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Income Inequality and Job Creation

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Abstract

This paper shows that rising top income shares affect job creation at firms of different sizes. High-income households save relatively more in stocks and bonds, and less in bank deposits. We propose that a higher income share of top earners therefore channels funds to large firms, but tightens financing conditions for small, bank-dependent firms. In turn, small firms create relatively fewer jobs. Exploiting variation in top incomes across U.S. states and an instrumental variable strategy, we establish that an increase in the top 10 percent income share reduces the job creation rate of small firms, relative to large firms. Very small firms and those in bank-dependent industries are most affected. Experiments in a quantitative macroeconomic model show that growing top incomes account for 16 percent of the decline in the employment share of small firms since 1980, and that ignoring the link between inequality and job creation understates welfare effects of income redistribution.

Key words: income inequality, job creation, small businesses, bank lending, household heterogeneity, financial frictions

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This paper presents preliminary findings and is being distributed to economists and other interested readers solely to stimulate discussion and elicit comments. The views expressed in this paper are those of the author(s) and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System, and the Bank for International Settlements. Any errors or omissions are the responsibility of the author(s).

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1 Introduction

Since the 1970s the share of income accruing to high-income households in the United States has increased substantially (Jones, 2015). Today the income share of the top 10% stands at around 50% (Saez, 2019). Several studies investigate the causes of rising top incomes, or their consequences for households and aggregate demand (Auclert and Rognlie, 2017, 2020; Mian, Straub and Sufi, 2020). Much less is known, however, about the consequences of rising income inequality for firms and the production side of the economy. This limits our understanding of how inequality affects the economy, and makes it difficult to fully assess policy proposals that target widening income disparities.

We propose a novel mechanism through which rising top income shares alter the relative availability of funding between small and large firms, and thereby affect their job creation. The mechanism rests on two empirical observations. First, high-income households hold a lower share of their financial wealth in the form of deposits than low-income households. Instead, top earners invest in financial assets such as stocks or bonds (Wachter and Yogo, 2010; Melcangi and Sterk, 2020). Second, banks' access to deposits as a source of cheap funding affects their cost of funds and ability to grant loans (Ivashina and Scharfstein, 2010; Drechsler, Savov and Schnabl, 2017), and small firms are more affected by changes in banks' credit supply than large firms (Gertler and Gilchrist, 1994; Chodorow-Reich, 2014).

Based on these observations, we argue that rising top income shares improve funding conditions for large firms, but increase financing costs for small firms through their negative effect on banks' access to deposits. In turn, job creation among small firms declines, relative to large firms. The first part of the paper tests this hypothesis empirically. The second part builds a quantitative general equilibrium model to study the consequences of rising top income shares for macroeconomic outcomes and welfare. Taken together, our empirical and theoretical analysis connects two salient macro trends, the increase in top income shares and the shift in employment and dynamism from smaller, bank-funded to larger, publicly-funded firms (Davis, Haltiwanger, Jarmin, Miranda, Foote and Nagypál, 2006; Autor, Dorn, Katz, Patterson and Van Reenen, 2020).

To test our hypothesis, we exploit variation in top income shares across US states from 1980 to 2015, in combination with a Bartik-style instrumental variable (IV) strategy and granular fixed effects. We establish that a 10 percentage point (p.p.) increase in the top 10% income share significantly reduces the net job cre-

ation rate of small firms by around 2.5 p.p., relative to large firms.¹ The average increase in the state-level income share of the top 10% from 1980 to 2015 was around 10 p.p., so the net job creation rate at small firms would have been around 2.5 p.p. higher today had top income shares remained at their 1980 levels. Relative to an average net job creation rate of small firms of around 4% during the 1980s, the effect is economically sizeable.

To address endogeneity concerns, we predict the actual evolution in state-level top 10% income shares with each state's 1970 top 10% income share, adjusted for the national growth in the top 10% income share. Specifically, we compute the 'leave-one-out' national growth of top income shares by excluding each respective state from the nationwide changes used to adjust initial income shares in that state. The predicted income shares are then used as an IV for the actual shares. This leave-one-out Bartik approach mitigates the concern that unobservable state-specific shocks at the firm size-level could induce changes in income shares.

We further control for observable and unobservable time-varying characteristics that could affect job creation within each state through granular fixed effects. Detailed data at the state-firm size-year level allow us to include state*time fixed effects. These absorb, for example, the effects of technological change or globalization in each state over time, two common explanations behind the rise in income inequality (Cowell and Van Kerm, 2015). When possible, we include state*industry*time fixed effects that absorb common trends that affect industries within each state differentially. These include changes in industry concentration or import competition. In these saturated specifications, any unobservable factor that could simultaneously drive job creation and top income shares would need to affect small and large firms within the same state and industry differently, above and beyond the set of controls and fixed effects included in our regressions.

We then provide evidence for the underlying mechanism, i.e. that rising top incomes lead to tighter funding conditions for small firms, relative to large firms. First, we show that the magnitude of the effect of rising top incomes on job creation is declining in firm size, consistent with the empirical evidence that small firms are more bank-dependent (Petersen and Rajan, 1994; Chodorow-Reich, 2014). Second, we establish that a given increase in top incomes reduces net job creation at small relative to large firms by more in industries that rely more on banks as a source of financing. This finding further supports the argument that rising top incomes affect the availability of credit to small firms. Third, we show that effects are increasing in the income share threshold (10% vs. 1%), reflecting the fact that

¹In the baseline specification, small firms are defined as firms with one to nine employees.

deposits as a share of financial assets decline steadily with income.

To investigate the effect of rising top incomes on deposits directly, we use bank balance sheets data from the US call reports. In bank-level regressions, we find that a rise in top income shares in banks' headquarters state has a significant negative effect on the amount of deposits and a positive effect on banks' deposit expense. The relative fall in quantities and increase in prices is consistent with a relative reduction in households' supply of deposits induced by rising top income shares.² We show that the effect of rising top incomes on deposits and deposit rates increases in magnitude in the income threshold. We obtain similar results for commercial and industrial (C&I) loans: higher top income shares reduce loan amount but increase interest income.

We also examine alternative explanations that could underlie the link between top incomes and job creation. To rule out that top income shares affect job creation through changes in local demand, we exclude non-tradable industries from our regressions and find similar effects. The effects we find are present both among new entrants and continuing small firms, but economically larger for continuing firms. Further, directly controlling for the differential impact of house prices on small and large firms does not affect the results. This suggests that our findings are not explained by confounding effects that work through the collateral channel (Chaney, Sraer and Thesmar, 2012; Adelino, Schoar and Severino, 2015). Finally, the result are robust to controlling for state-level spending on education, implying that they do not arise from changes in the provision of public goods (Braggion, Dwarkarsing and Ongena, 2020).

Motivated by our empirical findings, we build a structural model that incorporates the link between top income shares, household portfolio choice, and job creation. To conduct quantitative experiments we calibrate the model based on our empirical estimates. We then study to what extent rising top income shares drive macroeconomic outcomes, such as aggregate output and the employment shares at small and large firms. We also examine the welfare effects of rising top incomes shares for households in different parts of the income distribution, and to what extent our channel amplifies or dampens them. This macroeconomic model, which is the first to feature a general equilibrium feedback between households' portfolio choices and the employment decisions of firms that are heterogeneous in their funding sources, is a distinct contribution of our paper.³

²An implicit assumption is that banks raise a significant share of their deposits in their headquarters state. We show that this is the case for 98% of deposits of the average bank.

³In Den Haan, Rendahl and Riegler (2017), households' portfolio choice between a liquid and a productive asset connects precautionary savings behavior with employment in a sector of identical

The model features incomplete markets, heterogeneous households, heterogeneous firms, and a banking sector. Households are subject to income risk and face a portfolio choice between bank deposits and direct firm investments. Deposits yield a lower return but provide utility. Borrowing ideas from [Straub \(2019\)](#), we generate a share of deposit holdings that declines with income through non-homothetic savings behavior.⁴ On the production side, the model features a representative and frictionless ‘public’ firm that receives direct investments from households, as well as a sector of heterogeneous ‘private’ firms. Private firms do not have access to public capital markets, but instead require funding from banks to finance their wage bill. A competitive banking sector offers deposits to households and provides loans to private firms.

We calibrate the model to target the stylized facts and the causal estimates obtained from our empirical analysis. In the initial stationary equilibrium, we match income and portfolio shares of households, as well as the size distribution of firms, to their counterparts in US data in the early 1980s. The effects of growing top income shares on job creation precisely match our estimated coefficients. In particular, in the model a 10 p.p. increase in the top 10% income share reduces the net job creation rate across different firm size buckets by the same relative magnitudes as implied by the coefficients obtained from our regressions.

We then conduct quantitative experiments in the calibrated model. We start from an initial top 10% income share of 30%, resulting from permanent labor productivity heterogeneity between households. We then impose income transfers and taxes to raise the top 10% income share to 50%, matching its actual evolution from the 1980s to today. The transfers and taxes net out to zero across households. Imposing transfers and taxes that are lump sum ensures that the change in top income shares we induce does not otherwise affect the aggregate economy. For example, generating changes in inequality through technological change would have additional effects on the economy by affecting aggregate productivity.⁵

In the model experiments, we first examine the effects of higher top income shares on aggregate outcomes, as well their impact on firms of different sizes. With more income accruing to top earners, who have higher savings rates, total savings increase. This increase is driven by a rise in direct investments in the public firm, while deposits fall. These changes in the supply of funds are reflected in

firms. Models in which firms are heterogeneous in their funding do not incorporate household portfolio decisions, see e.g. [Zetlin-Jones and Shourideh \(2017\)](#).

⁴In addition to changes in the savings composition, overall savings rates in the model increase in permanent income, consistent with [Dynan, Skinner and Zeldes \(2004\)](#) and [Straub \(2019\)](#).

⁵The modeling framework is general enough to alter income inequality in other ways.

returns: the return on direct firm investments falls, and the deposit rate increases. Due to the zero profit condition of banks, the increase in funding costs also raises loan rates.⁶ In consequence, job creation among small firms declines compared to large firms. In line with our empirical results, the decline is strongest among the smallest, most financially constrained firms.

Quantitatively, the employment share of firms with less than 500 employees declines by 0.8 p.p. on aggregate. In the data, the corresponding employment share has fallen by 4.9 p.p. since 1980, so rising top incomes, through their effect on funding conditions, explain 16% of the overall decline. The rise in top income shares also brings about a decline the labor share, and a modest reduction in aggregate employment and output. Aggregate economic activity declines because resources move away from small firms, where marginal products are higher than at larger firms. The differences in marginal products across firm sizes are not targeted by our calibration, but are implied by matching the empirical estimates.

Beyond the effects of rising top income shares on firms and aggregate activity, we study the consequences for household welfare. In a first step, we analyse how redistributing income via lump-sum transfers affects welfare along the income distribution. By design, redistribution towards the top increases welfare for the top 10% and decreases it for the bottom 90%, implying a decline in welfare for the average household. In a second step, we investigate to what extent our channel – i.e. that households adjust their portfolio and thereby affect firms' funding conditions – amplifies or mitigates these welfare effects. To this end, we benchmark the welfare consequences arising from our experiment to those in an alternative version of the model, in which we restrict households to save in deposits and public firm capital in constant proportions.

We find that the link between changes in income, household portfolio allocation, and job creation at different firms amplifies the welfare impact of growing income inequality. Specifically, when we allow households to adjust their portfolio, an increase in the top 10% share has a larger negative impact on welfare of low-income households and a larger positive impact on welfare of high-income households, relative to the fixed portfolio share model. This amplification arises from the changes in different sources of income in equilibrium. First, for lower income households, wage income is relatively more important. As the supply of deposits, and hence bank credit, declines, private firms become more constrained

⁶Recent research links income inequality with declining interest rates (Mian, Straub and Sufi, 2021a,b). Our model is consistent with these findings in the sense that the marginal product of capital falls with higher inequality. We show in addition that returns across different assets move in different directions due to rising income inequality.

and their employment and wages fall. This disproportionately hurts low income households by suppressing labor income. In contrast, in the fixed portfolio share model a higher share of income accruing to top earners keeps savings flowing to both public and private firms in the same proportion, and wages across the economy rise. Second, capital income matters relatively more at the top end of the income distribution. In response to receiving more income, richer households invest a higher share of their assets in the public firm. As public firm investments yield higher returns than deposits, richer households see an increase in income and experience welfare gains. This contrasts with the fixed portfolio share model, where top earners must invest in deposits and the public firm proportionally.

Contribution to the literature. Our main contribution is to study the consequences of rising top income shares for job creation among small and large firms. A related strand of literature investigates the consequences of rising inequality for households.⁷ For example, inequality affects household consumption and savings in the short and long run (Auclert and Rognlie, 2017, 2020), and rising top incomes lead to an increase in the consumption of poorer households (Bertrand and Morse, 2016). Coibion, Gorodnichenko, Kudlyak and Mondragon (2020) show that low-income households in low-inequality areas accumulate more debt than their counterparts in high-inequality areas. Mian, Straub and Sufi (2020) argue that inequality has led to an increase in savings by rich households and fuelled the indebtedness of low-income households. Inequality and household savings also play a key role in our setting, and we provide novel insights on how their interaction affects the production side of the economy.⁸

With respect to the nexus between inequality and the production side of the economy, a number of papers examine the effects of income inequality on growth in cross-country settings (Barro, 2000; Forbes, 2000; Banerjee and Duflo, 2003; Berg and Ostry, 2017). Yet, little well-identified evidence exists on how inequality affects job creation. An exception is Braggion, Dwarkarsing and Ongena (2020),

⁷A series of papers studies the causes of income inequality. See Gordon and Dew-Becker (2008) and Cowell and Van Kerm (2015) for surveys on the causes of rising inequality in the US. Demirgüç-Kunt and Levine (2009) study how finance, in particular financial sector policy, affects inequality. Gabaix, Lasry, Lions and Moll (2016), Jones and Kim (2018), and Aghion, Akcigit, Bergeaud, Blundell and Hemous (2019) argue that entrepreneurship and innovation contribute to rising income inequality.

⁸Our economic mechanism is consistent with the empirical patterns reported in Mian, Straub and Sufi (2020). Their paper emphasizes that savings of the rich flow into assets that are ultimately claims on household debt, in particular money market fund shares. We emphasize that savings of high-income households also flow into funding sources of large firms, such a equity and bonds. As empirically the portfolio shares of *both* money market fund holdings and equity/bond holdings increase with income, these explanations are not mutually exclusive.

who empirically establish a negative effect of wealth inequality on entrepreneurship using micro data for the US since 2004. They provide evidence that higher wealth inequality reduces the provision of public goods and the political support for redistribution, and argue that these forces could explain the negative correlation. To the best of our knowledge ours is the first paper to investigate the effects of rising income inequality on financing and job creation at firms of different sizes, and to assess the macroeconomic and welfare implications in a model featuring general equilibrium feedback between households' portfolio choices and the employment decisions of heterogeneous firms.

Finally, our analysis identifies the rise in income inequality as a driver of the shift in the overall share of US employment from smaller towards larger firms. We thereby add a novel explanation for major economic trends that have emerged over the last decades, such as the decline in economic dynamism and the growing importance of large firms (Davis, Haltiwanger, Jarmin, Miranda, Foote and Nagypál, 2006; Decker, Haltiwanger, Jarmin and Miranda, 2016; Autor, Dorn, Katz, Patterson and Van Reenen, 2020; Sterk, Sedlacek and Pugsley, 2021; Haltiwanger, Hyatt and Spletzer, 2022).

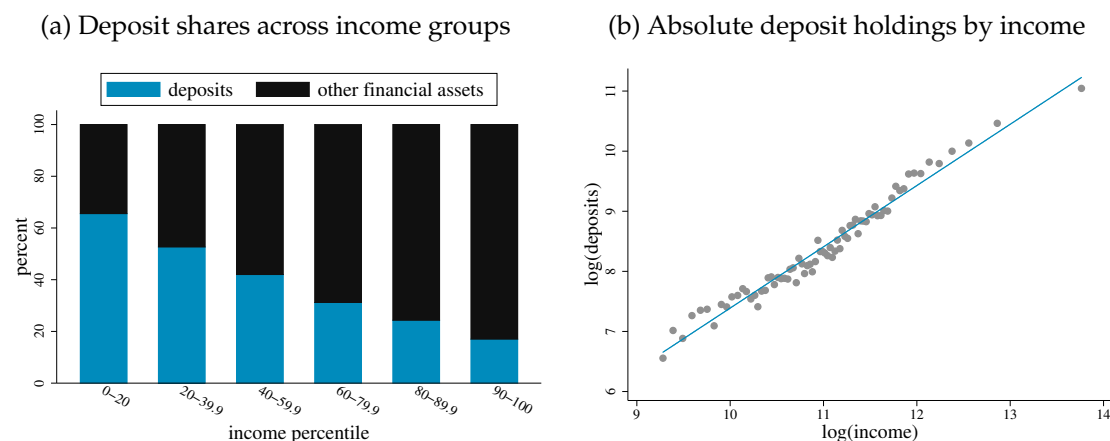
2 Motivating evidence and hypotheses

This section first presents stylized facts on the relation between household income and savings in different types of financial assets. Second, it discusses the relevance of deposits for bank lending, and reviews findings on the importance of banks for small firms. Based on these observations, it develops the main hypotheses.

Household income and asset allocation. We study the allocation of financial asset across the household income distribution with data from the Survey of Consumer Finances (SCF) of the Federal Reserve. The SCF is a triennial cross-sectional survey on household assets and demographics. We combine the survey waves from 1992 to 2007 (122,244 observations). The average (median) household has an income of \$83,458 (\$51,207) and \$223,182 (\$28,994) in total financial assets (all in 2016 dollars). Income is separated into six subgroups, which represent the following income percentiles: 0-19.9%, 20-39.9%, 40-59.9%, 60-79.9%, 80-89.9% and 90-100%. We compute the deposit share as the ratio of deposits to total financial wealth.⁹ The Online Appendix provides summary statistics.

⁹We focus on financial assets, and exclude nonfinancial assets such as housing. The SCF defines financial wealth as 'liquid assets, certificates of deposit, directly held pooled investment funds, stocks, bonds, quasi-liquid assets, savings bonds, whole life insurance, other managed

Figure 1: Household financial asset holdings across the income distribution



Note: Panel (a) provides a breakdown of the allocation of households' financial wealth in deposits (defined as the sum of checking accounts, savings accounts, call accounts and certificates of deposit) and other financial assets (life insurance, savings bonds, money market (MM) deposits, money market mutual funds (MMMMF) pooled investment funds, stocks, bonds, and other financial assets) by income group. Panel (b) provides a binned scatterplot with linear fit of the log of total household deposits (defined as the sum of checking accounts, savings accounts, call accounts and certificates of deposit) on the vertical axis and the log of total household income on the horizontal axis.

Figure 1, panel (a), shows that the share of financial assets held as deposits declines in income (see also Wachter and Yogo (2010); Guiso and Sodini (2013)). Deposits represent around two-thirds of financial wealth for the bottom income percentiles but less than one-fifth for the top income percentile. Instead, direct investments such as stocks, bonds, and other financial assets increase with household income, and so does stock market participation (Melcangi and Sterk, 2020). The Online Appendix provides a finer breakdown of asset classes and also shows that the negative relation between incomes and deposit shares is not explained by a large set of household controls, such as age, education level, occupation, and gender. Further, the relation holds even within the top 10%: While the average household with an income of \$150,000 holds around 20% of its financial assets in deposits, the share averages just 10% for households earning above \$750,000.

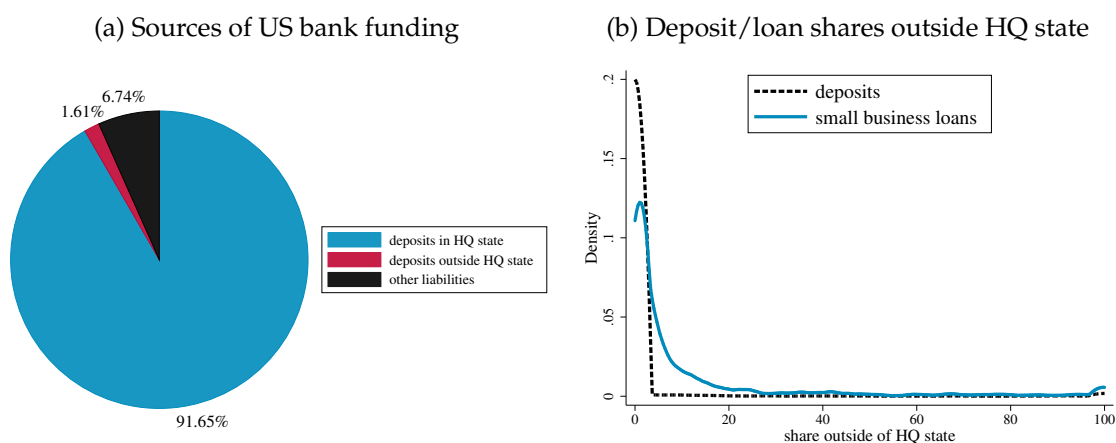
While panel (a) relates *relative shares* of financial asset holdings to income, panel (b) plots the *level* of deposit holdings against income and reveals a log-linear relationship. While high-income households hold relatively fewer deposits, the absolute amount of deposits increases with income. This pattern reflects that high-income individuals generally have more resources to save.

Bank deposits and lending to small firms. According to the Federal Deposit Insurance Corporation (FDIC), deposits account for 93% of total liabilities for the

assets, and other financial assets'. Non-financial wealth includes 'all vehicles, value of primary residence, value of other residential real estate, net equity in nonresidential real estate, value of business interests, and other financial assets'.

average bank between 1993 and 2015. This is illustrated in [Figure 2](#), panel (a), and suggests that deposits are the major source of funding in the US banking system. Importantly, the same chart reveals that the average bank raises around 98% of its total deposits in its headquarters state. The strong reliance on local deposits is also reflected in the fact that only 2% of banks hold more than 10% of their deposits in branches outside their headquarters state (see panel (b), which plots the distribution of bank-year observations). These patterns suggest that the supply of household deposits in banks' headquarters state will affect banks' liabilities.

Figure 2: Bank deposits and loans inside vs. outside headquarters state



Note: Panel (a) provides a breakdown of banks' total liabilities into deposits held in branches located in the banks' headquarters state, deposits held in branches located outside the banks' headquarters state, and liabilities other than deposits. Numbers reflect averages across all banks and years in the sample. Panel (b) shows the distribution of bank-year observations on the y-axis against the share of deposits held in branches located outside the banks' headquarters state (black dashed line) and the share of CRA small business loans originated to borrowers outside the banks' headquarters state (blue solid line) on the x-axis. Data is provided by the FDIC SOD, CRA, and US call reports.

Panel (b) also presents the distribution of banks' small business lending, based on data from the Community Reinvestment Act (CRA) from 1997 to 2015. The solid blue line plots the density of bank-year observations over the share of CRA loans outside banks' headquarters state. Similar to deposits, most banks extend the majority of their loans in their home state. Less than one-quarter of banks grant more than 25% of their CRA loans outside their headquarters state.¹⁰

Previous studies show that banks' access to deposits as a cheap and stable source of funding affects their ability to extend credit ([Ivashina and Scharfstein, 2010](#); [Drechsler, Savov and Schnabl, 2017](#)), or provide causal evidence that banks' access to deposits affects their ability to grant loans ([Becker, 2007](#); [Gilje, Loutskina and Strahan, 2016](#)). For example, [Cortés and Strahan \(2017\)](#) show that banks operating in counties exposed to natural disasters bid up deposit rates in other

¹⁰Note that banks subject to CRA reporting requirements are generally larger, so the share of actual small business lending outside the headquarters states is likely overstated.

markets to fund the higher loan demand in shocked markets.¹¹

The literature also highlights the importance of bank lending for small firms. Banks have a comparative advantage in screening and monitoring borrowers, which is especially relevant for smaller firms that are informationally opaque (Gertler and Gilchrist, 1994; Gorton and Winton, 2003; Liberti and Petersen, 2019). Consequently, smaller firms are often financially constrained and depend relatively more on bank lending (Petersen and Rajan, 1994; Abdulsaleh and Worthington, 2013), making their investment and employment more sensitive to changes in credit supply (Becker and Ivashina, 2014; Chodorow-Reich, 2014).¹²

The Online Appendix presents aggregate trends from the US Financial Accounts (Flow of Funds). Deposits as a share of household assets have fallen over the last few decades, while bonds and equities have increased. Similarly, the share of C&I loans in business sector liabilities has decreased, while the share of bonds and equities has risen (see Figure OA8).

Main hypotheses. Motivated by this evidence, we propose a novel economic channel that links household savings behavior to firm financing and job creation: as the income share of top earners rises, a relatively larger share of total financial assets is held in the form of stocks and bonds, thereby reducing funding costs for large firms. Meanwhile, the share of deposits declines, increasing the cost of funds for banks. Since banks have a comparative advantage in screening and monitoring opaque firms, this leads to a relative decline in the availability of financing for small firms, which in turn have more difficulty in creating jobs. In sum, more dollars in the hands of high- rather than low-income households lead to fewer jobs created by small firms, relative to large firms.

Screening and monitoring costs decrease in firm size (Liberti and Petersen, 2019) and some industries depend more on external financing than others (Rajan and Zingales, 1998). As rising top incomes reduce banks' ability to finance firms, we therefore expect their effect on job creation to be stronger for smaller firms, as well as for firms operating in bank-dependent industries. Further, the fact

¹¹The importance of deposits arises because banks cannot replace them with other source of funding without incurring costs (Hanson, Shleifer, Stein and Vishny, 2015). For further research on the importance of bank deposits, see Gatev and Strahan (2006); Heider, Saidi and Schepens (2019); Supera (2022).

¹²See also Beck and Demircug-Kunt (2006), Jiménez, Ongena, Peydró and Saurina (2017), and Bottero, Lenzu and Mezzanotti (2020). Coleman and Carsky (1999) show that 92.2% of firms surveyed in the 1993 National Survey of Small Business Finances use commercial banks to obtain credit. A frequent finding is that smaller banks have a comparative advantage in collecting local soft information and lend relatively more to smaller firms (Berger, Klapper and Udell, 2001; Berger and Black, 2011).

that deposits as a share of financial assets decline steadily with income implies that the magnitude of our channel should increase in the income share threshold (e.g. 10% vs. 1%). Consequently, for a given increase in their share, small firm job creation should also be more affected at higher income thresholds. The next section investigates these hypotheses empirically.

3 Data and empirical strategy

This section describes the data, the construction of the main variables, and the empirical strategy to identify how changes in top income shares affect job creation.

3.1 Data

Top income shares. Frank (2009) provides annual data on income inequality and the share of income that accrues to the top 10%, 5%, 1%, and 0.1% across 48 states from 1917 to 2015. Income shares are derived from pretax adjusted gross income data reported in the Statistics of Income published by the Internal Revenue Service (IRS). Income data include wages and salaries, capital income (dividends, interest, rents, and royalties), and entrepreneurial income. These data provide the most comprehensive state-level information on income shares for a longer time period.

Job creation across firm sizes. Data from the Business Dynamics Statistics (BDS), provided by the Center for Economic Studies, contain detailed information on job creation for firms in 12 distinct size categories. We define our baseline measure of *very small firm* as firms with 1-9 employees, i.e., containing the distinct groups of firms with 1-4 and 5-9 employees. We further construct groups for firms with 10 to 99 employees, and 100-499 employees. Our main outcome variable is the net job creation rate (net JCR). As alternative outcome variables, we also use the job creation rate (JCR), the job creation rate by new establishments (JCR birth), as well as the log difference in employment.¹³ BDS also provide a breakdown at the state-2-digit NAICS industry-firm size level, which we use when investigating our effects in bank-dependent industries.

¹³The net JCR is defined as job creation rate minus job destruction rate. The job creation (destruction) rate is the 'count of all jobs created (destroyed) within the cell over the last 12 months' in year t , divided by 'the average of employment for times t and $t - 1$ '. The JCR is defined as the 'count of all jobs created within the cell over the last 12 months' in year t , divided by 'the average of employment for times t and $t - 1$ '. JCR birth is defined as 'count of jobs created within the cell by establishment births over the last 12 months' in year t , divided by 'the average of employment for times t and $t - 1$ '.

Other state-level information. We also collect yearly state-level information on the total population, the share of the black population, the share of the population of age 60 and above (all provided in the Census Bureau’s Population Estimates), the log difference in income per capita (Bureau of Economic Analysis), the Gini index (Frank, 2009), and the unemployment rate (Bureau of Labor Statistics’ Local Area Unemployment Statistics). Finally, we collect state-level data on the number of venture capital deals from PWC’s Money Tree Explorer; as well as on expenditures on education as a share of state-level GDP from the Census.

Bank dependence. We compute each industry’s bank dependence (BD) from the 2007 Survey of Business Owners (SBO). The survey contains firms’ sources of business start-up and expansion capital, as well as two-digit NAICS industry codes. Among firms with fewer than 100 employees that were founded before 1990, for each industry i we compute the fraction of firms out of all firms that reports using bank loans to start or expand their business (Doerr, 2021). In the average industry one-third of firms obtain bank credit, with a standard deviation of 10%.¹⁴ We split industries into high and low bank dependence along the median.

Bank-level data. Our bank-level data are from the US Call Reports provided by the Federal Reserve Bank of Chicago, collapsed to the bank-year level (Drechsler, Savov and Schnabl, 2017). We obtain consistent data from 1985 to 2015 that contain information on the income statements and balance sheets of all commercial banks in the US. For each bank, we use the headquarters location to assign the respective evolution of state-level top incomes. We collect information on total deposits, deposit expenses over total deposits, total assets, the share of non-interest income, return on assets, and leverage (defined as total assets over equity). We further collect data on total C&I lending, as well as interest income on C&I loans over total C&I loans, both of which are available only for a subset of banks.

We end up with a panel of 19,176 state–firm size–year observations for 47 distinct states from 1981 to 2015. Table OA1, panel (a) in the Online Appendix provides descriptive statistics for our main state-level variables on the state-year level. Across the sample, the top 10% income share averages 40.5%. The top 5%, 1%, and 0.1% share average 29%, 14.9%, and 6.5%. Average net job creation at small firms (2.3%) exceeds average net job creation for all firms (1.8%). Growth in income per capita averages 4.7% over the sample period. Once we break down

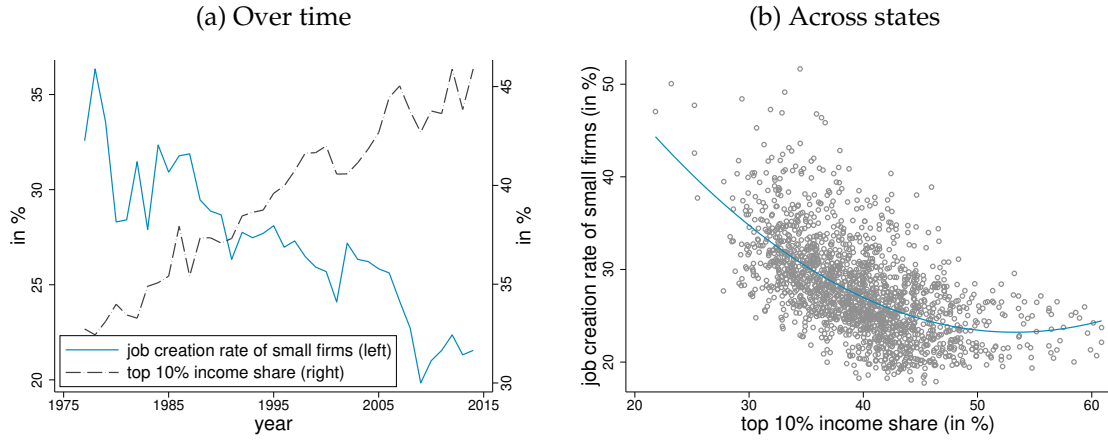
¹⁴Industries with the highest values of bank dependence are manufacturing (31–33), wholesale trade (42), transportation and warehousing (48–49) and management of companies and enterprises (55). Those with the lowest are finance and insurance (52), educational services (61), and arts, entertainment, and recreation (71).

the data by industry, the panel expands to up to 298,834 state–firm size–industry–year observations. Panel (b) provides information on the bank-level variables. The sample contains a total of 18,092 unique banks (by RSSD ID). Banks’ deposit expenses average less than 1%, their C&I interest income averages around 2%.

3.2 Empirical strategy and identification

Figure 3 previews our main result: a negative relation between top income shares and job creation at small firms. Panel (a) shows trends in the top 10% income share (black dashed line, right axis) and job creation at small firms (blue solid line, left axis) over time. While the top income share increases steadily, job creation at small firms is in secular decline. Panel (b) shows that the negative relation also occurs within states: the vertical axis plots job creation at small firms against the top 10% income share on the horizontal axis for each state-year cell. The blue line denotes a quadratic fit. There is a strong and significant negative relation: states with higher top income shares also see lower job creation rates among small firms.

Figure 3: Top incomes and small business job creation are negatively correlated



Note: Panel (a) shows the evolution of the top 10% income share, averaged across states, over time (black dashed line, left axis) and the evolution of job creation at small firms with one to nine employees (blue solid line, right axis) over time. Panel (b) provides a scatterplot with quadratic fit of the job creation rate on the vertical axis and the top 10% income share on the horizontal axis within each state-year cell in our sample. Source: Frank (2009) and BDS.

To examine the relation between top incomes and small firm job creation formally, we estimate the following regression:

$$\begin{aligned}
 net\ jcr_{s,f,t} = & \beta_1\ top\ 10\%\ income\ share_{s,t-1} + \beta_2\ very\ small\ firm_f \\
 & + \beta_3\ top\ 10\%\ income\ share \times very\ small\ firm_{s,f,t-1} \\
 & + controls_{s,t-1} + \theta_{s,f} + \tau_{s,t} + \epsilon_{s,f,t}.
 \end{aligned} \tag{1}$$

The dependent variable *net jcr* measures the net job creation rate by firms in firm size category f that are located in state s in year t . *top 10% income share* $_{s,t-1}$ is the share of income that accrues to the top 10% in state s , lagged by one period. *very small firm* $_f$ is a dummy with a value of one for the group of firms with one to nine employees. We include the following set of lagged state-level controls: average income per capita growth, log population, the unemployment rate, the share of population age of age 60 and above, and the share of the black population. Standard errors are clustered at the state level to account for serial correlation among observations in the same state.

We include state (or state-firm size) fixed effects ($\theta_{s,f}$), which gives [Equation 1](#) an interpretation in terms of changes: $\beta_3 < 0$ implies that an increase in the state-level share of income that accrues to the top 10% decreases job creation at small firms. By controlling for growth in *average* incomes, coefficient β reflects the effect of a change in state-level top income shares on net job creation, holding average state-level income growth constant.

Identification. Omitted variables or reverse causality could pose a threat to establishing a causal relation between top incomes and job creation at small relative to large firms. For example, an unobservable shock could trigger wage growth among large firms. If large firms employ a high share of top income earners, the unobservable shock would in turn influence the evolution of the top income share.

For identification, we combine granular time-varying fixed effects with an instrumental variable strategy. First, we include state*time fixed effects ($\tau_{s,t}$) in [Equation 1](#). These fixed effects control for observable and unobservable time-varying characteristics at the state level that could affect job creation, for example technological change or globalization – two common explanations behind the rise in income inequality.¹⁵ Any unobservable factor that could simultaneously drive small firm job creation and top income shares hence needs to affect firms of different sizes within the same state. We further control for the marginal effect of a large set of state-level controls on job creation at small firms by interacting our state-level controls with the dummy *very small firm*.

To further address omitted variable bias or reverse causality, we construct an IV that is highly correlated with changes in a state’s top income share, but is not otherwise associated with changes in local firms’ employment. Specifically, we predict the top income share of a state based on the state’s initial 1970 share adjusted for national growth of top income across the distribution. Importantly,

¹⁵When we include state*time fixed effects, the coefficients on *top 10% income share* $_{s,t-1}$ and state-level controls are no longer separately identified.

we compute the ‘leave-one-out’ national growth of top incomes by excluding each respective state from the nationwide changes used to adjust initial income shares in that state. We then use the top income shares derived from this predicted distribution as an instrument for the actual top income shares. This leave-one-out Bartik-style IV approach excludes the possibility that unobservable, state-specific shocks that affect firms of different sizes could be correlated with changes in state-level top income shares.¹⁶

4 Results of the empirical analysis

Table 1 shows that rising top income shares reduce the net job creation at small firms, relative to large firms. It reports results for Equation 1 and instruments the actual top income shares with our Bartik IV. We provide results from OLS regressions in the Online Appendix.¹⁷ Column (1) employs state and year fixed effects, as well as state-level controls, and shows that rising top income shares are associated with lower net job creation on average ($\beta_1 < 0$). Small firms have higher average net job creation rates ($\beta_2 > 0$) than larger firms. However, rising top incomes significantly reduce net job creation rates of small firms ($\beta_3 < 0$), relative to larger firms. A 10 p.p. increase in the share of income that accrues to the top 10% income earners is associated with a decline in the net job creation rate of small firms by 2.53 p.p., relative to larger firms.

Column (2) adds time-varying fixed effects at the state level that control for unobservable time-varying characteristics at the state level that could affect net job creation. These include, for example, the unemployment rate or income growth. The estimated coefficients do not change in a statistically or economically meaningful way. Column (3) further adds state-firm size fixed effects to further account for time-invariant factors that affect firm size groups in a given state. The coefficient on the interaction term remains highly significant and increases in magnitude, relative to column (2).

¹⁶Figure OA3 in the Online Appendix provides a visual illustration of our IV strategy. Top income shares remained constant until around 1980, suggesting that the initial 1970 income shares were not determined by unobservable factors that were already in operation before the 1970s. Furthermore, there is a strong and highly significant positive relation between actual and predicted state-level top 10% income shares. The coefficient for the first-stage relationship at the state-year level is 0.75 ($t = 70.80$; $R^2 = 0.70$).

¹⁷Table OA7 shows that the coefficient on the interaction term in OLS regressions remains stable as we add fixed effects and controls, although the R-squared increases by almost 17 p.p. In light of the increase in the R-squared, the stability of the estimated coefficient suggests that the effect of rising top incomes on job creation at small firms is orthogonal to further unobservables, e.g. to self-selection and omitted variables (Altonji, Elder and Taber, 2005; Oster, 2019).

Table 1: Rising top incomes and job creation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	net JCR	net JCR	net JCR	net JCR	net JCR	low BD net JCR	high BD net JCR
top 10% income share	-0.114 (0.200)						
very small firm (1-9)	0.110*** (0.010)	0.110*** (0.010)					
top 10% × very small firm (1-9)	-0.253*** (0.026)	-0.253*** (0.026)	-0.338*** (0.028)	-0.360*** (0.032)		-0.342*** (0.030)	-0.752*** (0.046)
top 10% × small firm (10-99)				-0.066*** (0.017)			
top 10% × medium firm (100-499)				-0.042** (0.020)			
top 1% × very small firm (1-9)					-0.410*** (0.033)		
Observations	16,450	16,450	16,450	16,450	16,450	97,260	88,112
Controls	✓	-	-	-	-	-	-
State FE	✓	-	-	-	-	-	-
Year FE	✓	-	-	-	-	-	-
State*Year FE	-	✓	✓	✓	✓	✓	✓
State*Size FE	-	-	✓	✓	✓	✓	✓
F-stat	65.41	129.1	232.9	147.9	260.8	197.6	195.4

Note: This table reports results from 2SLS regression Equation 1 at the state-firm size-year level in columns (1)–(5) and at the state-industry-firm size-year level in columns (6)–(7). The dependent variable is the net job creation rate. The variables *top 10% income share* and *top 1% income share* denote the income share that accrues to the top 10% or 1% in state s , lagged by one period, and instrumented with the respective Bartik instrument. The variable *very small firm* is a dummy with a value of one for the group of firms with one to nine employees; *small firm* is a dummy with a value of one for the group of firms with ten to 99 employees; *medium firm* is a dummy with a value of one for the group of firms with 100 to 499 employees. *Low/high BD* denotes to industries with low/high dependence on bank lending. Standard errors are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. F-stat refers to the first-stage F-statistic.

Columns (1)–(3) hence suggest that rising top incomes cause a decline in job creation at small firms, relative to large firms. To put our results into perspective, the average increase in the state-level income share of the top 10% from 1980 to 2010 was around 10 p.p. Based on the estimated coefficient, relative net job creation at small firms would have been 2.5 p.p. higher today had top incomes remained at their 1980 levels. Relative to the average job creation at small firms during the 1980s, which equalled 4.2%, the effect is economically large.

4.1 Evidence on the mechanism

In what follows we provide evidence consistent with the argument that rising top incomes lead to a relative decline in small businesses' net job creation through their effect on banks' access to deposits. We first show that the effect of rising top income shares on job creation is declining in firm size; and that small firm job creation declines by more for a given increase in the income share of the top 1% than for the top 10%, as the share of deposits declines in household income. We

further demonstrate that the negative effect of a rise in the top 10% income share affects small firms by more in industries that depend more on bank finance.

Banks have a comparative advantage in screening and monitoring opaque firms. As small firms are informationally more opaque (Liberti and Petersen, 2019) they depend more on banks as a source of credit than larger firms (Cowell and Van Kerm, 2015) and are hence more affected by changes in banks' credit supply (Becker and Ivashina, 2014; Chodorow-Reich, 2014). If rising top incomes affect banks' ability to grant loans, the relative effect of a given increase in top income shares on job creation should decline in firm size. Column (4) in Table 1 shows this to be the case: while a 10 p.p. increase in the top 10% income share reduces net job creation by 3.6 p.p. for very small firms with 1-9 employees, net job creation declines by 0.66 p.p. and 0.42 p.p. for small (10-99 employees) and medium (100-499 employees) firms, relative to firms with 500 or more employees.

Next, we exploit heterogeneity in the share of deposits out of financial assets across the income distribution. As discussed in Section 2, a given increase in the top 10% income share should affect banks' ability to finance small firms by relatively less than a similar increase for the top 1%, as the latter hold an even lower share of their financial wealth as deposits.¹⁸ Redistributing \$1,000 of aggregate income to the top 1% should thus reduce deposits by relatively more than giving it to the top 10%. To test this prediction, column (5) in Table 1 reports results for regression Equation 1, but uses the top 1% income share as explanatory variable. Compared to column (3), a similar increase in top income shares leads to an stronger negative effect on job creation by small firms for the 1% income threshold. In terms of magnitude, for a 10 p.p. increase in each income share, relative net job creation at very small firms declines by 4.1 p.p. for the top 1%. This compares to a 3.38 p.p. decline for the top 10% income share.

To further shed light on our channel, we exploit variation in the importance banks across industries. If an industry depends more on banks as a source of financing, a relative contraction in credit should hurt firms in this industry by more than firms in other industries. Consequently, when top income shares rise, we expect job creation at small firms in bank-dependent industries to be affected more negatively. To this end, we estimate regressions analogous to regression Equation 1, but at the state-industry-firm size-year level, with data on job creation obtained from the BDS. Specifically, we estimate regressions separately for industries in the bottom (low BD) and top (high BD) tercile of bank dependence.

¹⁸Figure OA1, panel (b) in the Online Appendix shows that the deposit share declines from around 0.2 to 0.05 as we move from the top 10% to the top 1% in the income distribution.

Columns (6)–(7) in [Table 1](#) show that the negative effect of rising top income shares on job creation by small firms, relative to large firms, is twice as large in bank-dependent industries. Specifically, a 10 p.p. increase in top 10% incomes shares leads to a relative decline in job creation among small firms of 3.67 p.p. in low bank-dependence industries in column (6). Among bank-dependent industries in column (7), a 10 p.p. increase in top 10% incomes shares reduces job creation among small firms by 7.52 p.p., relative to large firms.

Taken together, [Table 1](#) provides evidence consistent with our proposed mechanism: A rise in top income shares reduces job creation by small firms. It does so especially among the smallest firms, i.e., those that are informationally opaque or operate in bank-dependent industries.

4.2 Top incomes and bank deposits

Our hypothesis asserts that an increase in top income shares has a negative effect on the supply of bank deposits by households. As deposits represent the cheapest and most-stable source of funding for banks, a negative shift in their supply represents an increase in the cost of funds for banks, and negatively affects their ability to lend to firms. This conjecture implies that an increase in the top income share in a state should have a negative effect on the amount of bank deposits, and a positive effect on interest rates on deposits, relative to states with less of an increase in the top income share. To provide direct evidence for this hypothesis, we estimate the following bank-level 2SLS regression:

$$y_{b,t} = \delta \text{ top 10\% income share}_{s,t-1} + \text{controls}_{b,t-1} + \text{controls}_{s,t-1} + \theta_b + \tau_t + \epsilon_{b,t}. \quad (2)$$

The dependent variable $y_{b,t}$ is either the log amount of total deposits or the ratio of deposit expenses to total deposits of bank b headquartered in state s in year t . The share of income that accrues to the top 10% is measured at the bank headquarters state s , and instrumented with our Bartik IV. Controls include baseline state-level controls, as well as the bank-level log of total assets, the share of non-interest income, return on assets, deposits over liability, and the leverage ratio, all lagged by one period. Each regression includes bank (θ_b) and year (τ_t) fixed effects that control for time-invariant bank characteristics and aggregate trends. Standard errors are clustered at the headquarters state level. The inclusion of bank fixed effects implies an interpretation in changes. If, for example, rising top incomes reduce bank deposits, we expect $\delta < 0$.

An important assumption underlying [Equation 2](#) is that banks raise a significant share of their deposits in their headquarters state. [Figure 2](#), panel (b), shows that the average bank in the sample raises around 98% of its deposits in the headquarters state. The Online Appendix further shows that, while this ratio declines in bank size and over time, even in 2015 the vast majority of banks raise the lion's share of their deposits in their headquarters state. However, if banks were to raise deposits outside their headquarters state, this would lead to an attenuation bias and coefficient δ would reflect a lower bound of the true estimate.

[Table 2](#) shows that rising top incomes lead to a relative decline in deposits and an increase in the deposit rate (proxied by deposit expenses over total deposits).¹⁹ Columns (1)–(2) use the log of total deposits as dependent variable. Column (1) shows that a 10 p.p. increase the (instrumented) top income share leads to a 23% decline in bank deposits for the average bank. The coefficient is significant at the 1% level. To put these results into perspective, the top 10% income share has increased by around 10 p.p. between 1980 and 2010. Over the same period, aggregate deposits as a share of household non-financial assets have declined by around 50% (see [Figure OA8](#) in the Online Appendix). Column (2) shows that the effect is stronger when we use a higher income threshold (1%). This finding is consistent with the fact that the share of deposits out of financial assets declines in household income. The aggregate supply of deposits by households is thus expected to decline by more if the income share of the top 1% increases by 10 p.p., compared to a similar increase for the top 10%.

Columns (3)–(4) use the deposit rate as dependent variable and show that the price of deposits increases significantly as top income shares rise. In column (3), a 10 p.p. increase in the predicted top income share increases the deposit rate by 0.26 p.p. (28% of the mean and 0.51 standard deviations). Column (4) again shows that rates increase by more the higher the income threshold. These results thus suggest that a rise in top income shares leads to a relative decline in the *quantity* of deposits, but increases their *price*. This pattern is consistent with a relative decline in the supply of local deposits by households as state-level top income shares rise.

Bank loans and loan rates. Finally, columns (5)–(6) of [Table 2](#) show that higher top incomes also reduce banks' C&I lending and increase their interest income on C&I loans. This pattern suggests that rising top incomes, through their effect on the supply of bank deposits, affect banks' credit supply to firms, thereby hurting

¹⁹The ratio of deposit expenses to deposits reflects the average expense on existing and new deposits and is less responsive to changes the deposit supply than the actual deposit rate offered to new customers.

Table 2: Rising top incomes, bank deposits, and rates

VARIABLES	(1) log(dep)	(2) log(dep)	(3) dep rate	(4) dep rate	(5) log(CI)	(6) CI rate
top 10% income share	-2.328*** (0.576)		2.652*** (0.645)		-2.405*** (0.657)	11.655** (4.843)
top 1% income share		-4.928*** (1.134)		2.942*** (1.077)		
Observations	242,651	242,651	242,651	242,651	112,393	112,393
Bank FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
F-stat	117.1	89.52	117.1	89.52	77.45	77.45

Note: This table reports results from 2SLS regression Equation 2 at the bank-year level. The dependent variable the log amount of total bank deposits in columns (1)–(2) and the ratio of deposit expenses to total deposits in columns (3)–(4). In columns (5)–(6), the dependent variable is the log amount of total bank C&I lending and the ratio of C&I interest income to total C&I lending. *top X% income share* is the share of income that accrues to the top X% in state s , lagged by one period. All regressions include state and bank controls. Standard errors are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. F-stat refers to the first-stage F-statistic.

bank-dependent businesses more than those that can access financing without banks. While bank-level data on bank lending do not allow us to directly control for confounding factors, such as changes in loan demand, the observed pattern is in line with our mechanism.

Bank size. The Online Appendix provides additional bank-level results. Table OA8 shows that the effects on deposits loan amounts are significantly less pronounced for larger banks, as measured by log assets. Furthermore our state-level effects of rising top incomes on net job creation are stronger in states where the median bank is smaller, and in states that have more banks per capita. These results are in line with the interpretation that smaller banks are more likely to finance themselves through local deposits and lend locally.

4.3 Alternative explanations and other outcome variables

The Online Appendix tests alternative explanations for the link between top income shares and job creation at firms of different sizes. First, we ensure that the relationship is not explained by the collateral channel. Second, venture capital is an important source of financing for startups and could possibly substitute for the decline in bank lending to small firms. Our results are robust when we exclude states that account for the majority of venture capital funding or directly control for the amount of venture capital invested at the state-level. Further, controlling

for state-level spending on education does not affect our results, which ensures that our channel is distinct from [Braggion, Dwarkarsing and Ongena \(2020\)](#). Finally, we again move to state-industry-firm size-year level regressions and control for time-varying confounding factors at the state-industry level through granular state*industry*year fixed effects. The coefficient of interest remains near-identical in terms of sign, size and significance to our baseline specification. In addition, we exclude non-tradable industries, thereby addressing the concern that rising top incomes induce changes in the local demand for good, which good affect the local industrial structure, and show that results remain similar.

The Online Appendix also provides results for several additional outcome variables. First, we show a relative decline in the number of small firms as top income shares increase, as well as a relative decline in their job reallocation rate. Second, the relative reduction in the gross job creation rate of small firms is slightly larger than that of the net job creation rate. This pattern arises since higher top incomes also lead to a modest reduction in the relative job destruction rate of small firms. This could have several reasons, including a compositional effect by which a tighter financing environment changes the composition of firms away from riskier small businesses. Third, job creation falls (in relative terms) both among new entrants (extensive margin) and continuing (intensive margin) small firms when top incomes rise, but that the effect among continuing firms is economically larger. The fact that the intensive margin responds more than the extensive margin could be driven by the fact that more income in the hands of high-income individuals may positively affect new business creation through a separate net worth channel. For example, [Hurst and Lusardi \(2004\)](#) and [Azoulay et al. \(2020\)](#) study how the propensity to become a business owner is related to wealth or age.

5 Structural model

This section introduces a theoretical model that formalizes the link between top income shares, household portfolio choice, and job creation at firms of different sizes. The model incorporates general equilibrium effects from changes in wages and asset returns. In the next section, we calibrate the model to the stylized facts and empirical estimates, and use it to conduct quantitative experiments. Developing this macro model is a distinct contribution of this paper, as it is the first to incorporate a connection between households' portfolio choices and the employment decisions of firms that are heterogeneous in their funding sources.

5.1 Model setup

Time is denoted by $t = 1, 2, \dots$ and continues indefinitely. The economy is populated by a continuum of households, a representative ‘public’ firm, a set of ‘private’ firms, and a representative bank. We describe these agents in turn.

Households. There is a unit mass of households, indexed by i . Households differ in terms of their idiosyncratic labor productivity $s_{i,t}$. Each household supplies labor to both the public firm and private firms, taking respective wages w_t and \tilde{w}_t as given. Households decide how much to consume and how much to save, as well as how to allocate their savings. Specifically, households can make deposits $d_{i,t}$ at a bank or invest directly in the capital $k_{i,t}$ of the public firm. These two assets differ in their returns $R_{d,t}$ and $R_{k,t}$, where our calibration will imply $R_{d,t} < R_{k,t}$.

Deposits and direct investments differ in the services they provide. We assume that bank deposits give utility. This assumption allows us to generate in a tractable way the empirical fact that the share of deposits in savings decreases in income, while the amount of deposits increases in income (see [Figure 1](#)). Deposits in the utility function is a simple stand-in for structural factors that change the deposit share along the income distribution. One example are liquidity services provided by deposits that benefit households at different income levels to a different degree, e.g. because of health risk. Indeed, in [Figure OA2](#) of the Online Appendix, we provide direct evidence from the SCF that households’ self-reported amount of savings for “emergencies and other things that may come up” (scaled by income) falls with the level of income.²⁰

Specifically, we follow a utility specification that borrows insights from [Straub \(2019\)](#). A household’s within-period utility flow is

$$u(c_{i,t}, n_{i,t}, \tilde{n}_{i,t}) + v(d_{i,t}) = \frac{\bar{u}(c_{i,t}, n_{i,t}, \tilde{n}_{i,t})^{1-\sigma}}{1-\sigma} + \psi_d \frac{d_{i,t}^{1-\eta}}{1-\eta}, \quad (3)$$

where $c_{i,t}$ is consumption, $n_{i,t}$ and $\tilde{n}_{i,t}$ is labor supplied to the public and private firms. We assume $\eta > \sigma$, which generates non-homotheticity in preferences and makes deposits a *necessity good*. That is, households with a low level of income and wealth hold a larger share of deposit in their portfolio than those with a high level. [Straub \(2019\)](#) makes a similar assumption to generate an increasing

²⁰There are investments other than deposits that are relatively liquid, such as direct stock holdings. However, in the US a large share of stocks are held through illiquid pension accounts ([Melcangi and Sterk, 2020](#)). Furthermore, private equity holdings, widespread among high income earners, are typically also less liquid than bank deposits. Another example of a structural factor could be differences in financial literacy/sophistication across the income distribution.

share of overall savings by making total wealth (bequests) a *luxury good*.²¹ The household's objective is to maximize expected lifetime utility

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \left\{ u(c_{i,t}, n_{i,t}, \tilde{n}_{i,t}) + v(d_{i,t}) \right\} \right], \quad (4)$$

subject to

$$c_{i,t} + d_{i,t+1} + k_{i,t+1} = s_{i,t}(w_t n_{i,t} + \tilde{w}_t \tilde{n}_{i,t}) + R_{k,t} k_{i,t} + R_{d,t} d_{i,t} + \Pi_{i,t} - T_{i,t}, \quad (5)$$

$$d_{i,t+1}, k_{i,t+1} \geq 0, \quad (6)$$

where $\Pi_{i,t}$ are profit rebates from firms, and $T_{i,t}$ is a lump-sum transfer or tax. We assume that the differences in labor productivity across households, given by $s_{i,t}$, come from an ex-ante component and an ex-post component, which we explain further below. In our quantitative experiments we introduce changes in $\{T_{i,t}\}_i$ to generate changes in the top incomes share that match their evolution since 1980.

Public firm. A representative public firm produces consumption good Y_t , using capital K_t and labor N_t , according to the production function

$$Y_t = Z K_t^\theta N_t^{1-\theta}, \quad (7)$$

where Z is total factor productivity and $0 < \theta < 1$ is the share of capital in production. Profit maximization implies

$$R_{k,t} = \theta Z (K_t/N_t)^{\theta-1} + 1 - \delta, \quad (8)$$

$$w_t = (1 - \theta) Z (K_t/N_t)^\theta. \quad (9)$$

The depreciation rate of capital is denoted by δ . This firm is 'public' in the sense that there are no information frictions or agency conflicts that prevent households from undertaking direct investments into the capital of this firm.

Private firms. The economy is populated by \mathcal{J} private firms, indexed by $j \in \{1, 2, \dots, \mathcal{J}\}$ with corresponding mass $\tilde{\mu}_j$. The mass across private firms sums to 1. Private firms produce consumption goods $\tilde{y}_{j,t}$ according to

$$\tilde{y}_{j,t} = \tilde{z}_j \tilde{n}_{j,t}^\alpha, \quad \alpha < 1, \quad (10)$$

²¹In our model, while deposits shares fall in income, overall savings shares (that is, the sum of capital and deposits relative to income) rise in income, as in [Straub \(2019\)](#).

where \tilde{z}_j and \tilde{n}_j are firm j 's idiosyncratic productivity and employment. The assumption of decreasing returns enables us to pin down a firm size distribution. We calibrate $\tilde{\mu}_j$ and \tilde{z}_j to match the relative sizes of the public and private firm sectors, as well as the relative sizes among private firms, to US data. Private firms do not have access to public capital markets, but require bank funding. Specifically, private firms need to borrow a fraction ϕ_j of their wage bill at the beginning of period t . To do so, they obtain a bank loan at gross interest rate $R_{\ell,t}$. Private firms hence solve the problem

$$\max_{\tilde{n}_{j,t}} \tilde{z}_j \tilde{n}_{j,t}^\alpha - \{1 + (R_{\ell,t} - 1)\phi_j\} \tilde{w}_t \tilde{n}_{j,t}. \quad (11)$$

The closed form solution to the above problem is given by

$$\tilde{n}^*(\tilde{z}_{j,t}, \phi_j) = \left[\frac{\alpha \tilde{z}_{j,t}}{\{1 + (R_{\ell,t} - 1)\phi_j\} \tilde{w}_t} \right]^{\frac{1}{1-\alpha}}, \quad (12)$$

which we use to analytically derive comparative statics further below.

Banking sector. There is a representative bank that operates in a perfectly competitive environment. It takes deposits from households and grants loans to private firms. We assume that banking operations require a fixed cost Ξ . On deposits, the bank pays gross interest rate $R_{d,t}$. It lends at gross rate $R_{\ell,t}$. Since there is no uncertainty associated with private firms, the bank does not face default risk. Thus, the zero profit condition for the bank and loan market clearing condition implies the following relationship between the deposit rate and the loan rate:

$$R_{\ell,t} = R_{d,t} + \frac{\Xi}{D_{t+1}}, \quad (13)$$

where D_t is the total amount deposit in the economy, which is equal to the total amount of loans granted to private firms.

Market clearing conditions. There are five markets in the model: the goods market, public firm labor market, private firm labor market, capital market, and loan (deposit) market. The two labor market clearing conditions are given by

$$N_t = \int n_{i,t} di \quad (14)$$

$$\sum_{j=1}^{\mathcal{J}} \tilde{n}_{j,t}^* = \int \tilde{n}_{i,t} di, \quad (15)$$

where the left-hand side of both equations is labor demand and the right-hand side is labor supply. The capital market clearing condition is

$$K_{t+1} = \int k_{i,t+1} di. \quad (16)$$

Since private firms borrow a fraction of their wage bill, aggregate loan demand can be expressed in relation to private firm employment

$$L_{t+1} = \sum_{j=1}^{\mathcal{J}} \phi_j \tilde{w}_t \tilde{n}_{j,t}^*. \quad (17)$$

Aggregate loans must equal aggregate deposits in the banking sector, so that

$$L_{t+1} = D_{t+1} = \int d_{i,t+1} di. \quad (18)$$

Finally, the goods market clearing condition is given by

$$Y_t + \sum_{j=1}^{\mathcal{J}} \tilde{y}_{j,t} = C_t + I_t, \quad (19)$$

where aggregate consumption and investment are $C_t = \int c_{i,t} di$ and $I_t = K_{t+1} - (1 - \delta)K_t$. We always assume that $\int T_{i,t} di = 0$, i.e., transfers that net out to zero.

Model solution. We solve for the model's stationary equilibrium. Although the model features both heterogeneous households and heterogeneous firms, solving it is facilitated by the fact that we abstract from aggregate risk, and that we can exogenously configure the private firm size grid through $\tilde{z}_{j,t}$ and ϕ_j . Our algorithm is akin to solving an Aiyagari-type model, but with a nested loop structure in which quantities and prices are guessed and we iterate over these guesses until market clearing conditions are satisfied. The Online Appendix provides a definition of the stationary equilibrium and a description of the algorithm.

5.2 Specification and calibration

Our strategy is to generate a stationary equilibrium that captures the state of the US economy in the early 1980s, which corresponds to the beginning of the sample period in the empirical analysis. In this stationary equilibrium, we precisely match quantitative facts about household portfolio shares across the income distribution from the SCF, as well as quantitative features of the firm size distribution in the BDS data. We then carry out experiments that increase the top income share

in the economy from 30% to 50%, capturing its actual evolution from 1980 to 2015. In these experiments, we directly match our estimated responses of the net job creation among firms of different sizes to changes in the top income share.

Household income risk and utility. We assume that heterogeneity across households comes from ex-ante and ex-post differences in idiosyncratic income. The ex-ante differences are permanent differences between households in the mean of their income process. There are two types of households $\chi = L, H$ with mean productivity s_χ and mass μ_χ . Type $\chi = L$ gets lower income draws in expectation than type $\chi = H$. The ex-post differences come from the realized income draws for each household, which are idiosyncratic also within the two type groups. This generates the idiosyncratic income risk standard in macro models with heterogeneous households and incomplete markets. Formally, household i of type χ faces the productivity process:

$$s_{i,\chi,t} = s_\chi \tilde{\zeta}_{i,t} \quad (20)$$

$$\log \tilde{\zeta}_{i,t} = \rho \log \tilde{\zeta}_{i,t-1} + \varepsilon_{i,t}, \quad \varepsilon_{i,t} \sim N(0, \sigma_\varepsilon^2), \quad (21)$$

where ρ and σ_ε are the persistence and standard deviation of productivity, common across all households. Differences between s_H and s_L allow for permanent income differences in the stationary equilibrium of the model. We calibrate these parameters to match the top 10% income share in US data. We specify household utility of consumption and disutility of labor as

$$\bar{u}(c_i, n_i, \tilde{n}_i) = c_i - \psi_n \frac{n_i^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}} - \tilde{\psi}_n \frac{\tilde{n}_i^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}}.$$

Note that in our setting, both household types work at both firm types. The model could be generalized to reflect sorting between households and firms.

Categorization of public and private firms. We set the number of private firms to $\mathcal{J} = 3$, to capture the same number of firm size buckets from the empirical analysis. The three private firm types represent firms with 1–9, 10–99, and 100–499 employees. The public firm represents companies with 500 employees or more. While the BDS data does not allow us to observe which size buckets contain firms that are publicly listed, our definition lines up with the standard definition of small and medium enterprises (see also [Caglio, Darst and Kalemli-Özcan, 2021](#)).

Structural parameters. The model's frequency is annual. We first set a few parameters to external values commonly used in the literature. We then inter-

nally calibrate the remaining parameters to match empirical moments related to households' income shares and portfolio composition, firms' employment shares, and the response of firms' net job creation to changes in top income shares. Here we directly draw on our motivating evidence and empirical estimates.

Panel (a) of [Table 3](#) presents the externally calibrated parameters. We set the coefficient of relative risk aversion to 1.5 and the Frisch elasticity to 3. The autocorrelation of the idiosyncratic productivity process is set to 0.92, implying a quarterly autocorrelation of 0.98. The standard deviation of the income process is set to 0.12, based on [Storesletten, Telmer and Yaron \(2004\)](#). The mass of each household type is set to capture the actual size of the top 10% and bottom 90% income groups. Finally, the degree of decreasing returns to scale in the private firm's production function is set to 0.95.

Panel (b) of [Table 3](#) presents the internally calibrated parameters. We set the coefficients of disutility from supplying labor such that the employment share of the public firm matches its counterpart in the BDS data in 1981 (46.9%). The coefficient on utility from deposits determines the overall desirability of deposits relative to capital. The curvature of the deposit utility function determines how rapidly marginal utility out of deposits falls with income. We calibrate these two parameters to match the deposit share of the middle quintile and the top 10% income in the SCF data in 1986 (0.45 and 0.22). The discount factor determines households' overall desire to save, and is calibrated to match the net return on capital of 8%, close to the historical average of US stock returns. The coefficient of idiosyncratic productivity for group L is normalized to 1, while s_H is calibrated to ensure that the high income group accounts for 30% of total income, the starting point of our experiments. In line with the [Frank \(2009\)](#) data used in our empirical analysis, total income consists of labor income, asset income, and profits.²²

Total factor productivity (TFP) of the public firm is set so as to normalize the real wage at public firms to 1. The calibrated capital share in production implies an annual depreciation rate of 6%, targeting NIPA data. We normalize the productivity of the smallest private firm to match the aggregate private firm employment share of 53.1% in the BDS. We then set the productivity differences between private firms so as to match the midpoint of the employment size in each size bucket, relative to the smallest size bucket in the BDS. These relative bucket sizes are 11 (based on dividing the midpoint of 10–99 by the midpoint of 1–9) and 60 (midpoint of 100–499 over midpoint of 1–9). The mass of each type of private

²²In the initial stationary equilibrium lump-sum taxes equal the profits of private firms, so that households receive no income from profits.

firm is calibrated to match relative employment shares in the 1981 BDS data (the employment shares of firms of size 1–9, 10–99 and 100–499 are 13.7%, 26.1%, and 13.2%). The degree of the working capital constraints are set to precisely reproduce the empirical estimates in Table 1 when income shares change (the specific changes are discussed further below). Banks’ fixed costs imply a deposit rate of 4%, broadly consistent with US data over the period we consider.

Table 3: **Model parameterization**

Panel (a): externally calibrated parameters

Parameter and description	Value
σ Relative risk aversion	1.50
ν Frisch elasticity of labor supply	3
ρ Persistence of productivity	0.92
σ_ϵ Std. dev. of productivity	0.12
μ_L Mass of L type households	0.9
μ_H Mass of H type households	0.1
α Private firm returns to scale	0.95

Panel (b): internally calibrated parameters

Parameter and description	Target (source)	Value	Model	Data
ψ_n Labor disutility (public)	Public firm employment share (BDS)	1.23	0.469	0.469
$\tilde{\psi}_n$ Labor disutility (private)	Private firm employment share (BDS)	1.29	0.531	0.531
ψ_d Deposit utility scale	Deposit share in 3rd quintile (SCF)	0.02	0.45	0.45
η Elasticity of deposit utility	Top 10% deposit share (SCF)	3.14	0.22	0.22
s_H Productivity scale H vs. L	Top 10% income share (SCF)	3.75	0.30	0.30
β Household discount factor	Mean return on US stock market (8%)	0.92	1.08	1.08
Z Public firm TFP	SS real wage (normalization)	1.13	1.00	1.00
θ Public firm capital	Capital depreciation rate (NIPA)	0.16	0.06	0.06
\tilde{z}_1 TFP private firm 1	Private firm employment share (BDS)	1.18	0.531	0.531
\tilde{z}_2 TFP private firm 2	Relative size 10-99 vs. 1-9 emp. (BDS)	1.24	11	11
\tilde{z}_3 TFP private firm 3	Relative size 100-499 vs. 1-9 emp. (BDS)	1.34	60	60
μ_1 Mass private firm 1	Employment share 1-9 emp. (BDS)	0.84	0.137	0.137
μ_2 Mass private firm 2	Employment share 10-99 emp. (BDS)	0.15	0.261	0.261
μ_3 Mass private firm 3	Employment share 100-499 emp. (BDS)	0.01	0.132	0.132
ϕ_1 Working cap. private firm 1	Table 1 Col. (4): estimate for 1-9 emp.	0.98	-0.360	-0.360
ϕ_2 Working cap. private firm 2	Table 1 Col. (4): estimate for 10-99 emp.	0.60	-0.066	-0.066
ϕ_3 Working cap. private firm 3	Table 1 Col. (4): estimate for 100-499 emp.	0.57	-0.042	-0.042
Ξ Fixed cost of bank	Return on deposit (4%)	0.09	1.04	1.04

Note: Summary of the model calibration for the initial stationary equilibrium. Panel (a) shows the parameters we fix directly to standard values. Panel (b) shows the internally calibrated parameters, which match data, mostly from the SCF and the BDS in the early 1980s. This makes the model consistent with the motivating evidence in Section 2 and our empirical estimates in Section 3.

Portfolio choices in the initial stationary equilibrium. Figure OA10 in the Online Appendix shows households’ heterogeneous portfolio composition in the initial stationary equilibrium. In line with our empirical evidence (Figure 1), the deposit share in households’ portfolios decreases with income, while the absolute amount of deposit increases.

Specification of rising top income share experiment. The initial stationary equilibrium features a top 10% income share of 30% through the permanent differences between s_H and s_L . In the model experiment, the top 10% share increases

to 50%, matching its actual evolution from the 1980s to today (Saez, 2019). We generate growth in top income shares through permanent lump-sum taxes and transfers between households. We choose an experiment based on transfers for two reasons. First, we deliberately want to remain agnostic about the multifaceted sources of the rise in top income shares. And second, we thereby abstract from any direct relation between aggregate growth and top income shares. Such a relation would be present, for example, if we generate the growth in top incomes through changing productivity differentials between households or firms. Instead, our exercise allows us to focus on the effects on job creation at firms of different sizes that stem exclusively from changes in portfolio shares.

The transfer changes net out to zero, thereby keeping *ex-ante* aggregate income constant.²³ We increase lump-sum taxes on the low-income group L and use the revenue to provide a lump-sum transfer to the high-income group H . In addition to transfers and taxes across groups, we tilt the taxes and transfers within each group. This provides additional flexibility when calibrating the experiments to reproduce our empirical estimates inside the model. Specifically, we set

$$\tilde{T}_{i,\chi} = c_\chi \tau \frac{s_{i,\chi}^\varphi}{\bar{s}_\chi}, \quad \bar{s}_\chi = \sum_{i=1}^{n_\chi} s_{i,\chi}^\varphi m_{i,\chi} / \sum_{i=1}^{n_\chi} m_{i,\chi}, \quad (22)$$

where $c_\chi = -1$ if $\chi = L$ and $c_\chi = 1$ otherwise, and $s_{i,\chi}$ is i -th level of productivity in group j . m_j is the mass of households with productivity $s_{i,\chi}$ and \bar{s}_χ is the mean of $s_{i,\chi}^\varphi$. The total amount of lump-sum taxes and transfers is denoted by τ . The parameter φ captures the degree to which households with higher productivity in the low (high) group pay (receive) a larger amount of lump-sum tax (transfer). We adjust this parameter, together with setting the working capital parameters $\{\phi_1, \phi_2, \phi_3\}$, so that our calibration precisely replicates the parameters from Table 1, column (4). This is achieved with $\varphi = 3$.

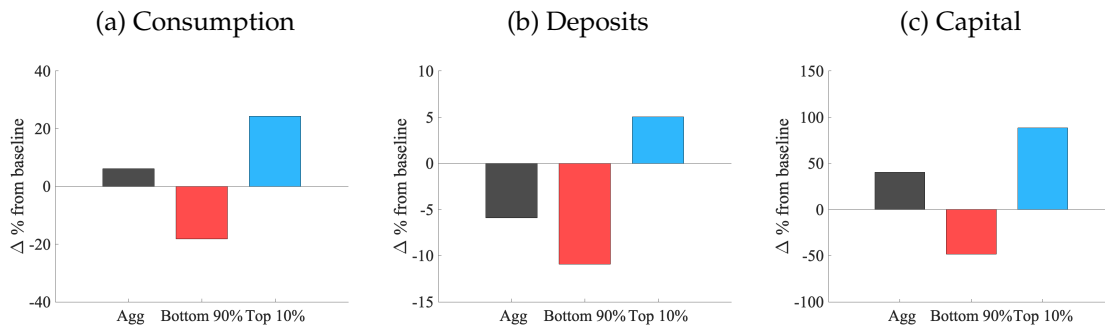
5.3 Model features in partial equilibrium

We begin by characterizing agents' decisions in partial equilibrium to illustrate the key mechanics of our structural model, for now focusing on households and private firms. In this preliminary exercise, we increase top incomes but hold wages and returns fixed at their values in the initial stationary equilibrium. We discuss the quantitative general equilibrium experiments in the next section.

²³Keeping aggregate income constant is in the spirit of controlling for mean income growth as in our empirical specifications. We compute income from labor, asset, and transfer income.

Household consumption, savings, and portfolio allocation. Figure 4 plots the responses of consumption (panel a), bank deposits (panel b) and public firm capital (panel c) to an increase in the top income share. Each panel contains the response in the aggregate, for the bottom 90% and for the top 10% of households. Specifically, the bars in each panel are constructed by computing the responses of all households, the bottom 90%, and the top 10%, scaling all responses by the aggregate quantity in the initial stationary equilibrium. The figure reveals that the bottom 90% households, experiencing a fall in income, reduce consumption, as well as savings in both deposits and public firm capital. Top earners, experiencing an increase in income, consume more and save more in deposits and capital.

Figure 4: Consumption, savings and portfolio allocation in partial equilibrium



Note: Summary of household decisions in partial equilibrium, in response to an income change that increases the income at the top and decreases income at the bottom. It plots the responses of consumption, bank deposits and public firm capital in the aggregate, as well as the contribution of the bottom 90% and the top 10% households. Specifically, each panel shows responses of all households, the bottom 90%, and the top 10%, scaled by the aggregate quantity in the initial stationary equilibrium. To compute these responses, we fix wages and returns at their values in the initial stationary equilibrium.

The magnitudes of these responses differ across income groups because households' preference for holding deposits decreases with income. For lower income households, deposits make up a large share of savings. Conversely, higher income households invest only a small part of their savings in deposits, as they have a comparatively weaker preference for holding deposits. In addition, each group's income and savings make up different shares of the aggregate. The bottom 90% of households hold a larger share of overall deposits in the initial equilibrium. Hence their reduction in deposits in response to declining incomes drives the fall in aggregate deposits. This contrasts with the rise in aggregate public firm capital, which is to a large degree held by the top 10%. The top 10% also contribute strongly to the aggregate increase in consumption. The relative magnitudes across panels convey that the partial equilibrium response in total savings, that is, the combination of deposits and capital, is stronger than that of consumption. Aggregate consumption increases by about 6%, whereas aggregate savings increase by 23%. While Figure 4 is instructive to understand household behavior, the mag-

nitudes of these responses differ in the general equilibrium experiment (shown below), where wages and returns adjust to household and firm behavior.

Marginal propensities to consume out of transitory income. The central mechanism we analyze operates as a trend over several decades. We therefore model the change in income inequality as permanent in nature. As a consequence, the patterns shown in [Figure 4](#) do not correspond to marginal propensities to consume and save (MPC and MPS) out of transitory income, as typically defined in the heterogeneous agent macro literature, see e.g. [Kaplan, Moll and Violante \(2018\)](#). While transitory income changes are not the focus of our paper, we can study their effects in the model. We do so in the Online Appendix, and find that the model implies an average MPC that falls into the lower end of the range of estimates in the literature. Furthermore, the model generates reasonable MPC differences along the income and wealth distribution.

Private firm comparative statics. Our private firm setting allows us to derive a set of analytical results in partial equilibrium. We focus on the relation between employment and changes in productivity, the degree of working capital constraints and interest rate changes. For a given wage \tilde{w}_t , the solution for $n_{j,t}^*$ given by Equation (12) implies that:

$$\frac{\partial n_{j,t}^*}{\partial \tilde{z}_{j,t}} > 0: \text{ more productive firms are larger,}$$

$$\frac{\partial n_{j,t}^*}{\partial \phi_j} < 0: \text{ more financially constrained firms are smaller,}$$

$$\frac{\partial n_{j,t}^*}{\partial R_{\ell,t}} < 0: \text{ higher loans rates reduce employment, and}$$

$$\frac{\partial n_{j,t}^*}{\partial R_{\ell,t} \partial \phi_j} < 0: \text{ do so by more for more constrained firms.}$$

These partial derivatives match our empirical findings. In particular, higher top income shares reduce net job creation and increase deposit rates and thereby loan rates. The effect of top income shares on net job creation is stronger the smaller the firm is, as financial frictions play a greater role for smaller firms.

6 Quantitative experiments in general equilibrium

In our quantitative experiments, we increase the top 10% income share from 30% to 50%, allowing wages and returns to adjust in general equilibrium. The change in income shares is generated through the lump-sum transfer schedule described

by [Equation 22](#), which nets out across households. We begin our analysis by examining the effects on a variety of macroeconomic and firm-level outcomes. In a second step we characterize the implications for household welfare.

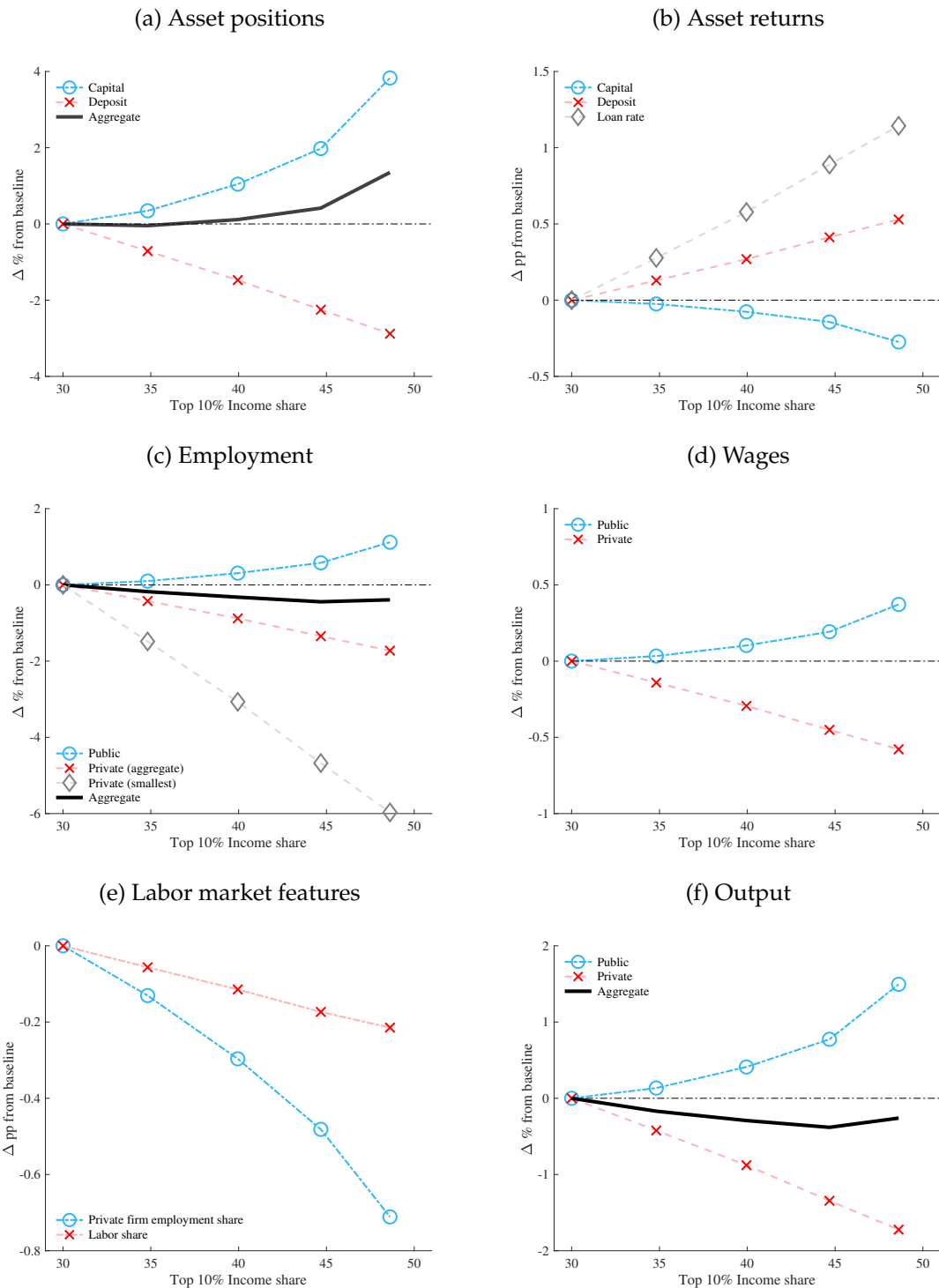
6.1 Aggregate and firm-level outcomes

[Figure 5](#) presents the consequences of growing top income shares in general equilibrium. We normalize variables to their level in the initial stationary equilibrium with a top 10% income share of 30%. Panel (a) shows that as high-income households have a higher overall savings rate, more income accruing to earners at the top results in higher aggregate savings of around 1% (black solid line). Aggregate savings are measured as the sum of direct capital investments and deposits for all households. As deposits are relatively less important for high-income households, a smaller proportion of aggregate income is saved in the form deposits and aggregate deposits fall by around 3% (red line with cross markers). Instead of deposits, savings flow to a larger extent into the public firm's capital, leading to an increase of around 4% (blue circled line).

Panel (b) shows how changes in household savings are reflected in the returns on different assets. The return on direct firm investments, determined by the public firm's marginal product of capital, falls by roughly 0.25 p.p., while the deposit rate increases by 0.5 p.p. Due to the zero profit condition of banks, higher deposit rates also raise loan rates, which increase by roughly 1 p.p. Qualitatively, the latter two effects line up with the responses of deposit and loan rates at the state level estimated in [Table 2](#). According to [Mian, Straub and Sufi, \(2021a, 2021b\)](#) income inequality has reduced equilibrium real interest rates. Our model experiment is consistent with their findings in the sense that the marginal product of capital is reduced by higher inequality. We show in addition that returns on different assets are moved in different directions by our economic mechanism.

Panel (c) plots employment, in the aggregate and based on a breakdown across firm types and sizes. Public firm employment is shown as the blue circled line. The red line with cross markers captures employment in the private firm sector as a whole (firms with less than 500 employees). The gray line with diamond markers shows the response for the smallest category of private firms, calibrated to those with less than 10 employees. The experiment shows that the rise in the top income share implies 2% lower employment in the private firm sector. Within the private firm sector, job creation declines by as much as 6% among the subset of smallest firms. This differential effect follows from the more severe impact of the

Figure 5: General equilibrium consequences of rising top income shares



Note: Selected equilibrium quantities and prices for different top 10% income shares. We focus on aggregate outcomes as well as outcomes across different asset types, firm types and firm sizes. The calibration shown in Table 3 is used for the initial stationary equilibrium with a top 10% income share of 30%. The different top income shares of up to 50% are then generated by varying net zero lump-sum transfers across the distribution of households.

working capital constraint, and captures a key result from our empirical analysis in [Table 1](#): rising top income shares reduce net job creation rates for small relative to large firms, and the effect is strongest for the smallest firms – for which bank financing is essential. Conversely, the public firm sector, which sees its funding conditions improved, increases employment by roughly 1%. In the aggregate, employment declines slightly, which we discuss further below.

Panel (d) shows that wages increase in the public firm sector and fall in the private firm sector. Employment and wages move in the same direction within each sector, reflecting that labor demand effects determine outcomes in the labor market in our specification.

Panel (e) shows that the share of employment in private firms decreases by 0.8 p.p. (blue circled line). According to BDS data, between 1980 and 2015 the US economy experienced a decline in the share of employment in firms with less than 500 employees of 4.9 p.p. Rising top incomes, through their effect on funding conditions, can thus explain 16% of the overall decline of that share according to our model. This is a non-negligible impact on a key trend that may relate to other patterns in the US economy over the last few decades, such as the decrease in business dynamism and the growing importance of large firms ([Davis, Haltiwanger, Jarmin, Miranda, Foote and Nagypál, 2006](#); [Decker, Haltiwanger, Jarmin and Miranda, 2016](#); [Haltiwanger, Hyatt and Spletzer, 2022](#)).

The labor share also falls (red line). This is a consequence of public firms growing relatively larger while producing with a lower labor share than private firms.²⁴ While the effect of rising top income shares on the labor share is modest, it aligns with another key trend in the US and globally ([Karabarbounis and Neiman, 2014](#); [Autor, Dorn, Katz, Patterson and Van Reenen, 2020](#)).

Finally, panel (f) presents the effects on output. As higher top income shares affect the relative funding situation across firms, public firms produce more, whereas private firms reduce their production. In the aggregate, there is a mild decrease in output, similar in magnitude to the reduction in aggregate employment. Intuitively, the effect on aggregate employment and output is the result of two offsetting forces. On the one hand, higher top income shares increase aggregate savings, leading to a larger steady state capital stock and higher output, all else equal. On the other hand, higher top income shares lead to a reallocation of resources away from private to public firms. To the extent that smaller, financially more constrained firms have higher marginal products, this suppresses aggregate output. As a consequence of targeting the relative effects in net job creation rates

²⁴In the data, larger firms indeed have higher capital-to-labor ratios ([Oi and Idson, 1999](#)).

with our calibration, the second effect dominates in general equilibrium. For example, as a result of calibrating ϕ_1 and \tilde{z}_1 to match our estimated coefficients in [Table 1](#), the marginal product of labor at the very smallest firm is around 30% larger than that of the public firm.

Overall, [Figure 5](#) shows that a higher share of income going to top earners has a substantial impact on the aggregate economy, as well as on the cross-section of households and firms. The experiment suggests that a sizeable share of the decrease in the small firm employment share over the past decades can be explained by rising top incomes shares, through their effect on firm funding and job creation.

6.2 The welfare effects of changing top income shares

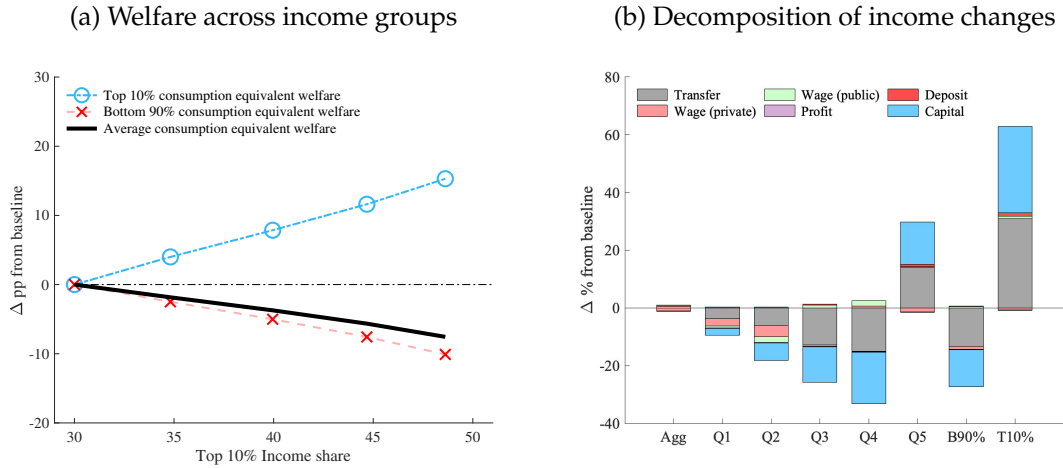
To assess welfare, we compute the consumption equivalent (CE) for households in different parts of the income distribution, as well as the average household in the economy. Panel (a) of [Figure 6](#) shows that in our experiment, welfare increases for the top 10% and decreases for the bottom 90%, as income is redistributed towards the top. As the bottom 90% of households form a bigger group, and their marginal utility is higher than that of the top 10%, the average household experiences a decline in welfare.

A significant part of these welfare effects results from changes beyond the direct, mechanical effects of lump-sum taxes and transfers. The reason is that agents' choices, as well as wages and returns, adjust in equilibrium. To illustrate these effects, panel (b) of [Figure 6](#) decomposes the changes in income across groups into different sources. Capital income increases at the top and decreases at the bottom. Wage income declines by most among households in the bottom 40% of the income distribution.

Welfare in a model with fixed portfolio shares. By design, our redistribution of income increases welfare for the top 10% and decreases it for the bottom 90%. To gauge the contribution of our mechanism to the welfare consequences of rising top incomes, we therefore benchmark the welfare effects in [Figure 6](#) against their counterpart in an alternative model with fixed portfolio shares. This allows us to “net out” the direct, mechanical effects of lump-sum taxes and transfers on welfare. We can thereby assess the extent to which our channel amplifies or mitigates the welfare consequences of higher top income shares.

In the alternative model, we shut off portfolio heterogeneity across households by restricting them to save only in a composite of deposits and public firm capital,

Figure 6: Welfare effects and income decomposition



Note: Welfare effects and income decomposition for different top 10% income shares. The calibration shown in Table 3 is used for the initial stationary equilibrium with a top 10% income share of 30%. The different top income shares of up to 50% are then generated by varying net zero lump-sum transfers across the distribution of households.

where the shares are fixed to the average portfolio shares in the 1980s SCF data. The composite asset pays the weighted average of the deposit interest rate and the marginal product of capital of the public firm. This ‘fixed portfolio share model’ is otherwise identical to our full model, and we calibrate it to match identical targets. In the Online Appendix, we provide the equivalents of Figure 5 and Figure 6 for the fixed portfolio share model. Forcing capital and deposit savings to respond in a proportional way to rising top income shares implies substantially different effects, in particular on employment across the income distribution. We discuss these differences in our comparison with the alternative model.

Contribution of the portfolio allocation channel to welfare effects. Figure 7 shows the effects of rising inequality when households do and do not adjust their savings behavior. Panel (a) plots the change in the top 10% income share for the baseline lump-sum transfer scheme (changes in τ in Equation 22). Recall that our experiment is designed to generate a change in the top 10% income share from 30% to 50% in the full model (black solid line). Imposing the same set of transfers across households in the fixed portfolio share model leads to a weaker increase in income inequality (blue circled line). When households cannot adjust their portfolio positions in response to exogenous changes in their income, then the top 10% income share rises only up to around 40% in equilibrium.

Panel (b) plots the differences in welfare between the full and the fixed portfolio share model. Positive numbers imply a relatively better welfare outcome in the full model. We compare the average household as well as the top, middle and bottom quintiles, where Q5 represents the top 20% earners. We find that top

Figure 7: Welfare analysis in counterfactual settings



Note: Welfare analysis across two different model versions. The full model is the one analyzed in Figure 5 and Figure 6. In the fixed portfolio share model (labeled 'fixed share') our main channel is shut off. The calibration shown in Table 3 is used for the initial stationary equilibrium with a top 10% income share of 30%. The different top income shares of up to 50% are then generated by varying net zero lump-sum transfers across the distribution of households.

earners experience a stronger increase in welfare in the presence of portfolio reallocation, while households in the bottom and middle parts of the distribution face a stronger decline in welfare. In other words, portfolio heterogeneity amplifies the positive impact of rising top income shares at the top and the negative impact at the bottom. The effects are economically large, amounting to differences in the order of magnitude of 1% in consumption equivalents. Ignoring the effects of income inequality on the allocation of savings understates the welfare effects of changes in the income distribution.

Panels (c) and (d) examine the driving forces behind these patterns. Panel (c) plots the difference in income between our full model and the fixed portfolio share model, across income groups and broken down by different incomes sources.²⁵

²⁵CE welfare differences arise from different sources, including differences in income. Welfare

This illustrates the key advantage of benchmarking the experiment in our model against an alternative model, as the direct effect of exogenous transfers almost exactly nets out across models. Importantly, the graph shows that the stronger positive (negative) welfare impact at the top (bottom) in the full model relative to the fixed portfolio share model is driven by differences in both asset and labor income. We focus our discussion on the two components with the largest contribution across income groups, namely income from holding capital in the public firm and wage income from private firms. To inform our discussion, panel (d) plots changes in public firm returns and private firm wages in the two models.

Panel (c) shows that in the full model, capital income rises more strongly for high income groups. Top earners are able to substitute into the higher return asset to increase their capital income, which makes up a large share of their overall income. This is true despite a fall in the return on public firm capital (see panel d). Indeed, the reduction in returns is driven by the large influx of capital from high income households, which lowers the capital income for lower income groups. Poorer households hence not only reduce their capital holdings, but also receive lower returns. Therefore our model implies a relatively worse asset income change for lower income households than under a fixed portfolio share. This pattern is particularly pronounced in the (upper) middle of the distribution where capital income still represents an important source of income.²⁶ As labor income represents the lion's share of income among households at the bottom of the distribution, the loss in capital income matters less for their welfare.

The full model also implies that labor income from private firms decreases sharply, as these firms reduce labor demand in response to the decrease in available bank funding. In equilibrium, private firm wages fall (see panel d). This stands in contrast to the fixed portfolio share model, in which top earners increase deposits after receiving more income, which benefits private firms through lower rates and allows them to increase wages. Wages in general make up a high share of the incomes of lower income groups. In the full model, this reduction in labor income has a strong negative impact on the welfare of low income households.

In summary, the link between household savings behavior and job creation at firms of different sizes amplifies the welfare impact of changes in income along the distribution. First, high income individuals receive higher income from capital

changes in our experiments are mirrored relatively closely by income differences, and we thus focus our interpretation of the welfare results on income changes.

²⁶In the full model, low income households do receive higher interest rates from holding deposits. However, they reduce the amount deposit holdings. Furthermore, as Panel (c) shows, differences in deposit income have only a very small contribution to overall income changes.

investments, a major source of their income. Second, private firm employment and wages are suppressed. As wages paid by private firms are an important source of income for lower-income households, their incomes are subject to an additional decline in equilibrium.

7 Conclusion

Exploiting variation across US states from 1980 to 2015 and an instrumental variable strategy, this paper provides empirical evidence that an increase in top income shares leads to a significant decline in net job creation at small firms, relative to larger firms. Our analysis of the underlying mechanism suggests that the effects works through a change in the availability of financing. As richer households hold more stocks and bonds, rather than deposits, rising top incomes channel more funds to larger firms, but tighten funding conditions for smaller firms.

Quantitative experiments in a structural model reveal that the rise in the top 10% income share between 1980 and 2015 explains around 16% of the overall decline in the small firm employment share over the same period. The model further shows that ignoring the key mechanism we uncover in this paper leads to an understatement of the welfare effects of rising top income shares.

While existing studies have investigated the effects of rising top incomes on households, this paper provides the first evidence on the effects of rising top income shares on job creation and employment at small and large firms. Our empirical and theoretical insights shed light on the broader economic consequences of inequality, and can help to design policy responses.

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Online Appendix

Further figures and tables for motivation and empirical analysis

[Figure OA1](#) provides additional details on the financial asset composition by household income.

[Figure OA2](#) provides direct evidence on household's liquidity needs by income.

[Figure OA3](#) shows aggregate trends and the first-stage relationship underlying the Bartik instrument.

[Figure OA4](#) shows that our main regression coefficients are stable when we exclude individual states, years or industries.

[Figure OA5](#) provides evidence on the occupations of top earners.

[Figure OA6](#) shows industries' bank dependence.

[Figure OA7](#) shows aggregate trends in small business employment.

[Figure OA8](#) shows aggregate trends in deposits, loans, bonds and equities.

[Figure OA9](#) shows a strong relation between bank deposits and loans.

[Table OA1](#) provides summary statistics for our main variables at the state and bank level.

[Table OA2](#) provides summary statistics for SCF data.

[Table OA3](#) provides additional tests to address alternative explanations for the link between top income shares and job creation along the firm size distribution. First, we investigate whether the relationship could be explained by the collateral channel: rising top income shares could be correlated with local house prices, and small and young firms rely relatively more on housing collateral to access credit ([Chaney, Sraer and Thesmar, 2012](#); [Adelino, Schoar and Severino, 2015](#)). Columns (1) and (2) show that our results remain unaffected when we directly control for the differential effect of the level or growth of house prices on small and large firms. They also remain near-identical when we exclude states that experienced a housing boom, or the years of the Great recession and subsequent collapse in house prices (see Online Appendix). These patterns suggest that our results are not due to a collateral channel through which house prices affect small and large firms to a different extent.

Venture capital is an important source of financing for startups and could possibly substitute for the decline in bank lending to small firms. Columns (3) and (4) show that when we exclude states that account for the majority of venture capital funding or directly control for the amount of venture capital invested at the state-level, our results remain unaffected. Further, column (5) shows that controlling for state-level spending on education does not affect our results. The fact that educational expenses do not explain our findings ensures that our channel is distinct from [Braggion, Dwarkarsing and Ongena \(2020\)](#), who emphasize the importance of public goods for entrepreneurship. Note that the coefficient on the interaction term of education expenditure and the small firm dummy is positive, consistent with the results in [Braggion, Dwarkarsing and Ongena \(2020\)](#).

Finally, we again move to state-industry-firm size-year level regressions. This has two advantages. First, relative to [Equation 1](#), the key difference is that we now can control for time-varying confounding factors at the state-industry level through granular state*industry*year fixed effects ($\tau_{s,i,t}$). These absorb any differential effect that industry-wide changes could have in different states. For example, rising import competition in some industries could affect firms in Ohio to a different degree than firms located in Nebraska. Similarly, we account for differential effects of changes in top incomes on all firms within a given industry in each state. Second, we can exclude non-tradable industries, thereby addressing the concern that rising top incomes induce changes in the local demand for goods, which in turn affects the local industrial structure.

Columns (6)–(7) in [Table OA3](#) report results for state-industry-firm size-year level regressions. Column (6) confirms that a rising top income share reduces job creation at small firms, relative to large firms. Similar to [\(1\)](#), column (6) includes state*size and state*year fixed effects to control for any unobservable changes within a given state-firm size cell and for common time-varying shocks at the state level. Column (7) exploits the rich variation in the data and uses state*industry*year fixed effects instead of state*year fixed effects. The coefficient of interest remains near-identical in terms of sign, size and significance to column (6), indicating that unobservable trends that affect industries differentially within each state do not explain our findings. Finally, column (8) focuses on firms in tradable industries only, and shows that also here, there is a negative effect of top income shares on job creation among small firms, relative to large.

[Table OA4](#) shows results for the main regression with alternative outcome variables.

[Table OA5](#) provides further robustness tests at the state-year level.

[Table OA6](#) provides further robustness tests at the state-industry-year level.

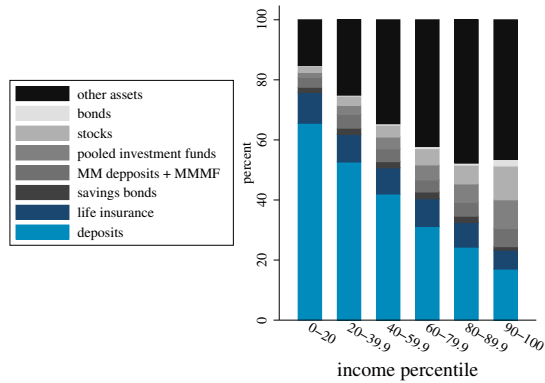
[Table OA7](#) provides the OLS results corresponding to our baseline regression.

[Table OA8](#) provides additional evidence on bank deposits and loans by bank size.

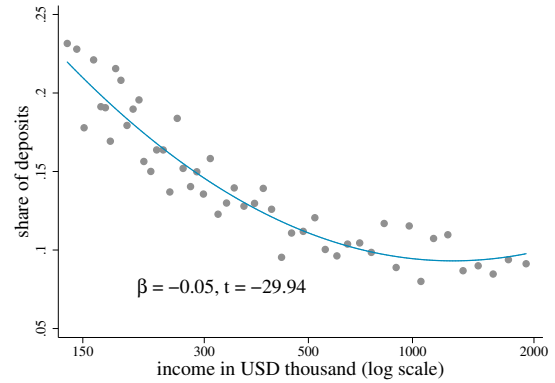
[Table OA9](#) shows that the share of deposits in total financial assets declines in income, even after controlling for an extensive set of household characteristics.

Figure OA1: Financial asset composition by household income

(a) Financial assets across income groups

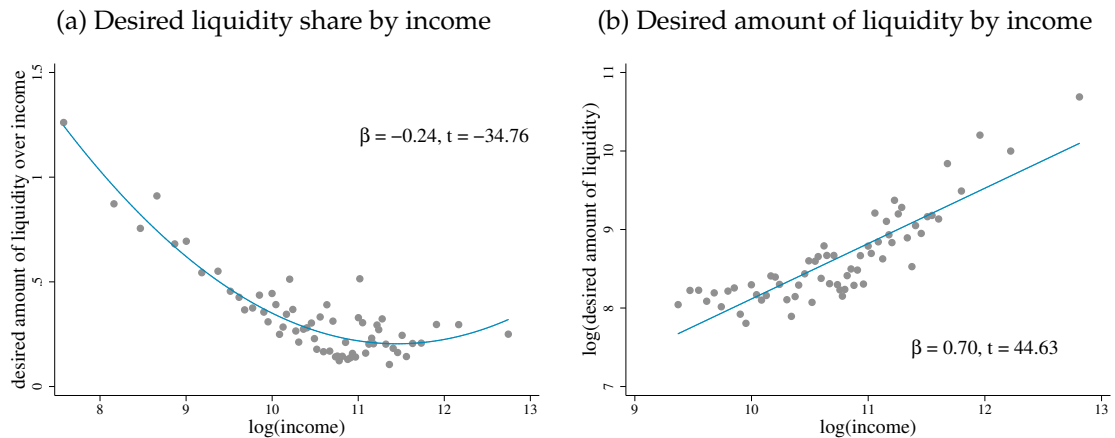


(b) Deposit share by income within top 10%



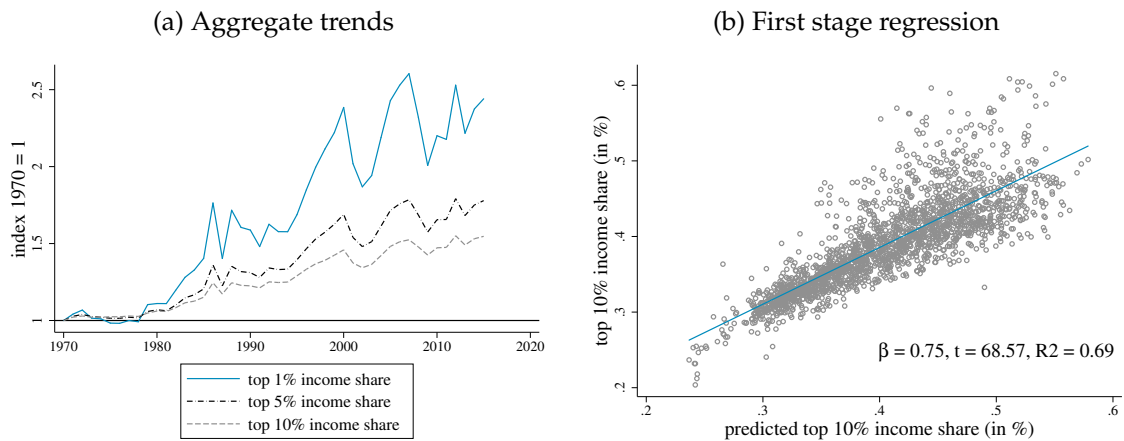
Note: Panel (a) provides a breakdown of the allocation of households' financial wealth by income group. Panel (b) provides a binned scatterplot with quadratic fit of the share of deposits over total financial assets on the vertical axis and log income on the horizontal axis for households with an income above USD 150,000. Source: Survey of Consumer Finances.

Figure OA2: Direct evidence on household's liquidity needs by income



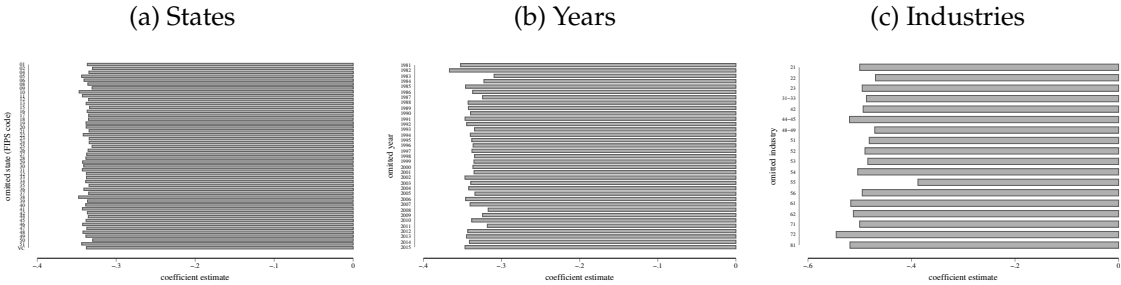
Note: Panel (a) provides a binscatter plot of the desired liquidity (defined as "About how much do you think you (and your family) need to have in savings for emergencies and other unexpected things that may come up?"), scaled by income, on the vertical axis and log income on the horizontal axis. Panel (b) shows the analogous relationship with the desired liquidity amount in logs rather than as a share of income. Source: 1993 Survey of Consumer Finances.

Figure OA3: Bartik IV – aggregate trends and first stage



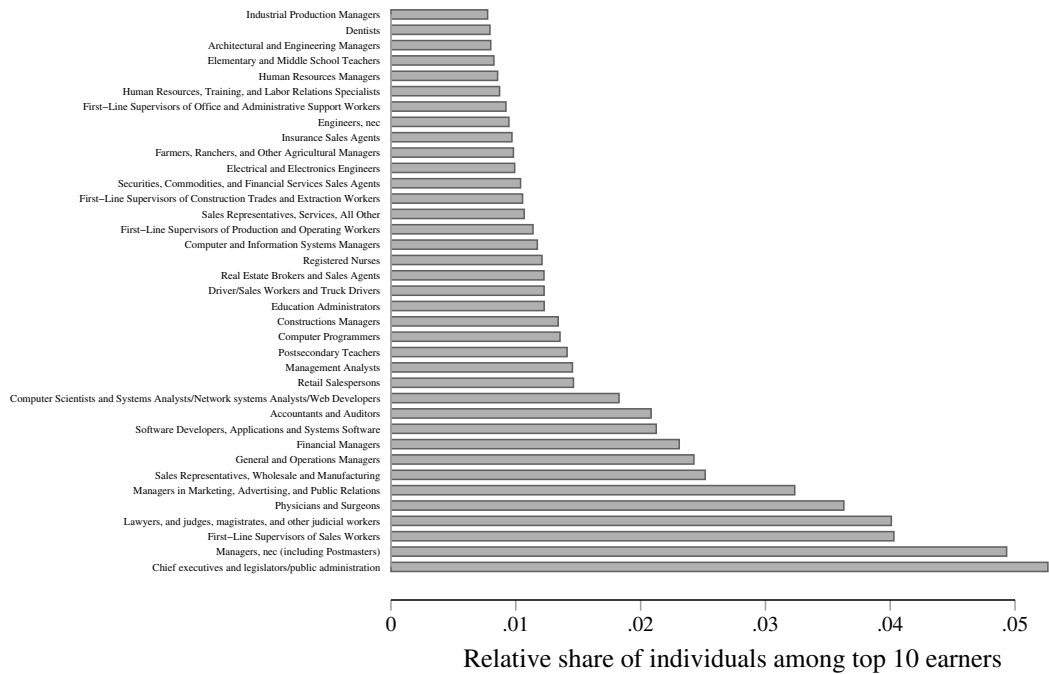
Note: Panel (a) presents the evolution of different top income shares over the sample period. These remained relatively flat until 1980. Afterwards shares at the upper end of the income distribution grew more rapidly. Panel (b) illustrates the first stage of our IV strategy. It plots actual state-level top 10% income shares on the vertical axis and the predicted shares on the horizontal axis.

Figure OA4: Stability of coefficients – excluding individual states, years, industries



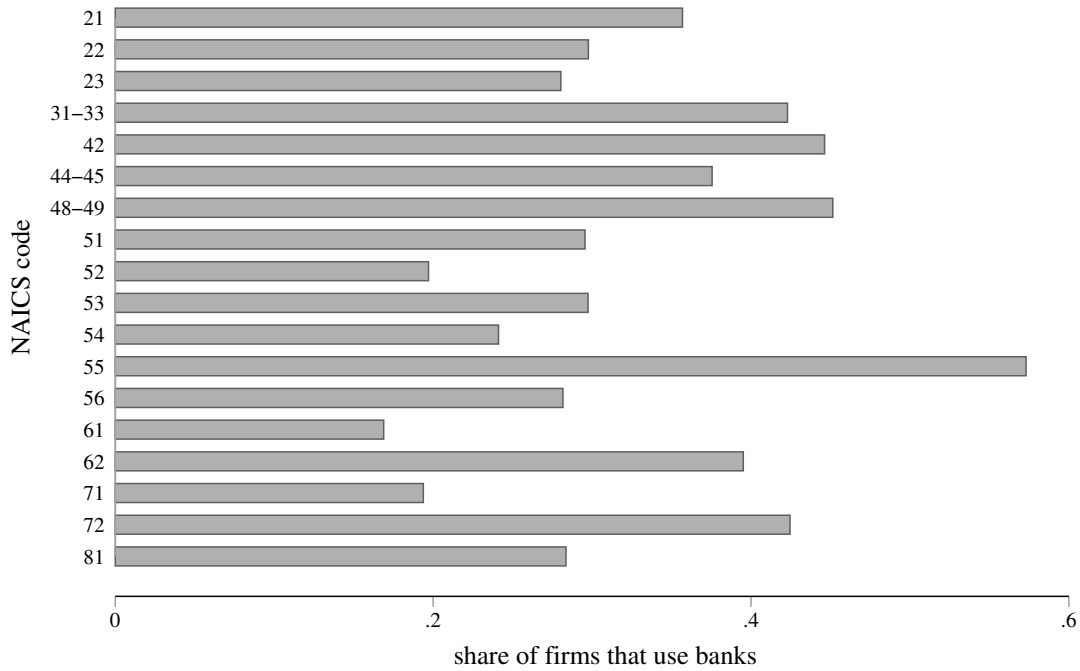
Note: all coefficients are significant at the 1% level.

Figure OA5: Who are the top earners? IPUMS occupations 2002



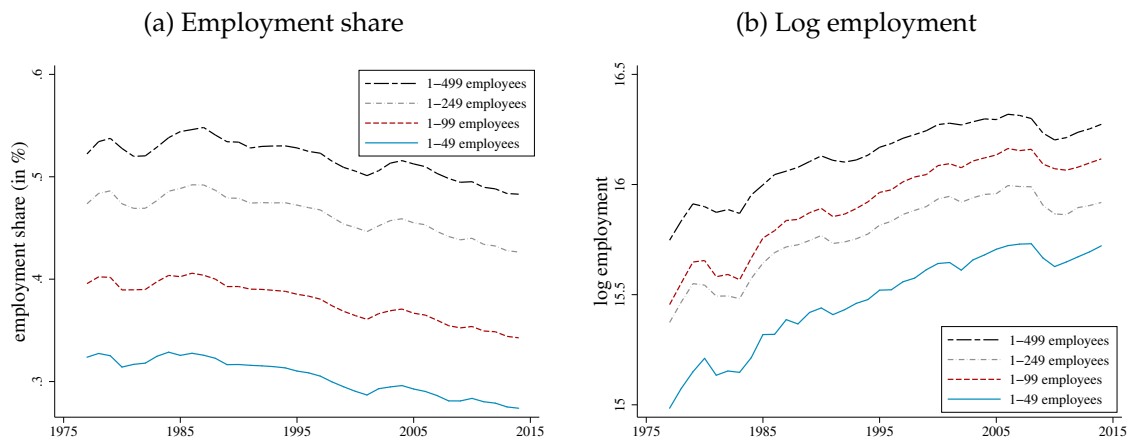
Note: This figure lists all occupations that represent at least 0.75% of all top 10% income earners in 2002. Source: IPUMS.

Figure OA6: Share of firms that use banks



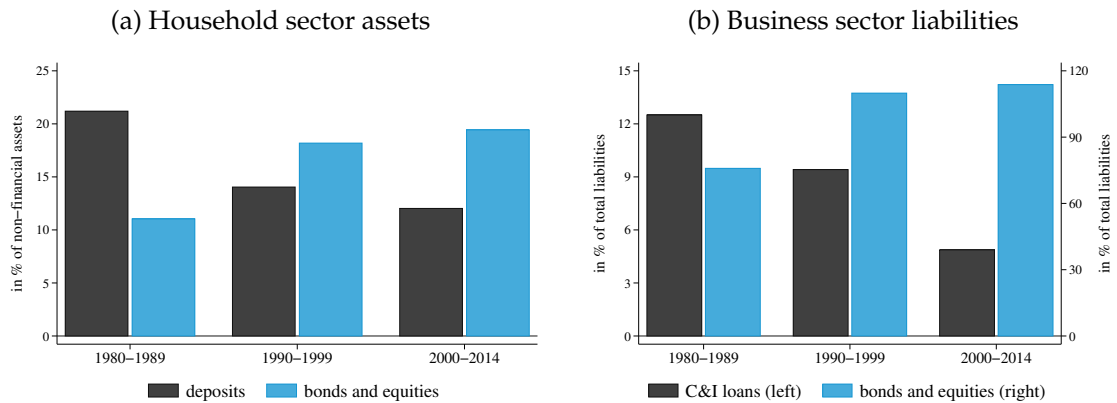
Note: Source is the Survey of Business Owners.

Figure OA7: Small business employment



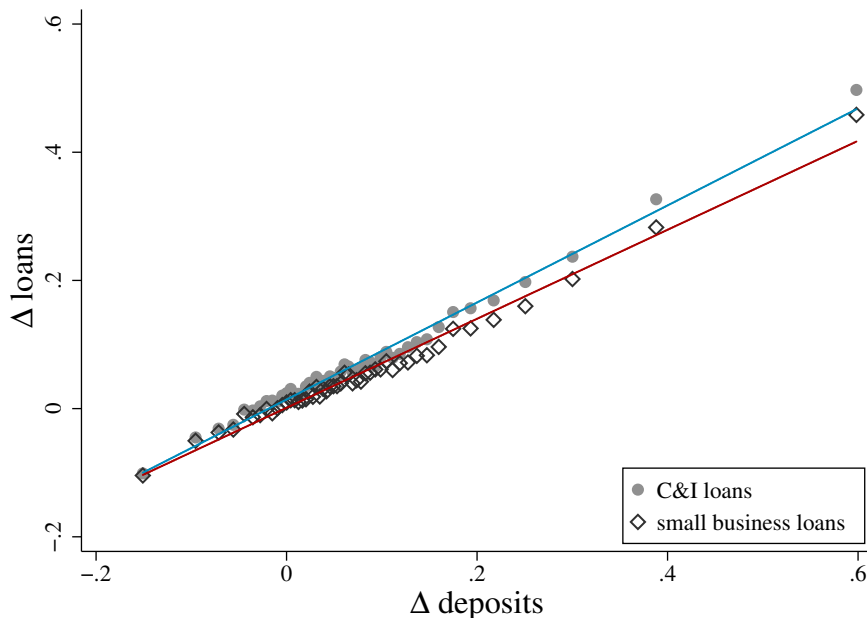
Note: Panel (a) plots employment in different firm size categories as share of aggregate employment over time. Panel (b) plots log employment in different firm size categories over time. Source: Business Dynamic Statistics 1977-2014.

Figure OA8: Aggregate trends in deposits, loans, bonds and equities



Note: Panel (a) plots deposits and bonds+equities as share of total household non-financial assets over time. Panel (b) plots C&I loans and bonds+equities as share of total non-financial corporate liabilities over time. Source: Financial Accounts of the United States.

Figure OA9: Bank deposits and bank lending



Note: Binscatter plot of the bank-level change in C&I and small business loans on the vertical axis against the bank-level change in deposits on the vertical axis. Source: Financial Accounts of the United States and FDIC Statistics of Depository Institutions.

Table OA1: Descriptive statistics

Panel (a): State level

Variable	Obs	Mean	Std. Dev.	Min	Max	P25	P50	P75
top 10% income share	1598	.405	.053	.252	.609	.368	.403	.436
top 5% income share	1598	.29	.053	.143	.515	.254	.286	.315
top 1% income share	1598	.149	.044	.061	.353	.119	.142	.167
Gini index	1598	.568	.046	.459	.711	.541	.566	.596
net job creation rate, firms 1-9	1598	.023	.041	-.178	.3	.001	.024	.045
net job creation rate, firms 10-99	1598	.019	.032	-.132	.189	.004	.021	.036
net job creation rate, firms 100-499	1598	.024	.036	-.139	.181	.004	.026	.045
net job creation rate total	1598	.018	.027	-.097	.144	.005	.02	.033
income per capita (in th)	1598	27.057	11.717	7.958	69.851	17.371	25.526	35.46
population (in th)	1598	5539.543	6164.385	418.493	38701.28	1332.213	3628.267	6450.632
% old population	1598	.125	.021	.029	.186	.114	.126	.137
% black population	1598	.119	.121	.002	.705	.027	.081	.162
Δ income p.c.	1598	.047	.031	-.104	.262	.031	.047	.064
unemployment rate	1598	.061	.021	.023	.154	.045	.057	.073

Panel (b): Bank level

Variable	Obs	Mean	Std. Dev.	Min	Max	P25	P50	P75
log(deposits)	243674	11.093	1.317	0	16.647	10.206	10.966	11.826
deposit expense (in %)	243674	.935	.511	.013	3.254	.547	.931	1.291
log(C&I loans)	112884	9.535	1.712	0	14.787	8.421	9.446	10.575
C&I interest (in %)	112884	2.049	.991	0	22.463	1.469	1.859	2.378
log(assets)	243674	11.437	1.373	6.878	21.423	10.515	11.289	12.163
non-interest income (in %)	243674	10.564	8.172	.327	62.203	5.628	8.679	13.023
return on assets (in %)	243674	2.137	2.6	-13.984	8.015	1.531	2.504	3.353
deposits/liabilities	243674	.946	.085	0	1	.934	.978	.99
capital/liabilities	243424	.1	.044	0	.999	.078	.092	.112

Note: This table provides summary statistics for the main variables at the state and bank level in panels (a) and (b). For variable definitions and details on the data sources, see the main text.

Table OA2: Descriptive statistics – SCF

Variable	Obs	Mean	Std. Dev.	Min	Max	P25	P50	P75
income (in USD th)	129440	83.458	310.522	0	264543	25.782	51.207	91.095
total financial assets (in USD th)	122244	223.182	1488.795	.001	1368505	3.821	28.994	134.098
% deposits (checking+saving+call+cds)	122244	.41	.4	0	1	.046	.229	.915
% direct	122244	.59	.4	0	1	.085	.771	.954
% life insurance	122244	.089	.221	0	1	0	0	.023
% savings bonds	122244	.019	.089	0	1	0	0	0
% MM deposits + MMMF	122244	.043	.145	0	1	0	0	0
% pooled investment funds	122244	.045	.144	0	1	0	0	0
% stocks	122244	.048	.148	0	1	0	0	0
% bonds	122244	.006	.053	0	.997	0	0	0
% other managed assets	122244	.022	.111	0	1	0	0	0
% residual assets	122244	.318	.362	0	1	0	.132	.653

Note: This table shows summary statistics for main variable from the Survey of Consumer Finances. For variable definitions and more details on the data sources, see the main text.

Table OA3: Collateral, venture capital, public goods, and local demand

VARIABLES	(1) net JCR	(2) net JCR	(3) no VC net JCR	(4) net JCR	(5) edu sample net JCR	(6) net JCR	(7) net JCR	(8) tradable net JCR
top 10% × very small firm (1-9)	-0.320*** (0.045)	-0.301*** (0.024)	-0.341*** (0.029)	-0.440*** (0.042)	-0.658*** (0.074)	-0.490*** (0.031)	-0.493*** (0.030)	-0.586*** (0.034)
house price index × very small firm (1-9)	-0.002 (0.004)							
house price index growth × very small firm (1-9)		0.149*** (0.019)						
log(VC deals) × very small firm (1-9)				-0.005*** (0.001)				
education exp. × very small firm (1-9)					0.020*** (0.005)			
Observations	16,450	16,450	15,050	9,450	10,120	298,834	298,759	246,978
State*Size FE	✓	✓	✓	✓	✓	✓	✓	✓
State*Year FE	✓	✓	✓	✓	✓	✓	-	-
State*Naics*Year FE	-	-	-	-	-	-	✓	✓
F-stat	145.7	298.2	282	280.9	108.6	331.3	330.9	330.3

Note: This table reports results from 2SLS regression Equation 1 at the state-firm size-year level in columns (1)–(5) and at the state-industry-firm size-year level in columns (6)–(8). The dependent variable is the net job creation rate. The variable *top 10% income share* denotes the income share that accrues to the top 10% in state s , lagged by one period, and instrumented with the Bartik instrument. The variable *very small firm* is a dummy with a value of one for the group of firms with one to nine employees. In columns (1) and (2), the variables *house price index* and *house price index growth* denote the level and change in the state-level house price index, with index year 1990. Column (3) excludes CA, MA, NY, and TX from the analysis, ie the states that account for the majority of venture capital (VC) funding. Column (4) directly controls for the number of VC deals in each state, interacted with the small firm dummy. Column (5) controls for state-level education expenditure as a share of GDP, interacted with the small firm dummy. Column (6) estimates the baseline 2SLS specification at the state-industry-firm size-year level with state*size and state*time fixed effects. Column (7) uses state*industry*time fixed effects instead of state*time fixed effects. Column (8) excludes non-tradable industries from the analysis. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1. F-stat refers to the first-stage F-statistic.

Table OA4: Alternative outcome variables

VARIABLES	(1) log(firms)	(2) log(jc)	(3) log(jc births)	(4) log(jc cont)	(5) log(jd)	(6) jcr	(7) jcr births	(8) jdr	(9) net jcr	(10) real. rate
top 10% × very small firm (1-9)	-2.443*** (0.198)	-3.517*** (0.297)	-2.447*** (0.269)	-3.706*** (0.311)	-2.512*** (0.270)	-0.405*** (0.027)	-0.312*** (0.023)	-0.061*** (0.012)	-0.338*** (0.028)	-0.334*** (0.030)
Observations	16,450	16,450	16,450	16,450	16,450	16,450	16,450	16,450	16,450	16,450
State*Size FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State*Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cluster	State	State	State	State	State	State	State	State	State	State

Note: This table reports results from 2SLS regression Equation 1 at the state-firm size-year level. The variable *top 10% income share* denotes the income share that accrues to the top 10% in state s , lagged by one period, and instrumented with the Bartik instrument. The variable *very small firm* is a dummy with a value of one for the group of firms with one to nine employees. Standard errors are clustered at the state level. The first-stage F-statistics equals 302.06 in each column. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table OA5: Robustness tests – state-year level

VARIABLES	(1) no recession net JCR	(2) no GFC net JCR	(3) pre 2008 net JCR	(4) no boom years net JCR	(5) no boom states net JCR	(6) net JCR
top 10% × very small firm (1-9)	-0.334*** (0.028)	-0.318*** (0.028)	-0.271*** (0.033)	-0.370*** (0.029)	-0.309*** (0.029)	-0.309*** (0.040)
Observations	14,800	15,510	12,690	12,690	13,300	16,450
State*Size FE	✓	✓	✓	✓	✓	✓
State*Year FE	✓	✓	✓	✓	✓	✓
Controls	-	-	-	-	-	× tiny

Note: This table reports results from 2SLS regression Equation 1 at the state-firm size-year level. The dependent variable is the net job creation rate. The variable *top 10% income share* denotes the income share that accrues to the top 10% in state s , lagged by one period, and instrumented with the Bartik instrument. The variable *very small firm* is a dummy with a value of one for the group of firms with one to nine employees. Column (1) excludes observations with GDP growth in the bottom decile (recessions) from the analysis. Column (2) excludes the years 2007-08 from the analysis. Column (3) only includes years prior to 2008 in the analysis. Column (4) excludes the years of the pre-GFC housing boom (2000–2007) from the analysis. Column (5) excludes all states that experienced a pronounced housing boom (AZ, CA, DC, FL, ML, MS, NV, NJ, RI, VT) from the analysis. Column (6) interacts the dummy *very small firm* with all state-level control variables. Standard errors are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table OA6: Robustness tests – state-industry-year level

VARIABLES	(1) net JCR	(2) net JCR	(3) net JCR	(4) net JCR
top 10% × very small firm (1-9)	0.182*** (0.055)	-0.424*** (0.029)	-0.389*** (0.028)	-0.364*** (0.027)
bank dep. × very small firm (1-9)	0.837*** (0.073)			
top 10% × bank dep. × very small firm (1-9)	-2.020*** (0.183)			
ext. fin. dep. × very small firm (1-9)		0.048*** (0.009)		
top 10% × ext. fin. dep. × very small firm (1-9)		-0.112*** (0.021)		
markup × very small firm (1-9)			0.009*** (0.001)	
HHI × very small firm (1-9)				0.037*** (0.008)
Observations	298,759	298,759	267,343	267,343
State*Size FE	✓	✓	✓	✓
State*Year FE	-	-	-	-
State*Naics*Year FE	✓	✓	✓	✓

Note: This table reports results from 2SLS regression Equation 1 at the state-industry-firm size-year level. The dependent variable is the net job creation rate. The variable *top 10% income share* denotes the income share that accrues to the top 10% in state s , lagged by one period, and instrumented with the Bartik instrument. The variable *very small firm* is a dummy with a value of one for the group of firms with one to nine employees. Column (1) interacts *top 10% income share* and *very small firm* with a dummy for bank-dependent industries. Column (2) interacts *top 10% income share* and *very small firm* with a dummy for external financial-dependent industries. Column (3) interacts *very small firm* with state-level markups, computed from Compustat. Column (4) interacts *very small firm* with the Herfindahl index for firm sales at the state-level, computed from Compustat. Standard errors are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table OA7: Rising top incomes reduce small firm job creation – OLS results

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	net JCR	net JCR	net JCR	net JCR	net JCR	low BD net JCR	high BD net JCR
top 10% income share	0.025 (0.019)						
very small firm (1-9)	0.073*** (0.008)	0.073*** (0.008)					
top 10% × very small firm (1-9)	-0.162*** (0.020)	-0.162*** (0.020)	-0.257*** (0.022)	-0.271*** (0.026)		-0.274*** (0.028)	-0.596*** (0.041)
top 10% × small firm (10-99)				-0.043*** (0.016)			
top 10% × medium firm (100-499)				-0.022 (0.017)			
top 1% × very small firm (1-9)					-0.317*** (0.030)		
Observations	16,450	16,450	16,450	16,450	16,450	97,260	88,112
R-squared	0.273	0.391	0.437	0.437	0.437	0.081	0.100
Controls	✓	-	-	-	-	-	-
State FE	✓	-	-	-	-	-	-
Year FE	✓	-	-	-	-	-	-
State*Year FE	-	✓	✓	✓	✓	✓	✓
State*Size FE	-	-	✓	✓	✓	✓	✓

Note: This table reports results from OLS regression [Equation 1](#) at the state-firm size-year level in columns (1)–(5) and at the state-industry-firm size-year level in columns (6)–(7). The dependent variable is the net job creation rate. The variables *top 10% income share* and *top 1% income share* denote the income share that accrues to the top 10% or 1% in state s , lagged by one period. The variable *very small firm* is a dummy with a value of one for the group of firms with one to nine employees; *small firm* is a dummy with a value of one for the group of firms with ten to 99 employees; *medium firm* is a dummy with a value of one for the group of firms with 100 to 499 employees. *Low/high BD* denotes to industries with low/high dependence on bank lending. Standard errors are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table OA8: Call reports – bank size

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	log(dep)	dep rate	log(CI)	CI rate	state-level net JCR	state-level net JCR
top 10% income share	-13.331*** (0.919)	-12.971*** (0.827)	-20.017*** (2.459)	-43.645*** (3.523)		
top 10% × log(assets)	1.352*** (0.033)	1.269*** (0.038)	1.783*** (0.087)	4.175*** (0.138)		
top 10% × very small firm (1-9)					0.569 (0.429)	-0.459*** (0.045)
very small firm (1-9) × log(median assets)					0.043** (0.018)	
top 10% × very small firm (1-9) × log(median assets)					-0.089** (0.040)	
very small firm (1-9) × log(banks pc)						-1.016*** (0.185)
top 10% × very small firm (1-9) × log(banks pc)						2.692*** (0.568)
Observations	242,651	242,651	112,393	112,393	16,100	16,100
Bank FE	✓	✓	✓	✓	-	-
Year FE	✓	✓	✓	✓	-	-
State*Size FE	-	-	-	-	✓	✓
State*Year FE	-	-	-	-	✓	✓
Cluster	State	State	State	State	State	State
F-stat	25.02	25.02	88.23	88.23	302.06	302.06

Note: This table reports 2SLS regressions. *top 10% income share* is the income share that accrues to the top 10% in state s , lagged by one period, and instrumented with the Bartik instrument. *very small firm* is a dummy with a value of one for the group of firms with one to nine employees. Standard errors are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table OA9: Deposit holdings and household income – variation with controls

VARIABLES	(1) % deposits	(2) % deposits	(3) % deposits	(4) % deposits	(5) % deposits
top 10% income group	-0.269*** (0.003)	-0.125*** (0.003)	-0.125*** (0.003)		
income percentile 20-39.9%				-0.129*** (0.005)	-0.097*** (0.005)
income percentile 40-59.9%				-0.236*** (0.005)	-0.176*** (0.005)
income percentile 60-79.9%				-0.344*** (0.005)	-0.257*** (0.005)
income percentile 80-89.9%				-0.413*** (0.005)	-0.304*** (0.006)
income percentile 90-100%				-0.486*** (0.004)	-0.359*** (0.006)
Observations	122,244	122,244	122,244	122,244	122,244
R-squared	0.044	0.149	0.150	0.149	0.184
Controls	-	✓	✓	-	✓
Time FE	-	-	-	-	-
Survey wave FE	-	-	✓	-	✓

Note: This table shows that high income households hold fewer deposits as part of their total financial assets. We estimate $\% \text{ deposits}_i = \mathbb{1}(\text{top } 10\% \text{ income group})_i + \text{controls}_i + \tau_i + \epsilon_{it}$, where $\% \text{ deposits}_i$ is the share of deposits out total financial wealth of household i (belonging to cohort t), and dummy $\mathbb{1}(\text{top } 10\% \text{ income group})_i$ takes on value one if the household belongs to the top income percentile. Column (1) shows that a household in the top income group holds on average 26.9% fewer of its assets in the form of deposits. Column (2) adds an extensive set of household-level controls: age, education level, number of kids, occupation, gender, race, marriage status, home ownership, and a dummy for business ownership. The coefficient declines in size to -12.5% , but remains highly significant at the 1% level. Column (3) adds cohort fixed effects (τ_i), but the coefficient of interest remains identical in terms of sign, size, and significance. Columns (4)-(5) include dummies for each income group, where the bottom 0-20% group of households is the omitted category. Hence, all coefficients indicate the share of deposits relative to the bottom income percentiles. Column (4) uses no controls, column (5) the full set of controls. Across specifications, coefficients decline in absolute magnitude as we add controls. Yet, all coefficients are decreasing with the respective income group, and they are economically large and statistically significant at the 1% level. In column (5), the second group holds 9.7% fewer assets in the form of deposits than the bottom group, while the fourth and sixth group hold 25.7% and 35.9% fewer financial assets in the form of deposits than the bottom group. Source: Survey of Consumer Finances. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Additional details and results for structural model

Stationary equilibrium definition

A stationary equilibrium is defined by a set of prices $\{R_k, R_d, w, \tilde{w}, R_l\}$, and a set of allocations $\{c_i, n_i, \tilde{n}_i, d_i, k_i, K, N, Y, \tilde{y}_j, \tilde{n}_j, P_i, L, D, C, I, G, T_i\}$ that satisfy:

1. Variables $\{c_i, n_i, \tilde{n}_i, d_i, k_i\}_{i \in [0,1]}$ maximize household i 's expected discounted life-time utility (4) subject to (5), taking $\{R_d, R_k, w, \tilde{w}, \Pi_i, T_i\}$ as given.
2. The public firm's capital and labor demand satisfies the optimality condition (8) and (9). The public firm output is determined by (7).
3. Each private firm $j \in \mathcal{J}$ chooses its optimal employment \tilde{n}_j^* according to (12) for a given loan rate R_l . The output of private firm $j \in \mathcal{J}$ is given by (10).
4. The loan rate is determined by (13) for given deposit rate R_d
5. The price variables $\{R_k, R_d, R_l, w, \tilde{w}\}$ clear all markets.

Solution algorithm

1. Guess the aggregate capital stock K .
2. For a given K , guess the deposit rate R_d .
3. Guess the public and private firm wage w and \tilde{w} .
4. For given wages, capital stock, and the deposit rate, compute the public and private firm labor demand.

$$N = \left\{ \frac{(1-\theta)Z}{w} \right\}^{\frac{1}{\theta}} K \quad (23)$$

$$\tilde{n}_j^* = \left[\frac{\alpha \tilde{z}_j}{\{1 + (R_\ell - 1)\phi_j\} \tilde{w}} \right]^{\frac{1}{1-\alpha}} \quad (24)$$

where

$$R_\ell = R_d + \frac{\Xi}{L} \quad \text{with} \quad L = \sum_{j=1}^{\mathcal{J}} \phi_j \tilde{w} \tilde{n}_j^* \quad (25)$$

5. Check the labor market clearing conditions.

$$N = \int n_i di \quad (26)$$

$$\sum_{j=1}^{\mathcal{J}} \tilde{n}_j^* = \int \tilde{n}_i di \quad (27)$$

6. Iterate the step 3 to 5 until the labor market clears.
7. Compute R_k and Π .

$$R_k = \theta Z \left(\frac{K}{L} \right)^{\theta-1} + 1 - \delta \quad (28)$$

$$\Pi = \sum_{j=1}^{\mathcal{J}} \left[\tilde{y}_j - \{1 + \phi_j(R_l - 1)\} \tilde{w} \tilde{n}_j^* \right] \quad (29)$$

8. For given $R_k, R_d, w, \tilde{w}, \Pi, T_i$, solve the household's problem.
9. Check the market clearing condition for deposit.

$$D = \int d_i di = L \quad (30)$$

10. Repeat steps 2 to 8 until the deposit market clears.
11. Check the capital market clearing condition.

$$K = \int k_i di \quad (31)$$

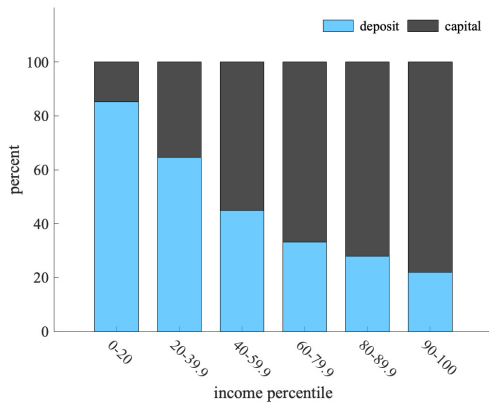
12. If the market clears, the model is solved. Otherwise, update the guess for K and repeat the procedure.

Household portfolio allocation in the model

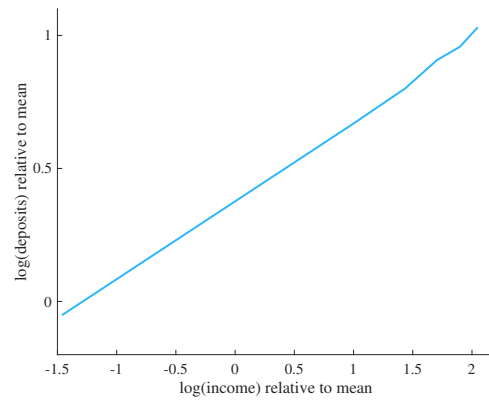
Figure OA10 shows households' heterogeneous portfolio composition in the initial stationary equilibrium of the model. Note that in the calibration of the model we target the SCF data in the early 1980s, while Figure 1 shows SCF data pooled over several survey waves.

Figure OA10: Portfolio allocation in initial stationary equilibrium

(a) Deposit shares across income groups



(b) Absolute deposit holdings by income



Note: Panel (a) provides a breakdown of the allocation of households' financial wealth in deposits and public firm investments by income group. Panel (b) plots the relation between the log of total household deposits on the vertical axis and the log of total household income on the horizontal axis. These plots are created in the initial stationary equilibrium of the structural model, which is calibrated to match the SCF data in the early 1980s.

Discussion of MPC and MPS in the structural model

While not central to the focus of our paper, we examine whether our model exhibits an empirically plausible marginal propensity to consume (MPC) and marginal propensity to save (MPS), as defined in the macro literature. Specifically, we compute households' consumption and saving responses to an unexpected transitory income transfer. The size of this transitory income shock is equal to 10% of average quarterly income.

The resulting average MPC in our model is 0.13, which is on the lower end of estimates in the empirical literature. A wide range of papers finds values between 0.1 and 0.9 for the average MPC of households in the United States and other countries, typically in Europe.²⁷ A relatively low MPC in the model can be attributed some features that the model abstracts from but that would likely give stronger consumption responses to transitory income changes. Examples from the literature are preference heterogeneity and the presence of illiquid assets.²⁸ The fact that deposits in our model play the role of a necessity good further reduces households' MPC.

Table OA10 presents MPCs and MPSs along the income distribution, and Table OA11 along the wealth distribution. The model generates qualitatively plausible distributions. For instance, Jaspelli and Pistaferri (2014) show that households with low cash-on-hand exhibit higher MPCs than households with high cash-on-hand.²⁹ Similarly, in our model, low income and low wealth households have higher MPCs than high income and high wealth households, though the difference between the bottom 90% and the top 10% is modest. In the model, income and wealth are positively correlated (correlation coefficient of 0.63) and all assets are liquid. Regarding the differences MPS across asset types, low income and low wealth households have higher MPS in deposits than high income and high wealth households, leading to higher deposit shares among relatively low income households.

²⁷Parker (1999) and Parker et al. (2013) report estimates ranging from 0.12 to 0.3 for the average quarterly MPC on non-durable goods. Shapiro and Slemrod (2009) and Sham et al. (2010) find that households spend one-third of stimulus checks in a year. Jaspelli and Pistaferri (2014) report a relatively high value of the average MPC, 0.48, using survey results on Italian households. Also, Souleles (2002) finds substantially higher values for the average annual MPC, ranging from 0.6 to 0.9, on non-durable goods.

²⁸Carrol et al. (2017) show that modest preference heterogeneity, i.e., the existence of impatient households, can increase the average MPC in macro models with heterogeneous agents substantially. Also, Kaplan and Violante (2014) show that households with little liquid wealth, i.e., hand-to-mouth households, exhibit a higher MPC than households with a positive amount of liquid wealth.

²⁹Aside from Jaspelli and Pistaferri (2014), the evidence on the MPC distribution is scarce partly due to the lack of enough samples to precisely estimate the MPC of subgroups of households. Also, Lewis et al. (2021) show that observable characteristics, such as non-salary income, account at most for a quarter of estimated MPC heterogeneity, implying that MPC may or may not decrease in income or liquid wealth.

Table OA10: MPC and MPS along the income distribution

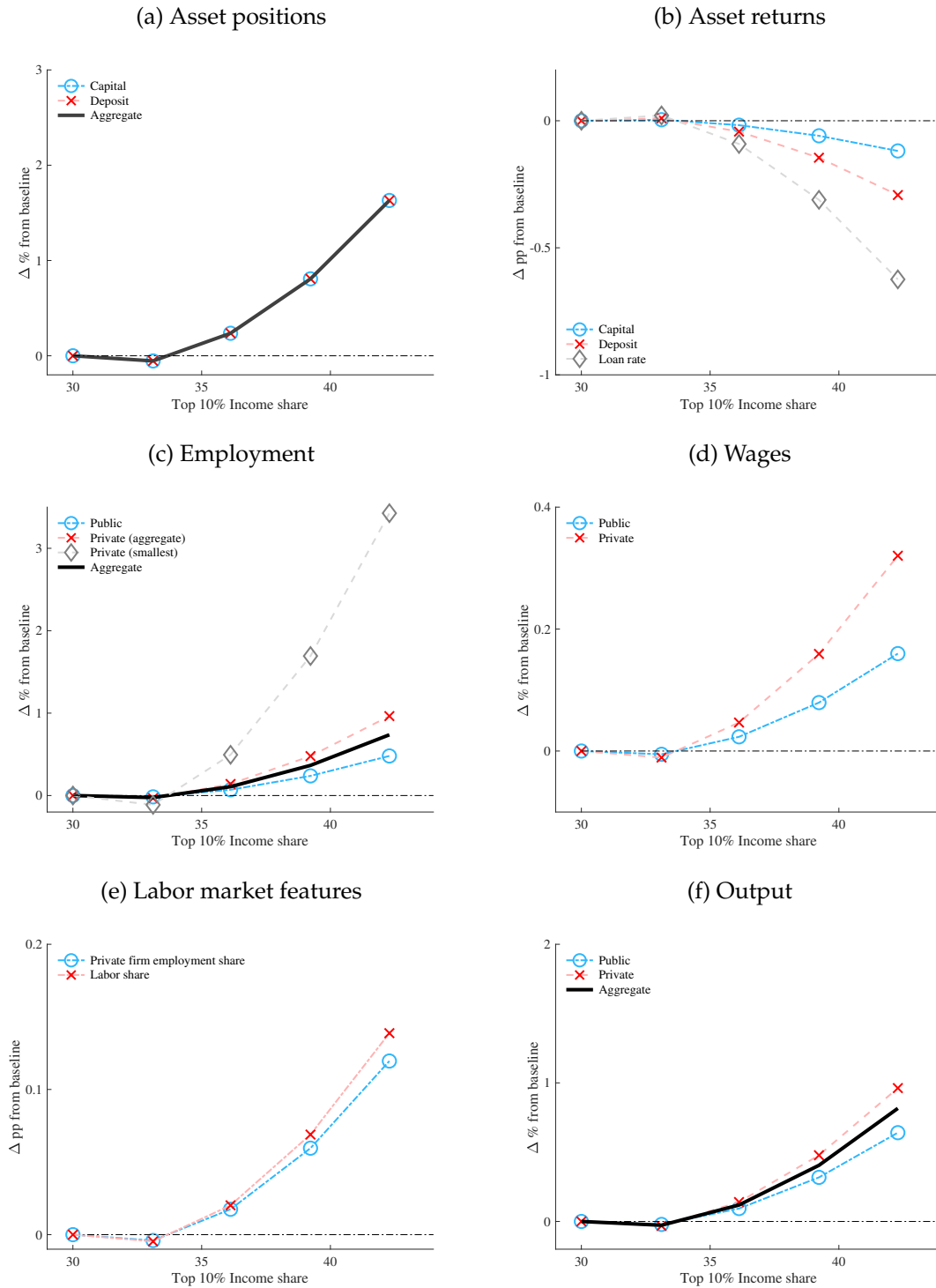
	MPC	MPS	
		(deposit)	(capital)
Q1	0.20	0.54	0.26
Q2	0.14	0.28	0.58
Q3	0.10	0.11	0.79
Q4	0.09	0.06	0.85
Q5	0.11	0.12	0.77
Bottom 90%	0.13	0.23	0.64
Top 10%	0.11	0.11	0.78
Average	0.13	0.22	0.65

Table OA11: MPC and MPS along the wealth distribution

	MPC	MPS	
		(deposit)	(capital)
Q1	0.16	0.36	0.48
Q2	0.09	0.06	0.85
Q3	0.09	0.05	0.86
Q4	0.08	0.05	0.87
Q5	0.08	0.04	0.88
Bottom 90%	0.13	0.24	0.63
Top 10%	0.08	0.04	0.88
Average	0.13	0.22	0.65

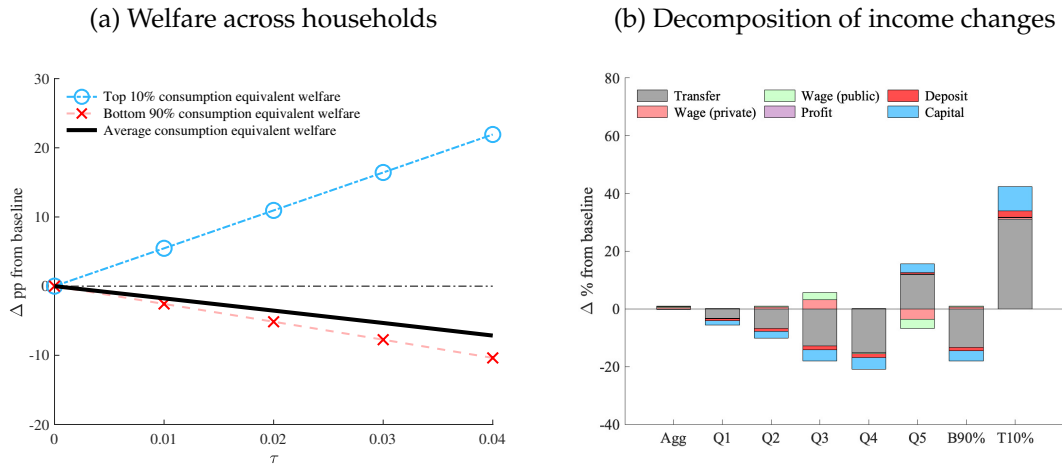
Additional results from the model experiments

Figure OA11: GE consequences of rising top income shares - Alternative model



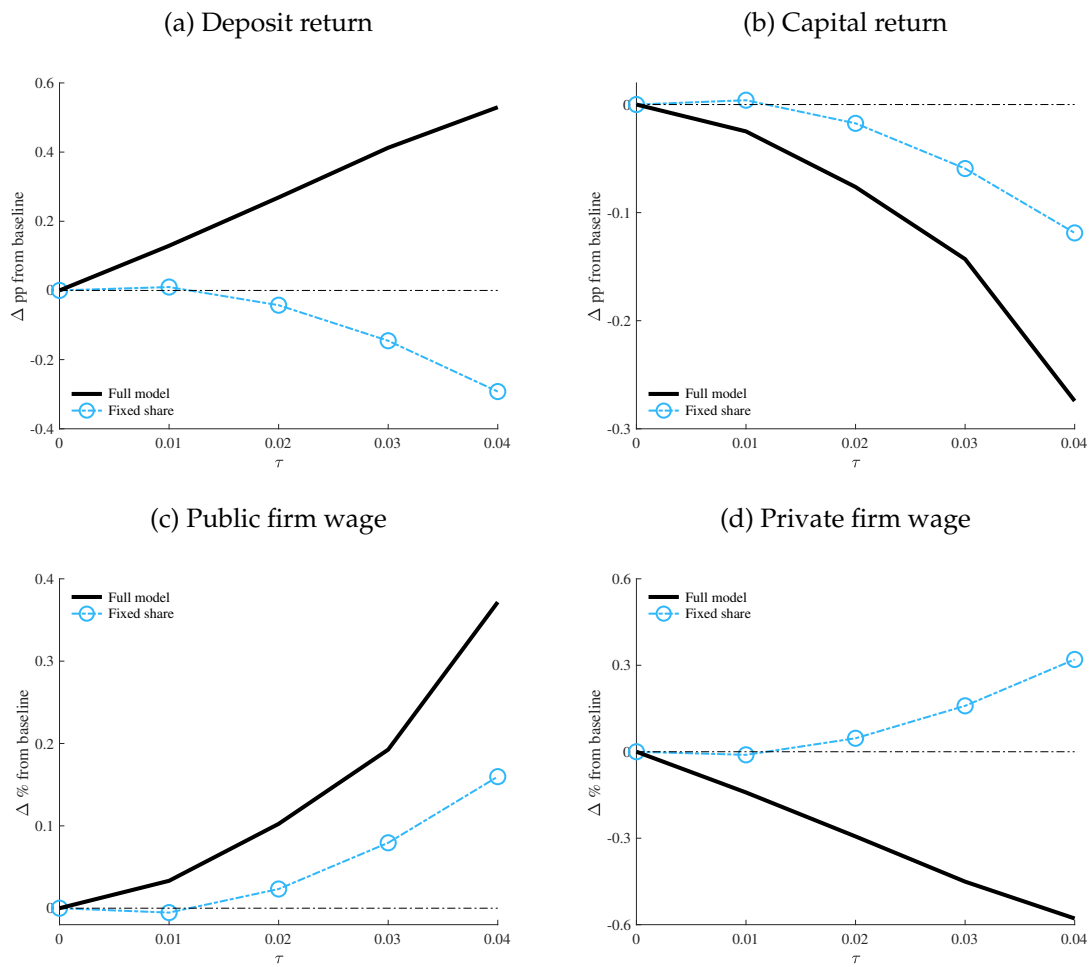
Note: This figure corresponds to Figure 5 in the main text, but shows the same results for the alternative model with fixed portfolio shares.

Figure OA12: Welfare consequences - Alternative model



Note: This figure corresponds to Figure 6 in the main text, but shows the same results for the alternative model with fixed portfolio shares

Figure OA13: GE consequences on prices across model versions



Note: This figure complements Panel (c) of Figure 7 in the main text, by showing all returns and wages across the two model versions.