-1.03
	SS	17.28	16.50	-0.78	2.20	-0.90	0.23	-1.15	-0.16	-0.41	-0.61	-0.00	0.00	
Detrended Y (% change)	FG	—	—	-0.30	4.18	-1.70	-1.52	-0.07	-0.00	0.65	2.56	-2.45		-1.95
	SS	—	—	-2.36	4.38	-1.78	-1.59	-4.16	0.00	0.54	2.69	-2.45	0.00	
Detrended I (% change)	FG	—	—	-4.95	17.18	-6.98	-0.12	-0.20	-0.94	-2.45	-0.96	-2.45		-8.02
	SS	—	—	-7.01	17.38	-7.05	-0.19	-10.93	-0.94	-1.91	-0.91	-2.45	0.00	

Appendix E: Quantitative implications of the decline in worker power for the NAIRU

In Section IV of the paper, we argue that the decline in worker power should have been expected to reduce the NAIRU. Here, we use a number of simple exercises to illustrate the possible magnitude of the decline in the NAIRU induced by the decline in worker power.

First, we use the model in Summers (1988) which argues that the equilibrium rate of unemployment is a function of the degree of worker rent-sharing power (indexed by the share of workers with power β and the wage premium they receive μ), the level of the value of unemployment relative to the value of work b , and the efficiency wage parameter α (the elasticity of worker productivity to the relative wage):

$$u = \frac{\alpha + \mu\beta}{(1 - b)(1 + \mu\beta)}$$

Summers sets $\alpha = 0.06$ and $b=0$. Using these, and plugging in the changes in the unionization rate (for β) and union wage premium (for μ) over 1982 to 2019, would predict a 3.5 percentage point decline in the equilibrium unemployment rate. Using the larger changes in the degree of rent-sharing that we estimate in prior sections – rather than just the decline in unionization – or using larger values for b , the value of unemployment, or smaller values for α , the efficiency wage parameter, would predict even larger declines in equilibrium unemployment.

A second exercise uses the model in Johnson and Layard (1986). They lay out a model of wait unemployment, where the availability of high wage union jobs incentivizes workers to search for union jobs rather than accept a lower-paid job in the competitive sector. In their simple model, the NAIRU is determined as follows:

$$U = \frac{1}{\frac{\delta(1 - \rho)}{QmP} + 1}$$

where P is the unionization rate, m is the union wage premium (markup over the competitive wage), Q is the rate at which unionized workers leave their jobs, δ is the discount rate, and ρ is the replacement rate of unemployment benefits (the ratio of the value of being unemployed relative to the competitive wage). Plugging the decline in the unionization rate and union wage premium from 1982 to 2019 into this simple equation, alongside a replacement rate of benefits of

0.5, discount rates of between 3 and 8 percent, and a separation rate of unionized workers of between 2 and 4 percent, would yield a fall in the NAIRU of 0.9-2.2 percentage points. Once again, using the full estimated reduction in labor rents would increase this estimate, whereas a higher replacement rate of benefits would reduce the fall in the NAIRU.

Finally, Akerlof, Dickens, and Perry (1996) specify a Phillips curve equation where inflation π is a product of the expected inflation rate π^E , unemployment u , the worker rent-sharing parameter a (in a simple bargaining-over-surplus model), firms' product market markup $\frac{\beta-1}{\beta}$, and a function of the degree of downward nominal wage rigidity S :

$$\pi_t = \pi_t^E + c - au_t + \frac{\beta}{\beta-1} S_t$$

In the absence of downward nominal wage rigidity, this suggests that the slope of the Phillips curve is equivalent to the degree of worker rent-sharing power. The decline in the slope of the Phillips curve estimated by Blanchard, Cerutti, and Summers (2015) was 0.23 from the 1960s until the 2010s. This would be consistent with the magnitude of the decline in worker rent-sharing that we have identified earlier in this paper. The decline in the worker rent-sharing parameter that was estimated to be consistent with changes in other macro variables like the labor share, in our accounting decomposition, was 0.42 over the 1980s to 2010s; and our estimated decline in imputed labor rents would have been consistent with a decline in the worker rent-sharing parameter of between 0.22 and 0.41 over the 1980s to 2010s (under the assumption of a constant aggregate markup of between 1.1 and 1.2 over the period).

What do these exercises suggest? While these models are by design not able to provide precise estimates, they suggest that in very loosely disciplined models with several free parameters it is very easy to obtain very large impacts of a decline in worker power – of the magnitude we have observed – on the NAIRU and the slope of the Phillips Curve.

Appendix F: Markup measurement and labor rents

Baqee and Farhi (2020) outline three measures for firm-level markups in the U.S. data: (1) the accounting profits approach, (2) the user cost approach, (3) the production function estimation approach. All three of these methods for measuring markups include some measure of costs, *including labor costs*, in the denominator. This means that if rent-sharing with labor falls, measured labor costs will fall, leading to an increase in measured markups without any changes in the underlying product market power of a firm. This is illustrated in more detail below.

Accounting profits approach: This is the simplest approach to markup measurement. If one assumes that operating income is equal to profits, this implies that markups are equal to sales divided by costs. Baqee and Farhi (2020) use the expression

$$operatingsurplus_{i,t} = \left(1 - \frac{1}{\mu_{i,t}}\right) sales_{i,t}$$

to back out firm-level markups μ , measuring operating surplus as *operating income minus depreciation* from Compustat data. Firm-level operating income is measured as revenue minus costs, where costs include labor costs. If rent-sharing with labor falls, payments made to workers for a given unit of work will fall, leading measured labor costs to fall. This leads mechanically to an increase in measured markups.

User cost approach: The user cost approach, used by Gutierrez and Philippon (2017) and Baqee and Farhi (2020), is similar to the accounting profits approach – but, with a more sophisticated consideration of the cost of capital. In this approach markups are estimated as the ratio of sales to total average costs, which are calculated as operating expenses plus an imputed cost of capital. Markups can be estimated from the expression

$$operatingsurplus_{i,t} = r_{kt,t}K_{i,t} + \left(1 - \frac{1}{\mu_{i,t}}\right) sales_{i,t}$$

where *operatingsurplus_{i,t}* is the operating income of the firm after depreciation and minus income taxes, *r_{kt,t}* is the user-cost of capital and *K_{i,t}* is the quantity of capital used by firm *i* in period *t*. Once again, since firm-level operating income is measured as revenue minus costs, where costs include labor costs, then if rent-sharing with labor falls, measured markups will mechanically increase.

Production function estimation approach : The production function estimation approach, used by De Loecker, Eeckhout, and Unger (2020) (and based on De Loecker and Warzynski (2012)), estimates firm-level markup as a function of the estimated elasticity of output with respect to variable inputs, θ_{it}^v , and the ratio of sales to variable costs, $\frac{P_{it}Q_{it}}{P_{it}^V V_{it}}$:

$$\mu_{it} = \theta_{it}^v \frac{P_{it}Q_{it}}{P_{it}^V V_{it}}.$$

To measure variable costs in the (imperfect) U.S. firm level data, De Loecker, Eeckhout, and Unger (2020) use Cost of Goods Sold (COGS). Other authors have used instead COGS+SGA (Cost of Goods Sold, plus Sales, General, and Administrative) expenses (see, for example, Traina (2018)). The elasticity of output with respect to variable inputs is estimated using the production function estimation technique as outlined in Appendix A of De Loecker, Eeckhout, and Unger (2020). They note that most of the rise in aggregate markups they identify is still present holding the elasticity term constant: that is, it comes from an increase in the ratio of sales to variable costs, rather than a change in the elasticity of output with respect to variable inputs. But once again, if firms earn some rents, and workers' compensation includes at least some of these rents, then some rents to labor will be included as part of measured labor costs. Since the Cost of Goods Sold (COGS) often includes some portion of the firm's labor costs (typically, the portion which is directly tied to production), a decline in rent-sharing with labor would show up under this measure as a decline in COGS relative to sales, and therefore would lead to a mechanical increase in the measured markup with no change in the underlying product market power of the firm.

Appendix G: Industry codes

G.1. Sector codes (NAICS and SIC)

For our calculations of the aggregate magnitude of labor rents, and the magnitude of labor rents by state, we use estimates of the industry wage premium at the *sector* level. At the aggregate level, NAICS level sector compensation data is available from the BEA for 1987-2016, and SIC level sector compensation data is available until 1997. At the state level, NAICS level sector compensation data is available from the BEA for 1997-2016, and SIC level until 1997. This means that we must estimate industry wage premia for both NAICS sectors and SIC sectors. It is relatively straightforward to estimate industry wage premia for SIC sectors in the CPS-ORG, because the CPS uses Census industry codes, which are based on SIC codes (we use the IPUMS-provided consistent code *ind1990*). It is less straightforward to crosswalk the industry codes in the CPS-ORG to the NAICS sectors. We first map the *ind1990* code, based on Census 1990 industry codes, into NAICS 3-digit codes (as described below), then aggregate this up into NAICS sectors.

G.2. Industry codes (BEA industry code, roughly NAICS-3 digit)

For our industry-level analyses, we use the same industry categorizations as Covarrubias, Gutiérrez, and Philippon (2019), whose industry classifications are primarily based on BEA industry codes. Data on value added, compensation, gross operating surplus, depreciation, investment, and fixed assets are available from the BEA at the level of these BEA industry codes from 1987-2016.

For our industry-level measures of labor rents, and wage premia, which are estimated from the CPS, we map the *ind1990* code (provided by IPUMS as a consistent industry code over time, based on Census 1990 industry codes) into NAICS 3-digit industry codes (as described in more detail below), then map these into BEA industry codes and group them as in Table F1 below (See also Table 10 in Covarrubias et al (2019)).

Mapping *ind1990* codes into NAICS 3-digit industry codes: We start with the Census NAICS industry crosswalk provided by the U.S. Census Bureau (available at <https://www.census.gov/topics/employment/industry-occupation/guidance/code-lists.html>). This maps many of our *ind1990* codes into NAICS 3-digit industry codes directly. There are some *ind1990* industries which map into more than one NAICS code. For these, we start by

considering workers in the CPS IPUMS data in 2003 and later, who are assigned Census 2000 industry codes as well as the time-consistent *ind1990* code. Many of these Census 2000 industry codes *do* map directly into one NAICS code, and we use this accordingly. For workers in the data before 2003, we impute their NAICS code using the information from the workers post 2003: for each industry-occupation cell (*ind1990* by *occ1990*), we calculate the share of workers in 2003 and later who are mapped into each NAICS code. We then randomly assign workers pre-2003 in each of those industry-occupation cells to those NAICS codes, with the probability that they receive each NAICS code corresponding to the share of workers post-2003 in their same *ind1990-occ1990* cell who are mapped to that NAICS code. A small number of *ind1990* codes are not mapped: the biggest are Manufacturing, n.s., and Metal industries, n.s., which correspond to a number of different possible codes with no obvious way of allocating people between them.

Table F1: Mapping of BEA industry codes to our industry codes (*replicating Covarrubias et al 2019*)

BEA industry category	Our industry category
Agriculture, forestry, fishing, and hunting	
Farms	Agr_farm
Forestry, fishing, and related activities	Agr_forest
Mining	
Oil and gas extraction	Min_oil_and_gas
Mining, except oil and gas	Min_ex_oil
Support activities for mining	Min_support
Utilities	Utilities
Construction	Construction
Manufacturing	
Durable goods	
Wood products	Dur_wood
Nonmetallic mineral products	Dur_nonmetal
Primary metals	Dur_prim_metal
Fabricated metal products	Dur_fab_metal
Machinery	Dur_machinery
Computer and electronic products	Dur_computer
Electrical equipment, appliances, and components	Dur_electrical
Motor vehicles, bodies and trailers, and parts	Dur_transp
Other transportation equipment	Dur_transp
Furniture and related products	Dur_furniture
Miscellaneous manufacturing	Dur_misc
Nondurable goods	
Food and beverage and tobacco products	Nondur_food
Textile mills and textile product mills	Nondur_textile

Apparel and leather and allied products	Nondur_apparel
Paper products	Nondur_paper
Printing and related support activities	Nondur_printing
Petroleum and coal products	Nondur_petro
Chemical products	Nondur_chemical
Plastics and rubber products	Nondur_plastic
Wholesale trade	Wholesale_trade
Retail trade	Retail_trade
Transportation and warehousing	
Air transportation	Transp_air
Rail transportation	Transp_rail
Water transportation	Transp_water
Truck transportation	Transp_truck
Transit and ground passenger transportation	Transp_passenger
Pipeline transportation	Transp_pipeline
Other transportation and support activities	Transp_other
Warehousing and storage	Transp_storage
Information	
Publishing industries, except internet (includes software)	Inf_publish
Motion picture and sound recording industries	Inf_motion
Broadcasting and telecommunications	Inf_telecom
Data processing, internet publishing, and other information services	Inf_data
Finance, insurance, real estate, rental, and leasing	
Finance and insurance	
Federal Reserve banks, credit intermediation, and related activities	Finance_banks
Securities, commodity contracts, and investments	Finance_securities
Insurance carriers and related activities	Insurance
Funds, trusts, and other financial vehicles	Finance_funds
Real estate and rental and leasing	
Real estate	Omitted
Rental and leasing services and lessors of intangible assets	Rental_leasing
Professional, scientific, and technical services	
Legal services	Legal_serv
Computer systems design and related services	Computer_serv
Miscellaneous professional, scientific, and technical services	Misc_serv
Management of companies and enterprises	Omitted
Administrative and waste management services	
Administrative and support services	Adm_support
Waste management and remediation services	Waste_mgmt
Educational services	Educational
Health care and social assistance	
Ambulatory health care services	Health_ambulatory

Hospitals and nursing and residential care facilities	Health_hospitals
Social assistance	Health_social
Arts, entertainment, and recreation	
Performing arts, spectator sports, museums, and related activities	Arts_performing
Amusements, gambling, and recreation industries	Arts_recreation
Accommodation and food services	
Accommodation	Acc_accomodation
Food services and drinking places	Acc_food
Other services, except government	Other_ex_gov

Table F2: List of industries for which we have various variables available

Note that for all our industry-level analysis, we exclude financial industries, real estate, and the management of companies and enterprises, in keeping with our focus on the nonfinancial corporate sector in the baseline analysis.

Industry	Labor share	Imputed labor rents	Concentration (Compustat, import-adjusted)	Concentration (Census, import-adjusted)	Q
Acc_accomodation	X	X	X	X	X
Acc_food	X	X	X	X	X
Adm_support	X	X	X	X	X
Agr_farm	X	X			X
Agr_forest	X	X			X
Arts_performing	X	X		X	X
Arts_recreation	X		X	X	X
Computer_serv	X	X	X	X	X
Construction	X	X	X		X
Dur_computer	X	X	X	X	X
Dur_electrical	X	X	X	X	X
Dur_fab_metal	X	X	X	X	X
Dur_furniture	X	X	X	X	X
Dur_machinery	X	X	X	X	X
Dur_misc	X	X	X	X	X
Dur_nonmetal	X	X	X	X	X
Dur_prim_metal	X	X	X	X	X
Dur_transp	X	X	X	X	X
Dur_wood	X	X	X	X	X
Educational	X	X		X	X
Health_ambulatory	X	X		X	X
Health_hospitals	X	X	X	X	X
Health_social	X	X		X	
Inf_data	X	X	X	X	X

Inf_motion	X	X	X	X	X
Inf_publish	X	X	X	X	X
Inf_telecom	X	X	X	X	X
Legal_serv	X	X		X	X
Min_ex_oil	X	X	X		X
Min_oil_and_gas	X	X	X		X
Min_support	X		X		X
Misc_serv	X	X		X	X
Nondur_apparel	X	X	X	X	X
Nondur_chemical	X	X	X	X	X
Nondur_food	X	X	X	X	X
Nondur_paper	X	X	X	X	X
Nondur_petro	X	X	X	X	X
Nondur_plastic	X	X	X	X	X
Nondur_printing	X	X	X	X	X
Nondur_textile	X	X	X	X	X
Other_ex_gov	X	X		X	X
Retail_trade	X	X	X	X	X
Transp_air	X	X	X	X	X
Transp_other	X	X	X	X	X
Transp_passenger	X	X	X	X	X
Transp_pipeline	X	X	X	X	X
Transp_rail	X	X	X		X
Transp_storage	X	X		X	
Transp_truck	X	X	X	X	X
Transp_water	X	X	X	X	X
Utilities	X	X	X	X	X
Waste_mgmt	X	X	X	X	X
Wholesale_trade	X	X	X	X	X

Appendix References

This list contains sources referred to in the Appendix but not contained in the references list of the main paper.

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