Household Inequality and Firm Savings [preliminary]

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Abstract

We document the link between household income inequality and financial asset holdings by firms in the U.S. data. Both aggregate corporate savings and those at the firm-level are positively associated with income inequality in the post-war period, with the observed rise in inequality accounting for a large share of the increase in firm savings in the last decades. We propose a simple mechanism of direct firm ownership in which financial assets are useful to fund capital investment, which is subject to a liquidity constraint. Higher income households value current consumption less, and thus choose to keep more assets to avoid being investment constrained in the future. An increase in income inequality leads to larger firm savings as it is associated with a higher concentration of firm ownership among richer households.

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1 Introduction

Both the rise in firm savings and in economic inequality among households have been pervasive features of most advanced countries in recent decades. In particular, the persistent accumulation of financial assets has led the U.S. non-financial business sector from being a net borrower relative to the rest of the economy prior to 2000 to a net lender today. At the same time, income inequality, as measured by several indexes such as the Gini ratio for households, has increased in the U.S. for several decades, reaching its historic high.

It is important to study and understand these two patterns together for several reasons. The rise in firms' gross and net savings reflects the choices of the business sector with respect to investment and profits allocation. At the same time, since all firms are ultimately owned by households through stock ownership in the case of corporations or directly for non-corporates, it is crucial to study how the characteristics of the individuals controlling the business sector can affect firms' decisions. This suggests that the two patterns can only be fully understood jointly as policies geared toward households will surely affect firms and vice versa. Further, as these patterns occur over decades, the effects of such policies will take time to appear and may therefore be undervalued by short-term policymakers.

Our main goal in this paper is to empirically document the link between firm financial asset holdings and household inequality using U.S. macro and micro data sources. In doing so, we highlight a new channel through which the income of firm owners affects firm savings decisions. Then, we provide intuition for the empirical results by proposing a simple theoretical mechanism that links households' income to the savings decisions of the firms they own. In this way, we argue that the distribution of firm ownership across households matters for the behavior of the business sector, which cannot be approximated by assuming the existence of a representative firm owner.

The literature has suggested a simple explanation of why firms save. Due to capital market imperfections, holdings of financial assets will be the optimal way to finance investment and cover unexpected negative cash flows. This is because internal savings allow firms to reduce the recourse to expensive external finance and to avoid transaction costs associated with selling illiquid productive assets. However, few papers have attempted to account for the positive trend in savings observed in the data. Two exceptions to this are Karabarbounis and Neiman (2014) and Armenter and Hnatkovska (2017). According to the former, a secular decrease in the labor share is the driver of increased saving, while the latter argues that changes in tax rates affecting the cost of capital incentivize firms to save. Similarly, in our model, the cost of capital is affected by the presence of an investment constraint that gives rise to a "precautionary motive". By saving more, firms can avoid the shadow cost of this constraint binding in the future when valuable investment opportunities are available. Differently, we suggest that it is an increase in the income of the representative firm owner that leads firms to put more weight on the cost of a binding constraint, in turn causing a rise in internal savings. We propose that a higher concentration of firm ownership among the richest households coming from a rise in income inequality can lead firms to save more. In this paper our goal is not to microfound the increase in income inequality or the associated change in the distribution of firm ownership among households observed in the data; rather, we take these two patterns as given and we aim to explore their implications on firm savings behavior.

We begin our analysis by providing some motivating evidence on the relationship between a measure of family income inequality and firm gross and net holdings of financial assets. For all non-financial businesses (both corporate and non-corporate), the correlation between the two series and the income Gini ratio in the postwar period is close to one, giving some *prima facie* evidence of the relationship we wish to study. Then, using data from the Survey of Consumer Finances (SCF), we show that over the past three decades the share of businesses held through stock or direct ownership by individuals in the top deciles of the income distribution has risen strongly. Further, we argue that this increase is not due to a change in richer households' portfolio compositions over time, but rather the share of all businesses held has increased over time with these individuals' level of income compared with other households.

Given the facts that we document in the first section of the paper, we build a simple model to provide intuition for our findings. Using a consumption-savings framework with firm and individual savings and investment, we show that households choose to hold assets within the firms that they own in the presence of a liquidity constraint. The intuition for the mechanism is as follows. When firm investment is limited by its net worth, savings within the firm perform an additional function relative to individual household savings. The higher is the household's endowment, the more she values keeping assets in the firm to fund future investment. As in the textbook dynamic consumption problem, a change in the distribution of resources across households affects individual savings decisions. When households own firms, the change in portfolio allocations directly affects savings by the business sector.

We show using a calibrated model that an endowment redistribution that increases inequality determines a rise in aggregate firm savings in an economy in which firm ownership is uniformly distributed across households. We see our results as a lower bound, as this effect would be amplified by taking into account that the share of firms held by households with higher endowments has grown over time, increasing their power as decision makers controlling firms' behavior. All in all, an increase in household income inequality will lead to an increase in the allocation of firm savings.

Our main contribution is to use aggregate and firm-level data to illustrate the relationship between household inequality and firm savings. First, using the data presented as motivating evidence, we show that even after controlling for macroeconomic and financial factors and trends, there is a large positive correlation between our variables of interest. The observed increase in the income Gini ratio of families accounts for 20 and 50% of the increase, respectively, in gross and net financial to total assets of the corporate non-financial sector. Then, we use micro data from Compustat to show that even within firms, aggregate inequality measures are important in the determination of financial asset holdings. We show that the firm-level savings decisions are highly correlated with inequality, and the effects of inequality have similar magnitudes as those predicted in the time series regressions. Therefore, we do not seem to be identifying changes in firm characteristics or a shift in firm savings affecting the aggregate, but rather a widespread effect of inequality on firm savings at the micro-level.

Our paper aims to link the large literature on household inequality with the recent works studying firm savings. The theoretical literature on household inequality grew from advances in models with heterogeneous agents, especially Krusell and Smith (1998) which made the analysis of these models tractable. Early papers of inequality include Alesina and Rodrik (1994), Persson and Tabellini (1994), and Alesina and Perotti (1996). The former empirically documents that higher income inequality is associated with lower economic growth over the following two decades, using a median voter argument to theoretically explain the pattern: when inequality increases, the median voter's income is below the mean, and therefore policies will be targeted to the preferences of lower income agents, decreasing growth through higher capital taxes. Persson and Tabellini (1994) explore a similar mechanism within an overlapping generations framework. Alesina and Perotti (1996) study the impact of income inequality on investment across 71 countries and suggest that the direction of the relationship between the two is ambiguous, highlighting the role of inequality in increasing political instability.

Additionally, there has been widespread interest in the macroeconomic effects of inequality, starting with Cutler et al. (1991) and Cutler and Katz (1992), among others. These papers stressed that the increase in wage dispersion coincided with an increase in the dispersion of consumption, with potentially large welfare losses for individuals at the bottom of the distribution. More recently, Heathcote et al. (2013) argue that the rise in income inequality was in part due to an increase in the skill premium and earnings volatility. These effects, however, need not imply welfare losses when workers can adjust labor supply and skill investment.

Our specific focus within the inequality literature is to explore how heterogeneity in endowments or income is linked to heterogeneous savings rates and portfolio decisions. Huggett and Ventura (2000) document that savings rates during prime-age years are increasing in an individual's position in the income distribution. They build a life-cycle model with retirement, social security, and earnings shocks to support the empirical pattern. Their model does not distinguish the composition of agents' savings, a key contribution of our empirical analysis. Gomes and Michaelides (2007) build an asset pricing model with idiosyncratic shocks to labor income and a life-cycle pattern of earnings and investment to study the quantitative importance of these and other model features for matching financial and macro targets. Intuitively, higher wealth individuals in their model invest more in the stock market. Unlike their paper, our goal is to study how portfolio decisions of households affect firms' decisions through direct firm ownership.

There is a large literature explicitly focusing on firm cash balances, highlighting the theoretical benefits and the empirical determinants of holding very liquid assets (see, for instance Opler et al. 1999, and the more recent work by Bates et al. 2016 and Zhao 2015). As we show in Section 2, however, the increase in non-cash assets has accounted for almost all of the rise in firm savings in the postwar period. For this reason, we take a more comprehensive view and study total firm savings rather than the subset of highly liquid assets when thinking about firms' uses of internal funds. Broadly, our analysis is interested in understanding the determinants of why firms hold all types of financial assets and find it optimal to be net lenders.

Two key papers highlight the increase in overall firm savings. Karabarbounis and Neiman (2014) relate corporate saving to a declining labor share. In their model, corporations face a constraint on debt and pay a flotation cost to raise equity, implying that corporate saving is the preferred source from which to finance corporate investment and equity buybacks. Their model, however, defines corporate saving as profits net of dividends and is thus always positive, in contrast to the majority of firms before 2000. Armenter and Hnatkovska (2017) instead show that firms have gone from being net borrowers to net lenders since the 1980s. They build a model of different tax rates on firms' sources of financing to illustrate a mechanism through which within-firm savings increase as tax rates on firms' other sources of funding, i.e. debt and equity, change. Other papers that provide explanations for the increase in firm savings are Boileau and Moyen (2010) and Zetlin-Jones and Shourideh (2017).

With a similar focus to ours, Meh (2005) links wealth inequality with entrepreneurship in a model with idiosyncratic investment opportunities. In that paper, entrepreneurs' savings are higher than those of other agents in the economy because they need resources on hand to invest in ideas. Unlike our paper, the focus is normative in exploring how a change from proportional to progressive taxation affects savings rates and inequality. We see our paper as complementary to Meh, as our goal is to show that for all businesses, and not just "small" entrepreneurs, measures of inequality are positively correlated with firms' asset positions.

Unlike the theoretical work discussed above, our contribution is mainly empirical. Azar et al. (2016) show that the cost of carry, defined as the cost of financing liquid assets, is an important determinant of firms' savings in the period after 1980. They show in out-of-sample tests that firm savings can be predicted by their approximate cost of carry even prior to this period. We use the same sources of aggregate and micro-level data, respectively the Flow of Funds and Compustat, to show a similar predictive power of inequality on firm savings, even when including their cost of carry estimates. Therefore, our analysis suggests that inequality matters for firms' savings decisions in addition to the cost of holding cash. In addition, we analyze patterns in the Survey of Consumer Finances (SCF) to document the increase in outstanding stocks held by individuals at the top of the income distribution and to disentangle the sources of this rise.

The remainder of the paper is organized as follows. Section 2 provides initial empirical motivation for the link between household inequality and firm savings. Section 3 presents the simple theoretical framework. Section 4 presents the main empirical analysis. Section 5 discusses the robustness of the results. Section 6 concludes.

2 Motivation

In this section we introduce several pieces of motivating evidence for the relationship between inequality and firm savings. Section 4 presents a full econometric analysis of the data shown in this section, as well as firm-level evidence from Compustat.

Figure 1 presents the key relationship that we wish to highlight. The dashed line corresponds to the aggregate ratio of financial to total assets held by the corporate business sector (excluding financial firms), computed using data from the Financial Accounts of the Federal Reserve Board of Governors, available since 1945. The solid line shows the income Gini ratio of families, which is provided by the US Bureau of Census starting from 1947.[1] There is a clear upward pattern in both series in the postwar period, with an acceleration in both lines during the 1980s. The correlation between the two series over the sample period 1947-2016 is equal to 0.97.

The trend in firms' holdings of financial assets has affected the aggregate net lending of corporate firms with respect to the rest of the economy. Figure 2 shows the income Gini ratio of families and net lending by non-financial corporate firms, defined as the difference between financial assets and liabilities. Both series are U-shaped in the postwar period. The acceleration in the accumulation of financial assets in the 1990s has progressively reduced net borrowing by firms, with the corporate business sector becoming a net lender in the 2000s for the first time since relevant data is available.[2] The non-financial corporate sector has remained a net lender since this time, with the exception of 2008, at the height of the financial crisis. As for gross holdings of financial assets, net lending is positively and highly correlated with the income Gini ratio (0.69), even after linearly detrending. Net lending by non-corporate non-financial firms shows a similar pattern.

Importantly, we choose to focus on all financial assets rather than solely cash in order to take a broader view on the trend in total firm savings in the postwar period. This trend, indeed, is not driven exclusively by the increase in holdings of cash and other short-term investments, that has been documented and studied widely (among others, see Azar et al. 2016 and Graham and Leary 2017). Figure 3 shows that the rise in the ratio of financial to total assets has been in large part due to a rise in less-liquid, rather than liquid assets. In particular, the relative weight of very liquid assets has dramatically fallen during the postwar period: the share of cash-like items within financial assets held by corporations fell from 29% in 1945 to 9% in 2016.[3] Consequently, if we consider financial assets net of liquid assets, the trend is essentially unchanged as is the correlation with the income

[1] We use the income Gini ratio of families, which spans the entire postwar period, rather than the ratio for households which is published by US Census Bureau since 1967. Budd (1970) has extended the series backward to 1944, but due to missing values and the unofficial nature of the data, we present results related to his series only as robustness checks for our main results. Importantly, the correlations discussed in this section are still present when replacing the Gini index of families with that for households.

[2] Liabilities of the corporate non-financial business sector also grew in the last three decades, but at a slower pace than financial assets.

[3] According to the definitions provided by the Financial Accounts, the core measure for liquid assets (i.e. cash-like items) held by the non-financial business sector includes: currency and checkable deposits, total time and savings deposits, private foreign deposits, and money market mutual fund shares. Broader liquid assets are made up of core liquid assets plus Treasury securities, agency- and GSE-backed securities, municipal securities, commercial paper, security repurchase agreements and mutual fund shares. This definition implies that less-liquid financial assets are consumer credit, mortgages, direct investment abroad, trade receivables and miscellaneous assets.

Gini ratio.

Next, we suggest a mechanism through which variation in household income inequality may affect firm saving decisions. In order to do so, we link the macroeconomic relationships illustrated in Figures 1 and 2 to the data on firm ownership by income. Table 1 shows statistics on the portfolios of households in the top 10% of the income distribution, computed using data from the Survey of Consumer Finances, collected every 3 years since 1989. Specifically, Table 1 presents two series. The first shows the stocks and business equity directly held by households in the top decile of the income distribution as a share of the corresponding holdings of all households. The second is the portfolio share of these two types of assets held by the same decile of the population.

Columns (1) and (2) show that the share of stocks and business equity directly held by households in the top decile of the income distribution has grown over time. This increase may be driven by two effects. First, the total amount of savings by those at the top of the income distribution may have risen, and with it the share of outstanding stocks held by these individuals. This implies a rise in the level of savings by the highest earning households as their incomes have risen relative to the median, but not necessarily a change in the share of savings invested in equity. Second, there may have been a shift in the portfolio composition of individuals at the top of the distribution over time, leading them to hold more stocks but less of other financial assets, without a large increase in their overall savings.

In columns (3) and (4) we provide some evidence that the latter effect seems to be weak. In particular, the share of stocks and business equity in the portfolios of individuals at the top of the distribution has no clear trend; the shares in 1989 are nearly identical to the shares in 2016 for the top decile. These shares do vary in the intermediate years, especially around the turn of the century with the "dot-com boom" of the late 1990s. Both the 2001 and 2008-2009 recessions are associated with declines in portfolio shares of directly held equity. Although the shares in both the even and odd columns seem to be affected by the business cycle as both rise during economic booms, only the shares of stocks owned show a clear increasing trend. Comparing the values reported in Table 1 and the Gini income ratio of families in the same years provides further support for this claim, as the correlations between the series in columns (1) and (2) and the inequality index are highly positive (0.94 and 0.95, respectively). On the contrary, the correlations for the series in columns (3) and (4) are very close to zero (0.155 and 0.52, respectively).

Overall, this evidence suggests that richer households have acquired the ownership of a growing share of the corporate sector in last 30 years. Crucially, this stylized fact cannot be explained by a shift in portfolio preferences, but it seems due to the increase in the size of such portfolios. In other words, firm ownership is more concentrated among fewer households at the top of the income distribution, whose incomes have risen relative to the rest of the population as inequality has increased.

Given that income inequality has increased over the last decades together with gross and net holdings of financial assets by the corporate sector, we argue that the two trends are related and need to be studied jointly. The proposed link between the two variables is the change in the income of the "representative" firm owner, which in turn affects her decisions with respect to the business she controls. This represents a departure from the standard macroeconomic framework in which firm ownership is uniformly distributed across households or entirely assigned to risk-neutral entrepreneurs. In the next section, we formalize this argument by building a simple model in which an increase in income inequality across households is associated with a rise in firm savings through the decisions of firm owners.

3 Model

Our model is a simple extension of a standard consumption-saving problem. To build intuition for our empirical analysis, we study the problem of one firm owned a risk-averse household who can choose individual savings, dividends, and investment. When firms face an investment constraint that includes only internal firm savings, we show that an increase in the household's endowment causes firm savings to rise.

3.1 Set Up

The horizon is infinite and time is discrete. There is a continuum of mass 1 of risk-averse households, whose utility function is given by $u(c_t)$, satisfying the standard assumptions. Households are ex-ante heterogeneous in the level of endowment e that they receive each period. We assume that e can take two values, $e_L < e_H$, with the probability that $e = e_H$ equal to $\pi \in (0, 1)$, and is constant for the lifetime of the household. Henceforth, we will refer to the endowment of the household as her fixed "type". Households discount the future at rate $\beta \in (0, 1)$.

Each household owns a firm that operates a technology whose only input is capital k, and produces output equal to

$$f(k, z) = zk^{\alpha}$$

where $\alpha \in (0, 1)$, $z \in Z$ is an idiosyncratic productivity shock and Z is a finite set in $\mathbb{R}_{++}$.

The household's objective is to maximize her present discounted value of consumption, which we interpret as her endowment, savings, and dividends from her firm, given by:

$$E\left[\sum_{t=0}^{\infty} \beta^t u(c_t)\right]$$

We explicitly distinguish between savings, or assets, within the firm, denoted by a^F and savings directly held by the household, a^H. The net interest rate on assets is given by r. Each period, the household chooses both types of assets a^H_{t+1} and a^F_{t+1}, capital k_{t+1}, and dividends d_t given her endowment, the productivity shock, and the firm's non-depreciated capital stock and assets. Dividend payments are subject to a constant tax $\tau \in [0, 1]$. In order to take assets out of the firm for consumption, the household must pay the tax on dividends. The budget constraint faced by the household is:

$$c_t + a^H_{t+1} = e_i + (1 + r)a^H_t + (1 - \tau)d_t$$

Both the household and firm face an exogenous borrowing limit such that $a^i_t \geq \underline{a}^i$ for $i = H, F$ and for all t. The firm's budget constraint states that current saving, dividends, and investment are limited by the sum of production, nondepreciated capital, and maturing assets:

$$d_t + a^F_{t+1} + k_{t+1} = z_t k^\alpha_t + (1 - \delta)k_t + (1 + r)a^F_t.$$

where we assume that dividends must be weakly positive at all dates and in all states. Raising funds through borrowing is assumed to take time, and therefore cannot be used to finance capital investment in the same period. We assume that production, nondepreciated capital, and maturing firm assets may be used to finance investment. Therefore the firm also faces the following investment constraint

$$k_{t+1} \leq z_t k^\alpha_t + (1 - \delta)k_t + (1 + r)a^F_t.$$

We consider a partial equilibrium in which households make optimal investment and savings decisions subject to their constraints, taking the return on risk free assets as given. We make the simplifying assumption of an exogenous risk-free rate for convenience. We are interested in comparative statics for within-firm and individual asset holdings and investment decisions as the household's endowment varies. We then relate the model explicitly to inequality by considering a change of endowments across agents to match the observed increase in inequality in the postwar period.

3.2 Optimal Investment and Savings Decisions

In order to compare marginal benefits and costs of firms savings, it is convenient to rewrite the above problem in the following way:

$$\max_{a^H_{t+1},a^F_{t+1},k_{t+1},d_t} E\Bigg[\sum_{t=0}^{\infty}\beta^t\Big(u(e+(1+r)a^H_t+(1-\tau)d_t-a^H_{t+1})+\mu^H_t(a^H_{t+1}-\underline{a}^H) + \mu^F_t(a^F_{t+1}-\underline{a}^F)+\lambda_t\big(z_tk^\alpha_t+(1-\delta)k_t+(1+r)a^F_t-k_{t+1}\big)\Big)\Bigg] \quad (1)$$

where μ^H and μ^F denote the multiplier on the borrowing constraint for the household and firm, respectively, and λ denotes the multiplier on the firm's investment constraint. Plugging in for d_t from the firm's budget constraint, the first order conditions to this problem are given by the following expressions:

$$u'(c_t)=\mu^H_t+\beta(1+r)E(u'(c_{t+1})) \quad (2)$$

$$(1-\tau)u'(c_t)=\mu^F_t+\beta(1+r)E((1-\tau)u'(c_{t+1})+\lambda_{t+1}) \quad (3)$$

$$(1-\tau)u'(c_t)+\lambda_t=\beta E\big((z_{t+1}k^{\alpha-1}_{t+1}+1-\delta)[(1-\tau)u'(c_{t+1})+\lambda_{t+1}]\big) \quad (4)$$

Equation (2) is the standard household euler equation. Conditions (3) and (4) determine firm saving and investment. The former may be interpreted as follows: if the household saves more assets in the firm, on the one hand she gives up some dividend and investment in the current period. On the other hand, she decreases the probability that the firm's borrowing constraint will bind today as well as the probability that the investment constraint will bind next period. The higher are firm savings, the less likely is either constraint faced by the firm to bind. Equation (4) determines the optimal choice of capital. First consider the case in which the constraint does not bind, that is, $\lambda_t = 0$. By investing an additional unit today, the household gives up consumption of dividends today, but increases the net worth of the firm next period, getting expected return equal to the marginal product of capital. The household values this increase in net worth both in terms of future dividend consumption, as well as the relaxation of the firm's investment decision next period. When the investment constraint binds in the current period, the household's marginal utility is too low relative to the right hand side of (4), but the firm cannot invest more due to low current net worth.

Combining (3) and (4) it is straightforward to derive the optimality condition for the allocation of savings between the two available types of assets for the firm, which is given by

$$\mu_t^F + \lambda_t = \beta E\big((z_{t+1}k_{t+1}^{\alpha-1} - \delta - r)[(1-\tau)u'(c_{t+1}) + \lambda_{t+1}]\big) \tag{5}$$

The right hand side is the marginal excess return (net of depreciation) of investing an additional unit of output in capital expressed in terms of marginal utility of consumption. When the firm's borrowing and investment constraints do not bind in period t, the expected net return on capital must be equal to that of saving. In contrast, the required on return on capital increases due to the presence of a binding constraint, as the firm cannot borrow or invest as much as it would like today.

Finally, combining (2) and (3) and rearranging, we get a relationship between the household and firm constraints:

$$\mu_t^H = \beta(1+r)E\left(\frac{\lambda_{t+1}}{1-\tau}\right) + \frac{\mu_t^F}{1-\tau} \tag{6}$$

In the absence of an investment constraint, the borrowing constraint binds for the household if and only if it also binds for the firm. Absent any other frictions, the proportional cost of taking one unit of savings from the firm as dividends implies that if the household's borrowing is constrained, it is always optimal to consume out of the firm's savings up to the constraint. However, when there is a possibility that the investment constraint binds next period, the shadow value of borrowing for the household increases. Intuitively, as long as there is a possibility for the firm investment constraint to bind in the future, the household will always optimally choose her borrowing to be constrained, since the marginal value of saving in the firm is higher than the marginal value of current consumption.

When the borrowing constraints bind, the shadow value on borrowing to fund consumption is much larger than the shadow value on borrowing within the firm the lower is the endowment. In this case, consumption today is valuable for the household and she will demand less firm saving and more dividends from the firm. In other words, the simple model presented here suggests that if households with a higher endowment are less likely to be constrained, they will optimally choose for the firm to be away from the borrowing constraint, resulting in a stronger incentive to save within the firm and less demand for dividends. We now study the effects of a change in the distribution of endowments as a proxy for the observed increase in income inequality. To analyze the forces present, we now turn to a numerical exercise to explore the quantitative implications of the model.

3.3 Numerical Exercise

[in progress]

In this section we study the quantitative effects of a change in inequality on individual and aggregate savings and investment. As the model is in partial equilibrium, agents' decisions do not rely on the distribution of wealth. We solve the model using standard value function iteration, defining the relevant state of the economy as $(z_t, \omega_t(z_t), a_t^H)$, where net worth is defined as $\omega_t(z_t) = z_t k_t^\alpha + (1-\delta)k_t + (1+r)a_t^F$.

$$V(z_t, \omega_t, k_t) = \max_{a_{t+1}^F, a_{t+1}^H k_{t+1}} \Big\{ u\big(e + (1+r)a_t^H - a_{t+1}^H + (1-\tau)\omega_t(z_t)\big) \\ + \beta E V(z_{t+1}, \omega_{t+1}(z_{t+1}), k_{t+1}) \Big\}$$

subject to $k_{t+1} \leq \omega_t$ for all t and $a_{t+1}^i \geq \underline{a}$ for $i = H, F$ and for all t. We solve the above recursive model for different levels of the endowment e.

We first present the optimal choices of a representative household with $e = 5$, and then compare the aggregate savings in two representative agent economies with $e = 4$ and $e = 6$, respectively. The level of the endowment in the first exercise is chosen to match the capital to GDP ratio of roughly 1.2, given the unconstrained capital stock with $z = 1$. In the second exercise, we think of the average of these two economies to represent an increase in inequality. As we study a partial equilibrium, building a heterogeneous agent economy is beyond the scope of this paper; we instead use the average across economies as suggestive of the empirical relationship we document below.

The other model parameters are chosen to match the average annual values in the postwar period, and are shown in Table 2. The interest rate, discount factor, and depreciation rate are set to standard values. The capital share α is taken from Krusell and Smith (1997); a similar number is used by many papers in the literature. Dividend taxes are set to 15%, the qualified dividend tax rate in the US since 2003.

In this exercise we consider a very simple productivity shock process. The shock is assumed to follow the AR(1) process in logs: $\log(z_t) = \rho \log(z_{t-1}) + \varepsilon$, where ε is an *iid* normal shock with standard deviation σ. We use the method of Tauchen (1986) to discretize this process into a 3-state (high, medium and low) Markov chain covering two standard deviations of the shock by setting the persistence ρ equal to 0.7 and standard deviation σ equal to 0.015. The resulting productivity shocks range between -5% and +5%.

Figures 4 and 5 show sample policy functions for savings in the risk-free assets held by the firm and household and for capital as functions of current net worth, respectively. Both figures are shown for given values of productivity and the other endogenous state (i.e. in the figure for risk-free assets, a_t^H is fixed). In Figure 4, the investment constraint is the 45 degree line, shown as the dashed black line. The capital choice is constrained at low values of current net worth, and unconstrained at high values of net worth. When the constraint does not bind, capital is equal to its optimal value k^* satisfying equation (5) when $\mu_t^F = \lambda_t = 0$. Figure 5 reports the choices of financial assets in the high and low states held within the firm and by the household, respectively. The figure shows the standard relationship between the shock and household borrowing: the optimal amount of financial assets held by the household, a^H, is smaller when productivity is low, meaning that the agents smooth consumption by borrowing more. As shown in equation (6), the multiplier on the firm borrowing constraint is strictly less than that on the household borrowing constraint, thus, the household chooses to invest first in the firm despite the dividend tax. At high levels of net worth and when the state is high, the probability of hitting the investment constraint is lowest, causing households to substitute tax-free assets for assets held within the firm, shown by the convergence of the middle two lines to the right side of the figure.

Importantly, omitting the investment constraint leads to lower borrowing levels in all states, due to the absence of the benefit stemming from the possibility of using maturing holdings of financial assets within the firm to fund investment in capital today. In other words, the presence of the investment constraint gives risk-free assets held within the firm a positive non-pecuniary externality.

Next, we solve the model for two different levels of the endowment, $e = 4$ and $e = 6$, taking the average of the two representative agent economies as a proxy for an increase in inequality (henceforth, "the model with inequality"). We simulate these two models, as well as our baseline with $e = 5$ discussed above, over 2,500 model periods, discarding the first 500, for 1,000 individuals. The histories of shocks differ for each agent as they are drawn from the transition matrix discussed above, and therefore each individual's choices of risk-free assets to hold individually and within the firm and of capital vary with the individual and aggregate states. Table 3 shows the results for the average investment and savings of all agents in the baseline and the model with inequality. In the exercise, the average endowment is identical to the baseline economy. At the same time, the model implies that average firm savings rise with inequality relative to the baseline. This is because the borrowing constraint is less likely to bind for richer households, who then assign more importance to preventing the investment constraint from binding. In sum, our simulations illustrate the link that we show empirically in the next section.

4 Empirical Analysis

In this section we explore the empirical relationship between inequality and macro- and micro-level measures of firm savings. We first describe the data. Then, we document the relationship of interest using time series data on aggregate corporate savings and inequality. Next, we turn to our panel data to study the relationship within firms over time. Finally, we show robustness of our aggregate and micro level findings to a series of checks.

4.1 Data

In our analysis, we rely on three main data sources. The first is the Financial Accounts (formerly Flow of Funds) of the United States, which provide aggregate balance sheet data on the non-financial business sector, both corporate and non-corporate, since 1945. We use this information to calculate the ratio of gross and net financial assets to total assets, the dependent variables of interest in our time-series regressions. The Financial Accounts also provide disaggregated information on the corporate sector balance sheet, allowing us to analyze the determinants of components of firm savings separately, such as less liquid assets.

The second source is Compustat, which contains accounting data for the US firms, allowing us to investigate the determinants of the evolution of net and gross corporate savings in the postwar period at the micro level. We exclude financial firms (SIC codes 6000-6999), utilities (SIC codes 4900-4999) and public administration (SIC codes 9000-9999) from the sample. These sample restrictions allow us to focus on unregulated private firms incorporated in the US and to align our analysis with the existing literature.[4] We use the information in the final dataset, which consists of an unbalanced panel beginning in 1951, to compute firm-level dependent and control variables used in our panel regressions.

[4]Following the empirical corporate finance literature, we also exclude firms whose total assets or sales are negative or missing.

Finally, we obtain several macroeconomic and financial time-series from FRED, among which is the the key variable of interest of our analysis, the income Gini ratio. This index of income inequality is computed by the US Census Bureau for both families and households since 1947 and 1967, respectively. Other time-series taken from FRED include variables that proxy for business cycle fluctuations and broad financial conditions, which can influence firms' savings, for instance by changing aggregate investment opportunities.

The frequency of our sample is limited by the income Gini ratio, which is available annually. Table 4 reports summary statistics for the firm-level variables that we will use in the analysis.

4.2 Time-series analysis

We study the relationship between aggregate firms savings and income inequality over the years 1947-2016, controlling for macroeconomic and financial factors that may affect the observed trends. In particular, we estimate several specifications of the following ADL model:

$$y_t = \rho \cdot y_{t-1} + \beta \cdot Gini_t + \varphi \cdot X_t + \gamma \cdot Gini_{t-1} + \delta \cdot X_{t-1} + f(t) + \alpha + \epsilon_t\,, \tag{7}$$

where t denotes the year, y_t is the ratio between either gross or net financial and total assets, y_{t-1} is its lagged value, $Gini_t$ is the income Gini ratio of families, X_t is a vector of control variables, $f(t)$ is a quadratic time trend, and α is a constant. We include the lagged value of the dependent variable as this allows us to deal with autocorrelation that may stem, for instance, from stickiness in the adjustment of aggregate firm savings to changes in macroeconomic conditions. We also run regressions in which we use the logarithm of the ratio of gross financial to total assets instead of its level. In this way, we can test the robustness of the estimates to a different functional form.

The coefficient on $Gini_t$ is of main interest as it captures the correlation between firm savings and household income inequality. With respect to the other explanatory variables, the controls in X_t include the log of real GDP and GDP deflator, the yield on the 3-month Treasury bill, the real GDP growth rate, and the productivity of capital. As documented by Azar et al. (2016), the 3-month Treasury bill yield is a proxy for the opportunity cost of holding financial assets; as the yield, a common measure of the risk-free rate, increases, the relative return on risky assets falls. This covariate therefore controls for the affect of the relative risky asset return on firms' savings. The GDP growth rate proxies for the stage of the business cycle, as increases in GDP growth indicate troughs and slowdowns indicate peaks, and therefore is included to allow for a cyclical component in firms' savings decisions. Finally, the productivity of capital, measured as nominal GDP scaled by private non-residential fixed assets, may affect both firms' savings and investment decisions as well as returns to capital owners, which may be reflected in income inequality.

The time series described above are available for the entire postwar period, allowing us to exploit the sample in its full length. We also provide a specification that includes lagged values of all the control variables, thus using a full ADL model rather than a LDV one and further controlling for potential autocorrelation. In an alternative specification of the LDV, we add two variables that may affect firm savings, the volatility of the stock price index and the interest rate on the 10-year Treasury. These additional controls reduce the number of observations as they are only available for a more recent subsample of the postwar period. For all estimates, we report standard errors computed according to Newey and West (1987), allowing for autocorrelation of up to 10 lags.

Table 5 presents the results of our time-series regressions with the dependent variable equal to the ratio between gross financial and total assets. Column (1) reports the estimates when controlling only for the income Gini ratio, the lagged dependent variable, and a quadratic time trend. The coefficient on Gini is highly statistically significant and positive, empirically supporting the mechanism we presented earlier. In terms of magnitude, the estimated effects mean that the observed increase in income inequality since 1970 can explain slightly more than one fifth of the rise in the ratio of financial to total assets ratio for the corporate sector over the same period.

The inclusion of macro controls in column (2) and of their corresponding lagged values in column (3) only marginally affects the size, though not the significance, of the coefficient on the Gini ratio. In the last two columns of Table 5, we test whether the baseline estimates are robust to alternative specifications. The results reported in column (4) show that the estimates are qualitatively and quantitatively robust to adding the stock market volatility and the 10-year Treasury yield as controls, since the size and significance of the coefficient on the income Gini ratio are statistically unchanged. In order to address potential concerns that the results are driven by the choice of functional form, we replace the raw ratio of financial to total assets with its log value in column (5) and find that the coefficient on the Gini ratio remains positive and highly significant. In this case, the coefficient may be interpreted as the semi-elasticity of the financial asset ratio to inequality: a 0.01 point increase in the Gini ratio is associated with roughly a 1.5% increase in financial to total assets. Thus, the estimated relationship between inequality and firms holdings of financial assets seems very robust in terms of magnitude and statistical significance across specifications.

Among other determinants of corporate savings, capital productivity is positive and statistically significant across specifications. This result is consistent with the existing literature on precautionary savings: higher productivity is associated with larger holdings of financial assets, as firms should save more when investment opportunities are likely to be more valuable. In contrast with similar analyses on firm cash balances, the estimated coefficient on the 3-month T-bill rate is basically zero. Given that we consider all financial assets, this result may reflect the fact that the higher opportunity cost of cash is counterbalanced by the greater benefit of holding longer-term assets. The coefficient on stock market volatility is positive and highly significant, suggesting that the precautionary savings motive becomes stronger when uncertainty in stock markets rises. Finally, in all specifications, the positive coefficient on the lagged value of the dependent variable suggests that the corporate sector faces some adjustment costs when changing its holdings of financial assets.

Table 6 examines the relationship between net savings by corporate firms and household inequality. In order to do so, we estimate four specifications of regression (7) with the ratio between net financial assets and total assets as the dependent variable and the income Gini ratio as the main explanatory variable. Comparing the results with those for gross financial assets in the first four columns of Table 5, the coefficient on the Gini ratio is still highly statistically significant and positive; however, it becomes larger as we add macro control variables. Given the estimates in column (2), the increase in income inequality since 1970 has the power to explain more than half of the contemporaneous rise in net firm savings.

All in all, the empirical evidence presented in Tables 5 and 6 support the existence of a strong relationship between both gross and net savings by the non-financial business sector and income inequality across households. The estimates are qualitatively robust to different specifications and quantitatively imply that the variation in the income Gini ratio is an important factor in the evolution of firm savings in the postwar period. The results from aggregate time-series regressions, however, cannot control for changes in firm characteristics that may play an important role in explaining the observed pattern in the aggregate holdings of financial assets by the business sector. In order to address such concerns, in the next section we perform an analysis at the firm-level, ruling out the possibility that the results at the aggregate level are affected by omitted micro variables.

4.3 Firm-level analysis

We now explore the relationship between inequality and holdings of financial assets at the firm level by using data from Compustat. In this way, we also check whether the results from the aggregate time-series regressions are robust to controlling for individual firm characteristics. The benchmark specifications we estimate have the following structure:

$$y_{i,t} = \beta \cdot Gini_t + \varphi \cdot X_{i,t} + f(t) + \alpha_i + \epsilon_{i,t}\,, \tag{8}$$

where i and t index the firm and the year, respectively, $y_{i,t}$ is the ratio of gross or net financial assets to total assets computed for each firm, $Gini_t$ is the same income Gini ratio of families used in the previous section, $X_{i,t}$ is a vector that includes macro and firm-level control variables, $f(t)$ represents a quadratic time trend, and α_i denotes a firm fixed-effect.

In order to compute gross financial assets (GFA) held by corporations, we sum cash with other short-term investments (STI) and other current assets (CA):[5]

$$GFA_{i,t} = cash_{i,t} + STI_{i,t} + CA_{i,t}.$$

By subtracting current liabilities (L) and long-term debt (D) from this variable, we obtain firm net savings, or net financial assets (NFA):

$$NFA_{i,t} = GFA_{i,t} - L_{i,t} - D_{i,t}.$$

Both gross and net financial assets are divided by the book value of total assets (BVA) to obtain our variables of interest. When the dependent variable is the ratio of gross financial to total assets, we take the log to reduce the impact of extreme outliers (see Bates et al. 2016). To study the sensitivity of the estimates to outliers, we also provide a specification using its level.

The controls in $X_{i,t}$ include all macro and financial variables coming from FRED that were used in the previous subsection, thus improving the comparability of the estimates from aggregate and micro regressions. In the panel regressions of this section we also add the firm-level variables that the relevant literature suggests to be important determinants of firm holdings of financial assets. In particular, we use data from Compustat to compute Tobin's Q and the ratio of the market value of assets to their book value

[5] Current assets are the sum of cash-like items and other types of financial assets. Therefore, CA is a measure of less-liquid financial assets held by each firm.

to proxy for investment opportunities. We also include a distributed-dividend dummy, capital expenditure, acquisition activity, net working capital and R&D expenditure proxy for the potential use of firm savings. Data on most of these controls are unavailable before 1961, reducing the effective time span of the sample, which can cover the years 1950-2015 if total assets at book value is the only firm-level explanatory variable included in the regressions.

In all specifications, we weigh observations by giving more importance to firms of larger size and that appear in the sample more often. Following Azar et al. (2016), each firm's weight is equal to the product of its average total assets and the number of years for which data on that firm is available. This choice allows us to compare the estimates from the panel and the time-series analyses because the aggregate ratios of firm savings to total assets from the Financial Accounts are arithmetically equivalent to an asset-weighted average of the same ratios computed at the firm-level. As a robustness test, we also run regressions in which observations are unweighted. The results, together with those from additional robustness exercises, are shown and discussed in Section 5. Throughout the analysis, we report two-way clustered standard errors by both firm and year.

Table 7 presents results from the firm-level analysis using the log of the ratio between holdings of financial and total assets as the dependent variable. In all columns, we control for the macro variables used for the time-series analysis.[6] In column (1), we include only the firm-level controls that are available for most firms in order to minimize the loss of observations. This specification yield a coefficient on the income Gini ratio is statistically significant, positive and almost three times larger than that estimated using aggregate variables in the previous section. Column (2) reports the results obtained by controlling for all relevant firm variables that proxy for the benefit, cost and possible utilization of financial assets.[7] Again, the coefficient on inequality remains highly statistically significant. Moreover, its sign is consistent with the theoretical mechanism proposed in Section 3 and its magnitude is very close to that estimated in our time-series regressions.

When introducing the lagged dependent variable among the controls in column (3), we find that the adjusted R-squared increases by about 16 percentage points and that the effect of past holdings of financial assets is positive and highly statistically significant, pointing to existence of frictions that prevent firms from freely adjusting their savings.

[6] In contrast to our time-series analysis, we always include the yield on the 10-year Treasury bill and the volatility of the stock price index as they are available since before 1960 and thus their inclusion does not shorten the sample period for the panel regressions.

[7] The inclusion of such explanatory variables determines the loss of about one-third of the observations compared with the specification in column (1).

Crucially, these frictions do not seem to be correlated with inequality because the coefficient on the Gini ratio is unaffected in terms of statistical significance and even slightly increases in size. The specification in column (4) aims to test whether the results are driven by corporations that remain active only briefly by excluding firms with less than 5 observations (about 8,000 firms, or 6.2% of the full sample). Neither the statistical significance nor the magnitude of the coefficient on the Gini index decreases compared to the results presented in the previous column. Finally, the estimates shown in column (5) are obtained by replacing the log of the ratio of gross financial to total assets with its level: the relationship between firm savings and income inequality becomes statistically insignificant, suggesting that extreme outliers may distort the results. This issue is discussed in greater detail in Section 5.

Firm characteristics have the effect suggested by the previous literature. For instance, larger corporations should hold less financial assets due to economies of scale (see Mulligan 1997) and the reported estimates support this view. Consistent with Azar et al. (2016), we find that a higher 3-month T-bill rate, which is a proxy for the opportunity cost of holding liquid assets, is negatively associated with firm holdings of financial assets. At the same time, the yield on the 10-year Treasury bond is positively associated with firm savings, as it probably reflects the benefit of holding long-term financial assets. Among other control variables, the coefficients on acquisition activity and capital expenditure are both negative, suggesting that firm savings are used to finance various types of investment.

As in the time series analysis above, we replace the log of the financial to total asset ratio with the level of the net financial to total asset ratio and estimate the same specifications as in Table 7. Table 8 shows the corresponding results. The relationship between firms' net savings and the income Gini index is similar to that estimated using aggregated data. Qualitatively, the relevant coefficient is positive and highly statistically significant across all columns. Quantitatively, the magnitude when controlling for all firm-level characteristics, shown in column (2), is almost identical to that obtained from time-series regressions and reported in Table 6. Adding the lagged value of ratio of net financial to total assets as an explanatory variable only slightly reduces the size and statistical significance of the coefficient on the income Gini ratio in column (3). Similar conclusions hold if we use exclusively data on firms that appear in Compustat for at least 5 years: the estimates presented in column (4) are not significantly different from those reported in previous two columns.

To sum up, the relation between firm-level savings and income inequality across households is positive and significant, confirming the findings of the analysis using aggregate data. Crucially, similarities between the results from time-series and micro-panel regressions are not only qualitative, but also quantitative. When studying the determinants of either gross or net holdings of financial assets in terms of total assets, the size of the coefficient on the income Gini ratio (in specifications with a full set of controls) is almost the same if we use aggregate data from the Financial Accounts or firm-level information from Compustat. It thus seems to not be the case that the effect of inequality on aggregate firm savings reflects a composition effect of a subset of individual firms. Rather, inequality affects individual firms in a similar way, leading to aggregate predictions in line with our firm-level estimates.

5 Robustness

In this section we check whether our results are robust to several tests. In particular, we explore the possibility that the estimates provided in the previous section are significantly affected by the variation in taxes on distributed dividends, the dynamics of cash holdings, the choice of the inequality index and the use of data on the corporate rather than the non-corporate non-financial business sector. We discuss these robustness checks in order and followed by a brief description of other tests for which we do not report for brevity.

According to the existing literature, there is a clear link between taxes and the accumulation of financial assets by firms.[8] In order to address the concern of a potential omitted variable bias in our estimates, we examine whether changes in the taxation of distributed dividends affect our benchmark estimates. The history of dividend taxation in the US can be broadly divided in two distinct periods since World War II: dividends were taxed at the marginal income tax rate until 2003, after which a flat tax rate (such as that on capital gains) was introduced. Poterba (2004) provides estimates of the effective marginal tax rate on dividends for the time period covered by our analysis, which we use to test this hypothesis.[9] Being a weighted average, these estimates reflects not only changes in tax rates but also shifts in the income distribution across households. For this reason, the inclusion of the effective tax rate on dividends among the explanatory variables in the time-series and panel regressions is likely to partially capture the effect of variation in households income inequality.

Table 9 presents the results from adding the tax rate on dividend income in specifications (7) and (8). We examine the effects for both the dependent variables of our

[8]See, for instance, McGrattan and Prescott 2005.

[9]Although the statutory tax rate on dividends was set to 15% in 2003, we follow Poterba (2004) and set the tax rate on dividends equal to 17%, taking into account both federal and state taxation.

interest (i.e the ratios of gross or net financial to total assets); however, we only report estimates from the regressions with the most complete set of controls for brevity. In all columns, the coefficient on the Gini income ratio remains positive and highly statistically significant. Moreover, its size only marginally changes relative to our benchmark regressions: it slightly decreases (increases) when using aggregate (micro) data. Considering also that the coefficient on the tax rate is statistically significant only in column (1), the empirical evidence thus suggests that the evolution of taxation on distributed dividends cannot explain the accumulation of financial assets by firms in the postwar period.

As discussed in the motivating evidence of Section 2, the relative weight of very liquid over total financial assets has dramatically decreased over time. Since we are interested in studying aggregate gross and net firm savings, it is then important to test whether our results reflect a pattern in the holdings of cash rather than in those of other types of financial assets. To this end, we exclude very liquid assets when computing the dependent variable and re-estimate the benchmark specifications in Table 10. The results from running the time-series regressions in columns (1) and (2) show that both the statistical significance and the magnitude of the coefficient on the income Gini ratio increase when compared to the baseline estimates. Using firm-level data, we obtain similar results; the coefficients on the Gini rati are qualitatively stronger and quantitatively greater than when very liquid assets are included in the dependent variable. The only exception is given by the specification in column (4): the coefficient is not statistically significant when controlling for the lagged value of the dependent variable, suggesting that frictions in the adjustment of holdings of less-liquid financial assets play a more important role than in the case of cash balances. In sum, the results reported in Table 10 alleviate the concerns that the evolution of firm savings from the end of World War II is mainly driven by the accumulation of cash and short-term investments. Rather, the relationship between household income inequality and non-cash financial assets seems stronger, as the relevant coefficient increases both in size and statistical significance.

In order to address concerns that the choice of the inequality index drives our results, we replace the income Gini ratio of families with other variables that proxy the change in the distribution of income and wealth across households. In particular, we consider the income Gini ratio for households and the share of stocks held by the top decile in terms of net wealth. As discussed earlier, the income Gini ratio for households is available only since 1967, limiting the span of our analysis, and is highly correlated with the corresponding index of families. The latter measure of inequality comes from Piketty, Saez, and Zucman (2016) and allows us to test whether changes concentration of firm among fewer households at the top of the wealth distribution can explain the evolution of corporate savings, as suggested by our model. This variable is thus more relevant than the total wealth share held by the top 10% of the wealth distribution because the fraction of stocks in household portfolios varies over time. We estimate the main specifications the ratio of net financial to total assets as dependent variable and present the results in Table 11. The coefficients in columns (1) and (2) show that the relationship between income inequality and firm net savings remains positive and statistically significant when the former is measured by the Gini ratio for households. Moreover, the magnitude of the effects is very close to that from the benchmark estimates. The last three columns show that the results are robust to replacing income with a proxy for firm ownership by the wealthiest decile of households. The corresponding estimated coefficient, indeed, is positive and significant from both the time-series and the panel regressions. In terms of size, the variation in the share of stocks owned by the wealthiest households can explain between 15 and 19% of the observed increase in the ratio of firm net financial to total assets since 1980. Therefore, the magnitude of the economic effects is not very different from that presented in the previous section.

We next investigate the relation between household income inequality and savings by firms that are not corporations. Table 12 presents the estimates from running time-series regressions using data from the Financial Accounts on the non-corporate non-financial business sector. To conserve space, we omit to report the results for specifications without a full set of control variables. Column (1) shows the results when the dependent variable is the ratio of financial to total assets. In the next column, we test the robustness of these results to considering only less-liquid assets. The last two columns show the results when net firm savings (to total assets) is the dependent variable and the the two different Gini indexes (of families and households) are alternatively included as main explanatory variable. All in all, the estimates indicate the positive relation between household income inequality and the ratio of (gross and net) holdings of financial to total assets is much weaker if using data on non-corporate firms. In particular, the coefficient on the income Gini ratio is only (barely) statistically significant when the net firm savings is the dependent variable. These result are consistent with the theoretical mechanism proposed in this paper, as the distinction between personal and firm assets is less clear for non-corporation, as it is much easier to move assets from individual portfolios to firm the balance sheet and vice versa. In turn, this implies that the incentive to keep financial assets within firms to avoid investment being constrained in the future is much weaker for owners of non-corporate business.

We perform several other robustness checks, whose outcomes are not reported to conserve space. First, we control for changes in the volatility of cash flows by including the industry sigma among the explanatory variables in the panel regressions.[10] Second, we include the yield spread between corporate bonds rated Aaa (or Baa) by Moody's and the 10-year Treasury, as this variable is a proxy for liquidity premium. Third, we add a cubic term to the time trend. The impact on estimates of all these robustness tests is negligible. Finally, we also estimate the panel regressions using OLS instead of WLS: not weighting observations only marginally reduces the statistical significance of the coefficient on the Gini ratio when net firm savings is the dependent variable.

6 Conclusion

In this paper we document a new channel through which income (and wealth) inequality affects firm savings via the distribution of business ownership across households. Using three data sources, we document the relationship of interest at both the macro- and micro-level, and explore its robustness in a series of checks. To build intuition for our results, we present a simple endowment economy with direct household ownership of firms. We show that a rise in inequality similar to that observed in the data between 1947 and 2016 can match the qualitative rise in firm savings seen in the U.S. data.

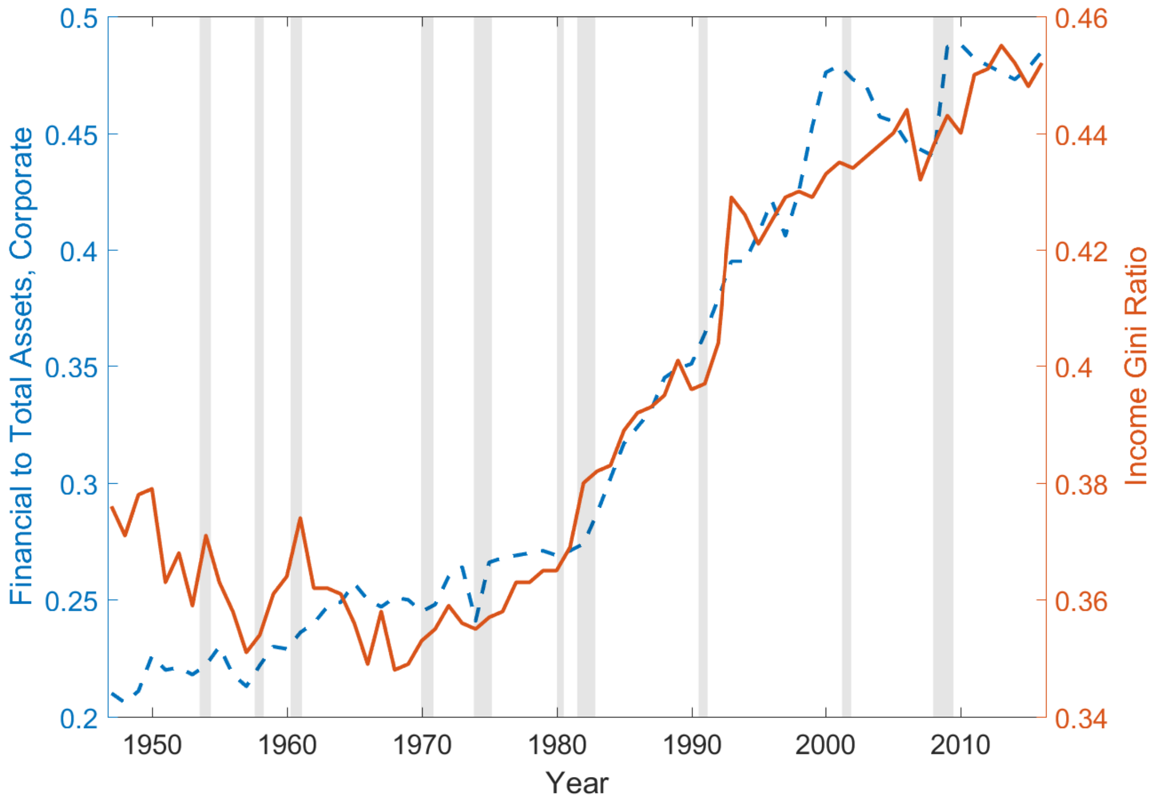
The model framework introduced here is simple, and a more micro-founded model of household portfolio choice, indirect firm ownership, and asset prices is necessary to fully explore the general equilibrium effects of the increase in household inequality on financial markets as well as the real side of the economy. One such extension is to add an endogenous household labor supply would allow us to better match our model to the empirical results related to income inequality that we present here. In general equilibrium, tools such as those developed by Krusell and Smith (1998) would be necessary to approximate the solution in the presence of heterogeneous agents. We abstract from these details here.

Our empirical analysis focuses on U.S. data but similar trends in corporate savings and income inequality have been observed in several advanced economies. We leave to future work to test if the results we find are also present outside the U.S., which would

[10] The industry sigma is computed as the volatility of cash flow to within the two-digit SIC group of a firm. Following the existing literature, for a given year and two-digit SIC group, we calculate the standard deviation of the ratio between cash flow and total assets over the previous 5 years for each firm within that group. Industry sigma for a two-digit SIC group is defined as the the average of the standard deviations of the cash flow-to-assets ratio across all firms in the group. Computing the standard deviations over the previous 10 years does not affect the results.

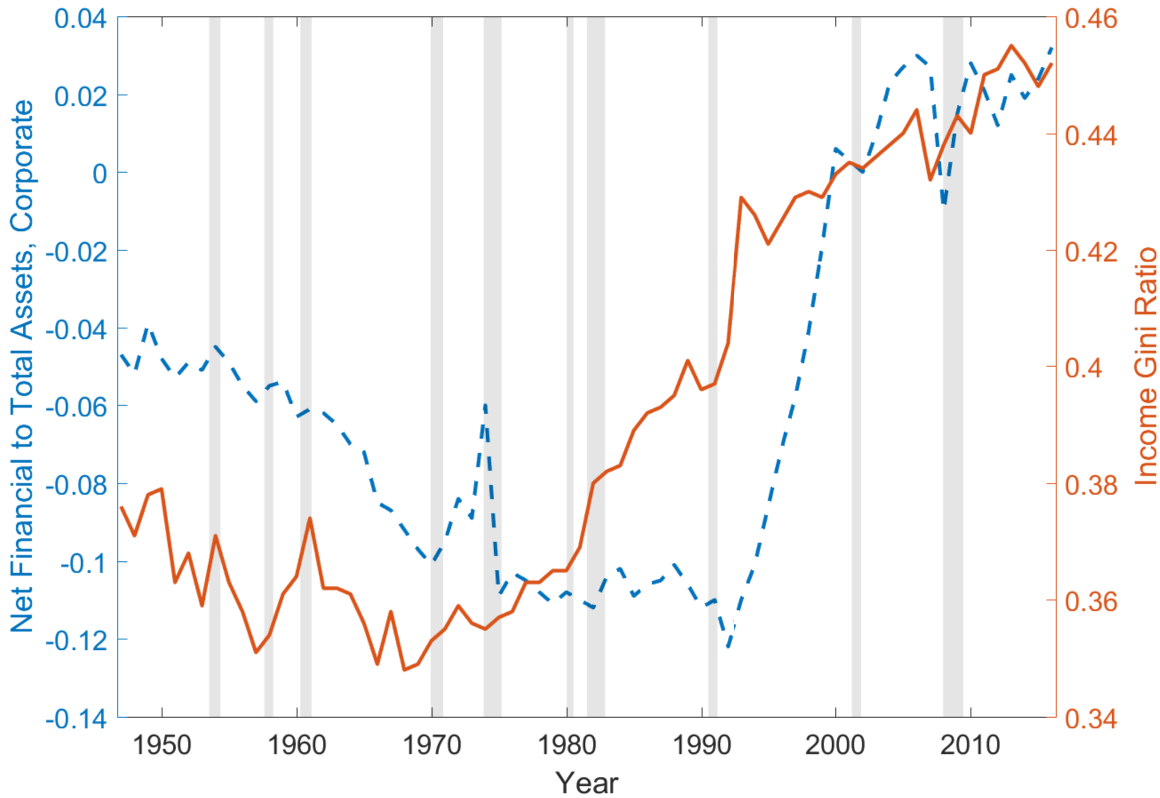
corroborate our empirical findings and lend further support to the theoretical mechanism suggested here.

Figure 1: Inequality and Gross Financial Assets, 1947-2016



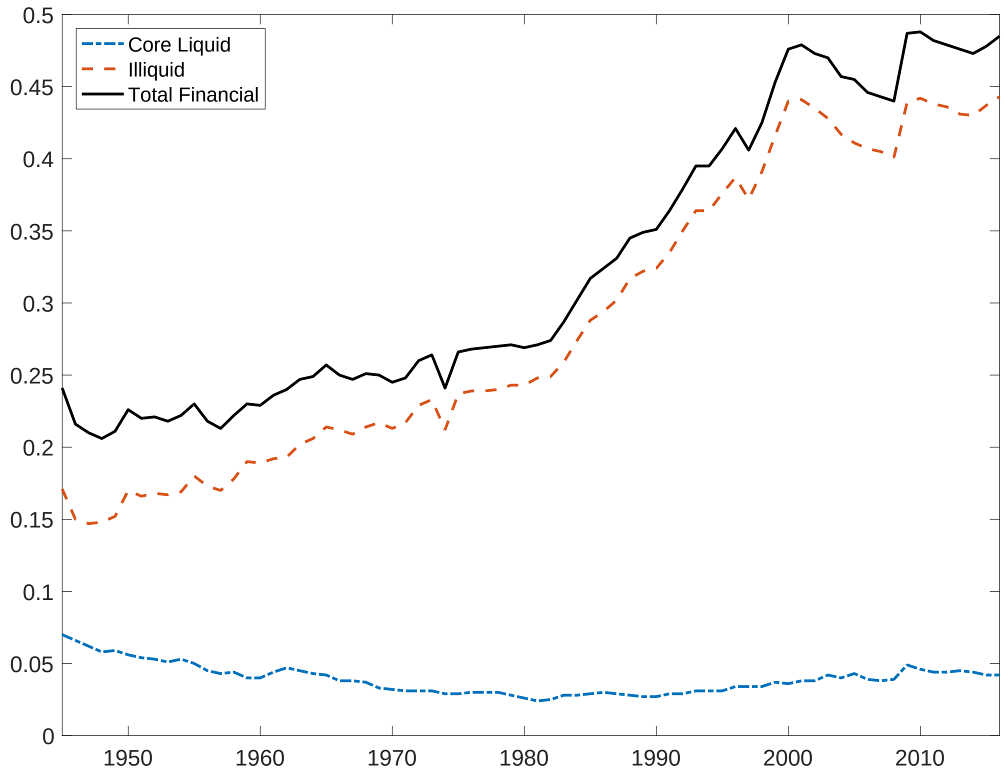
Notes: Annual financial to total assets for non-financial corporate businesses (left axis, dashed line) and income Gini ratio of families (right axis, solid line), 1947-2016. Asset data comes from the Federal Reserve Board Financial Accounts. Gini ratio for households comes from the US Census Bureau.

Figure 2: Inequality and Net Financial Assets, 1947-2016



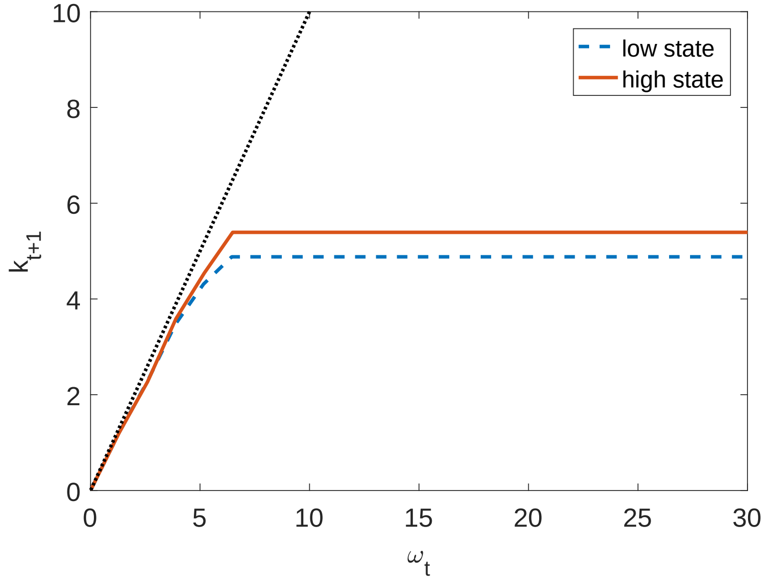
Notes: Annual financial to total assets for non-financial corporate businesses (left axis, dashed line) and income Gini ratio of families (right axis), 1947-2016. Asset data comes from the Federal Reserve Board Financial Accounts. Gini ratio of families comes from the US Census Bureau.

Figure 3: Financial Assets: Decomposition, 1945-2016



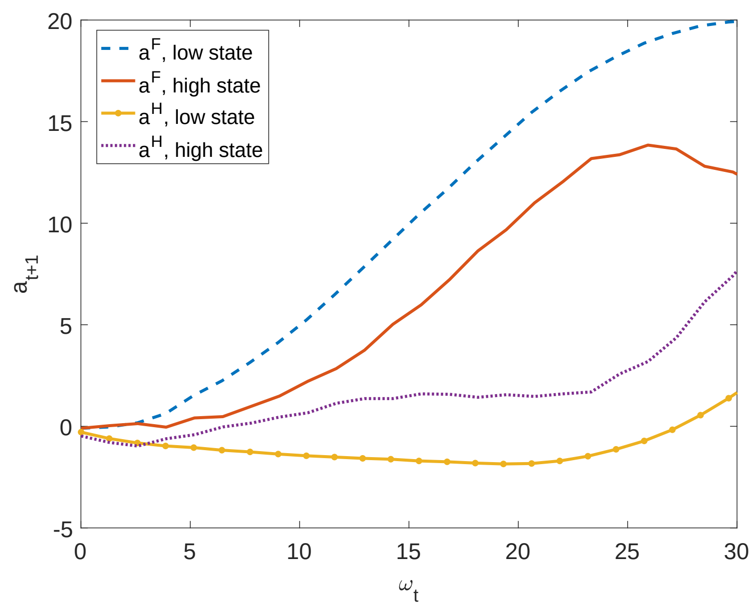
Notes: Figure plots Core Liquid Financial to total assets (dashed line), Less-liquid Financial to total assets (dash-dotted line), and total financial assets (solid line) for non-financial corporate businesses, 1945-2016. All data is annual, and comes from the Federal Reserve Board Financial Accounts. See footnote [3] for the definition of liquid and less-liquid assets.

Figure 4: Policy Functions: Capital



Notes: Figure plots capital choice as a function of net worth ω_t for the high (solid) and low (dashed) productivity shock, holding maturing assets held by the household, a_t^H constant.

Figure 5: Policy Functions: Assets



Notes: Figure plots asset choices for the household (a^H) and within the firm (a^F) as a function of net worth ω_t for the high (solid) and low (dashed) productivity shock, holding maturing assets held by the household, a_t^H constant.

Table 1: Stock and Business Equity Ownership, Top Decile of the Income Distribution

Year	(1) Share of stocks over household holdings	(2) Share of business equity over household holdings	(3) Share of stocks over total wealth	(4) Share of business equity over total wealth
1989	0.695	0.680	0.046	0.250
1992	0.711	0.697	0.075	0.253
1995	0.713	0.726	0.084	0.258
1998	0.753	0.746	0.135	0.245
2001	0.743	0.780	0.124	0.243
2004	0.747	0.778	0.089	0.244
2007	0.749	0.787	0.082	0.280
2010	0.739	0.763	0.072	0.245
2013	0.776	0.800	0.087	0.253
2016	0.779	0.830	0.065	0.264

Notes: Data comes from the public files of the Survey of Consumer Finances. Columns (1) and (3) correspond to the share of stocks directly owned by top 10% and 20% of the income distribution. Columns (2) and (4) correspond to the portfolio shares of this direct ownership for the same two percentiles of the income distribution.

Table 2: Numerical Exercise: Parameters

Parameter	Value	Source
e	5	Fixed Capital/GDP ratio
β	0.95	standard value
r	0.04	standard value
α	0.36	Krusell and Smith (1997)
δ	0.1	Standard value
γ	2	CRRA parameter, Standard value

Table 3: Numerical Exercise: Inequality in Endowments

	Benchmark	High-Low	Difference
e	5	$\frac{1}{2} \times 4 + \frac{1}{2} \times 6$	0%
Aggregate capital	4.87	5.23	+ 7.4%
Aggregate assets	-1.23	-1.21	+ 2.2%

Table 4: Summary Statistics for Firm-level Variables

Variable	Mean	Std. Dev.	Min	Max	N
Gross financial assets / total assets	0.237	0.241	-0.157	1.090	167967
Net financial assets / total assets	-1.827	75.727	-1.408	1.000	166762
Total assets (millions of 2014 USD)	0.145	0.864	0.000	32.439	168149
Cash flow / total assets	-0.913	35.550	-7.153	1.711	157968
Capex	0.061	0.084	-0.905	9.800	163117
Dividend dummy	0.298	0.457	0.000	1.000	168149
Acquisitions / total assets	0.015	0.623	-1.750	6.900	143038
Tobin's Q	1.929	1.489	0.083	9.998	137022
Market value / book value	10.493	323.015	0.076	5.258	140745
R&D / total assets	0.196	8.900	0.000	1.982	123564
NWC / total assets	-1.391	72.778	0.000	0.996	166667
Leverage	0.809	28.481	0.000	1.000	167518

Table 5: Time Series Regressions: Gross Financial to Total Assets

	(1)	(2)	(3)	(4)	(5)
	$\frac{FA}{assets}$	$\frac{FA}{assets}$	$\frac{FA}{assets}$	$\frac{FA}{assets}$	$\log(\frac{FA}{assets})$
Income Gini ratio	0.5235***	0.4835**	0.5402**	0.5130**	1.4608***
	(0.1200)	(0.2164)	(0.2135)	(0.2121)	(0.5539)
Lagged dependent	0.7543***	0.6088***	0.6521***	0.5150***	0.3542***
	(0.0620)	(0.1085)	(0.0956)	(0.0959)	(0.1017)
Log(real GDP)		0.0160	-10.2286***	-0.0131	0.0459
		(0.0478)	(0.0463)	(0.0617)	(0.1549)
Log(GDP deflator)		0.0170	-0.1129	0.0122	0.1345*
		(0.0158)	(0.0837)	(0.0270)	(0.0721)
GDP growth rate		0.0025	9.8864***	0.0306	0.1252
		(0.0518)	(0.0719)	(0.0637)	(0.1707)
Productivity		0.0599*	0.2450***	0.1525***	0.5551***
		(0.0358)	(0.0629)	(0.0423)	(0.1177)
3-m Treasury rate		-0.0016*	0.0003	-0.0001	-0.0021
		(0.0009)	(0.0010)	(0.0014)	(0.0035)
10-y Treasury rate				-0.0001	-0.0009
				(0.0019)	(0.0051)
S.d. market return				0.0012***	0.0028***
				(0.0002)	(0.0006)
Constant	-0.1438***	-0.3199	-1.0206***	-0.1942	-2.8183**
	(0.0360)	(0.3726)	(0.3824)	(0.4811)	(1.3451)
Gini ratio$_{t-1}$			✓		
X_{t-1}			✓		
Time Trend	✓	✓	✓	✓	✓
Observations	70	70	69	56	56
R-squared	0.991	0.992	0.995	0.994	0.995

*Notes: All data is annual, 1947-2016. The dependent variable is the ratio of gross financial assets to total assets for the non-financial corporate business sector (specification (6) uses the value in logs). The Income Gini Ratio is the annual ratio of families available from the US Census Bureau. All other data is available from FRED. The included time trend is quadratic. X_{t-1} indicates lagged values of the independent variables included in column (2). Standard errors are reported in parentheses and computed according to Newey and West (1987), allowing for autocorrelation of up to 10 lags. *** denotes a significance level of 1%, ** 5%, and * 10%.*

Table 6: Time Series Regressions: Net Financial to Total Assets

	(1) $\frac{NFA}{assets}$	(2) $\frac{NFA}{assets}$	(3) $\frac{NFA}{assets}$	(4) $\frac{NFA}{assets}$
Income Gini ratio	0.2831**	0.7796***	0.5494**	1.1830***
	(0.1119)	(0.2190)	(0.2735)	(0.2553)
Lagged dependent	0.8810***	0.7167***	0.6421***	0.6005***
	(0.0603)	(0.0809)	(0.0968)	(0.0952)
Log(real GDP)		0.0900*	-2.0352***	0.1368
		(0.0533)	(0.0428)	(0.0908)
Log(GDP deflator)		-0.0700***	-0.3074***	-0.1165***
		(0.0243)	(0.1122)	(0.0312)
GDP growth rate		-0.0067	1.9711***	0.1561**
		(0.0562)	(0.0915)	(0.0742)
Productivity		-0.0648	-0.0572	-0.1222**
		(0.0498)	(0.0849)	(0.0517)
3-m Treasury rate		0.0009	0.0030**	0.0021
		(0.0009)	(0.0012)	(0.0015)
10-y Treasury rate				-0.0000
				(0.0025)
S.d. market return				0.0007***
				(0.0002)
Constant	-0.1084***	-0.7417**	-1.2917**	-1.0919
	(0.0409)	(0.3744)	(0.5654)	(0.6776)
Gini ratio$_{t-1}$			✓	
X_{t-1}			✓	
Time Trend	✓	✓	✓	✓
Observations	70	70	69	56
R-squared	0.950	0.957	0.963	0.966

*Notes: All data is annual, 1947-2016. The dependent variable is the ratio of net financial assets to total assets for the non-financial corporate business sector. The Income Gini Ratio is the annual ratio of families available from the US Census Bureau. All other data is available from FRED. The included time trend is quadratic. X_{t-1} indicates lagged values of the independent variables included in column (2). Standard errors are reported in parentheses and computed according to Newey and West (1987), allowing for autocorrelation of up to 10 lags. *** denotes a significance level of 1%, ** 5%, and * 10%.*

Table 7: Firm-Level Regressions: Gross Financial to Total Assets

	(1) $\log(\frac{FA}{assets})$	(2) $\log(\frac{FA}{assets})$	(3) $\log(\frac{FA}{assets})$	(4) $\log(\frac{FA}{assets})$	(5) $\frac{FA}{assets}$
Income Gini ratio	5.2126**	1.6956**	1.9548**	1.9509**	-0.1418
	(2.0861)	(0.6891)	(0.8938)	(0.8962)	(0.1060)
Lagged dependent			0.6455***	0.6481***	0.6491***
			(0.0364)	(0.0365)	(0.0271)
Log(real GDP)	3.1629***	2.5425**	0.8138*	0.8185*	0.0494
	(0.9341)	(1.1000)	(0.4267)	(0.4249)	(0.0455)
Log(GDP deflator)	0.4555	0.1604	-0.1180	-0.1193	-0.0294
	(0.4508)	(1.0516)	(0.5336)	(0.5310)	(0.0508)
GDP growth rate	1.7042**	2.0537***	0.2680	0.2659	0.0469
	(0.6804)	(0.3098)	(0.5488)	(0.5517)	(0.0538)
3-m Treasury rate	-0.0676***	-0.0638**	-0.0448***	-0.0450***	-0.0044***
	(0.0131)	(0.0248)	(0.0100)	(0.0103)	(0.0008)
10-y Treasury rate	0.0284**	0.0264	0.0424**	0.0426**	0.0044***
	(0.0114)	(0.0241)	(0.0189)	(0.0195)	(0.0012)
Productivity	-3.1687***	-3.7832***	-1.4359**	-1.4350**	-0.1335**
	(0.8898)	(1.1853)	(0.5328)	(0.5335)	(0.0496)
S.d. market return	-0.0014	-0.0013	-0.0007	-0.0007	-0.0001
	(0.0023)	(0.0025)	(0.0025)	(0.0026)	(0.0003)
Log(real assets)	-0.1877***	-0.1644*	-0.0591**	-0.0589**	-0.0040
	(0.0489)	(0.0902)	(0.0278)	(0.0279)	(0.0025)
Cash flow	0.0234*	0.0705	-0.0045	-0.0355	0.0003
	(0.0117)	(0.0608)	(0.0337)	(0.0470)	(0.0021)
Capex	-0.8682*	-2.3128***	-2.8405***	-2.8368***	-0.3414***
	(0.4879)	(0.7442)	(0.4176)	(0.4200)	(0.0490)
Market-to-book	0.0019**	-0.0066	-0.0137**	-0.0142**	-0.0005*
	(0.0009)	(0.0045)	(0.0065)	(0.0068)	(0.0003)
Dividend dummy		0.0354	0.0095	0.0087	-0.0019
		(0.0919)	(0.0372)	(0.0378)	(0.0059)
Acquisitions		-0.7086***	-1.4238***	-1.4239***	-0.2006***
		(0.1618)	(0.2349)	(0.2298)	(0.0378)
Tobin's Q		0.1638***	0.1249***	0.1266***	0.0141***
		(0.0415)	(0.0248)	(0.0257)	(0.0032)
R&D		0.3541	0.0436	-0.0585	-0.0061
		(0.3066)	(0.1244)	(0.1648)	(0.0091)
NWC		-0.0672*	-0.0425*	-0.0467*	-0.0031*
		(0.0357)	(0.0219)	(0.0243)	(0.0018)
Leverage		-0.0942*	-0.0506	-0.0599*	-0.0041
		(0.0530)	(0.0307)	(0.0349)	(0.0025)
Firm FE	✓	✓	✓	✓	✓
Time Trend	✓	✓	✓	✓	✓
Observations	130908	92092	90186	82896	90429
R-squared	0.572	0.642	0.800	0.800	0.830

*Notes: All data is annual, 1950-2014. The dependent variable is the log ratio of gross financial assets to total assets at the firm level (specification (5) uses the raw ratio). The Income Gini Ratio is the annual ratio of families available from the US Census Bureau. All other variables are available from FRED or computed using Compustat data. The included time trend is quadratic. Observations are weighted by the firm's average real assets times the number of periods in the sample. Standard errors are reported in parentheses and are two-way clustered by firm and year. *** denotes a significance level of 1%, ** 5%, and * 10%.*

Table 8: Firm-Level Regressions: Net Financial to Total Assets

	(1)	(2)	(3)	(4)
Income Gini ratio	3.0164***	0.7347***	0.6516**	0.6027**
	(0.9801)	(0.2469)	(0.2532)	(0.2474)
Lagged dependent				0.0797*
				(0.0447)
Log(real GDP)	0.5122**	0.4472**	0.4542***	0.3970**
	(0.2475)	(0.1664)	(0.1597)	(0.1557)
Log(GDP deflator)	0.0465	0.1070	0.1320	0.0623
	(0.1289)	(0.2138)	(0.2002)	(0.2046)
GDP growth rate	0.1468	0.1200	0.1808	0.1254
	(0.2601)	(0.1299)	(0.1185)	(0.1145)
3-m Treasury rate	-0.0107*	-0.0136***	-0.0130***	-0.0132***
	(0.0055)	(0.0026)	(0.0024)	(0.0025)
10-y Treasury rate	0.0127*	0.0118***	0.0105**	0.0124***
	(0.0068)	(0.0042)	(0.0042)	(0.0045)
Productivity	0.1748	-0.2387	-0.3077*	-0.2232
	(0.1881)	(0.1756)	(0.1669)	(0.1592)
S.d. market return	0.0011	0.0003	0.0005	-0.0000
	(0.0011)	(0.0008)	(0.0007)	(0.0006)
Log(real assets)	-0.0199	0.0317***	0.0307***	0.0330***
	(0.0177)	(0.0103)	(0.0101)	(0.0103)
Cash flow	1.0831***	0.1364	0.0502	0.1389
	(0.2277)	(0.1001)	(0.0813)	(0.0868)
Capex	1.0901***	0.0187	0.0096	-0.0086
	(0.3815)	(0.2194)	(0.2143)	(0.2013)
Market-to-book	-0.1014***	-0.0302**	-0.0715*	-0.0334**
	(0.0186)	(0.0136)	(0.0362)	(0.0125)
Dividend dummy		-0.0186	-0.0174	-0.0074
		(0.0248)	(0.0243)	(0.0200)
Acquisitions		-0.1056	-0.1458**	-0.1672**
		(0.0658)	(0.0645)	(0.0675)
Tobin's Q		0.0781***	0.1317**	0.0836***
		(0.0189)	(0.0549)	(0.0184)
R&D		0.7544*	0.3875	0.7206*
		(0.4273)	(0.4280)	(0.3934)
NWC		0.7675***	0.7288***	0.7497***
		(0.1090)	(0.1211)	(0.0980)
Leverage		-0.5882**	-0.5590**	-0.5888***
		(0.2270)	(0.2170)	(0.1941)
Firm FE	✓	✓	✓	✓
Time Trend	✓	✓	✓	✓
Observations	130347	92244	84025	90326
R-squared	0.960	0.998	0.960	0.999

*Notes: All data is annual, 1950-2014. The dependent variable is the ratio of net financial assets to total assets at the firm level. The Income Gini Ratio is the annual ratio of families available from the US Census Bureau. All other variables are available from FRED or computed using Compustat data. The included time trend is quadratic. Observations are weighted by the firm's average real assets times the number of periods in the sample. Standard errors are reported in parentheses and are two-way clustered by firm and year. *** denotes a significance level of 1%, ** 5%, and * 10%.*

Table 9: Firm Savings: Controlling for the Tax Rate on Dividends

	(1) $\frac{FA}{assets}$	(2) $\frac{NFA}{assets}$	(3) $\log(\frac{FA}{assets})$	(4) $\frac{NFA}{assets}$
Gini ratio	0.4449**	1.1612***	2.0079**	0.6256**
	(0.1959)	(0.2675)	(0.9297)	(0.2478)
Lagged dependent	0.4085***	0.6021***	0.6450***	0.0796*
	(0.0871)	(0.0957)	(0.0363)	(0.0447)
Log(real GDP)	0.0632	0.1409	0.6875	0.3416**
	(0.0496)	(0.0917)	(0.4284)	(0.1517)
Log(GDP deflator)	0.0517**	-0.1122***	-0.2760	0.0266
	(0.0241)	(0.0340)	(0.6698)	(0.2271)
GDP growth	-0.0339	0.1503**	0.3798	0.1733
	(0.0604)	(0.0761)	(0.6506)	(0.1604)
3-month Treasury rate	-0.0018	0.0020	-0.0431***	-0.0125***
	(0.0013)	(0.0016)	(0.0089)	(0.0022)
10-year Treasury rate	0.0011	0.0001	0.0420**	0.0123***
	(0.0016)	(0.0025)	(0.0161)	(0.0045)
Productivity	0.2108***	-0.1172**	-1.5287**	-0.2628
	(0.0339)	(0.0541)	(0.5764)	(0.1881)
S.d. market return	0.0012***	0.0007***	-0.0009	-0.0001
	(0.0002)	(0.0003)	(0.0021)	(0.0007)
Log(real assets)			-0.0589**	0.0331***
			(0.0281)	(0.0104)
Cash flow			-0.0047	0.1389
			(0.0345)	(0.0868)
Capex			-2.8269***	-0.0028
			(0.4110)	(0.2063)
Market-to-book			-0.0137*	-0.0334**
			(0.0068)	(0.0126)
Dividend dummy			0.0094	-0.0074
			(0.0381)	(0.0201)
Acquisitions			-1.4230***	-0.1672**
			(0.2342)	(0.0676)
Tobin's Q			0.1251***	0.0837***
			(0.0301)	(0.0185)
R&D			0.0425	0.7204*
			(0.1241)	(0.3936)
NWC			-0.0423*	0.7497***
			(0.0222)	(0.0980)
Leverage			-0.0505	-0.5888***
			(0.0346)	(0.1941)
Tax on dividends	0.1252***	0.0132	-0.1464	-0.0636
	(0.0282)	(0.0357)	(0.2495)	(0.0843)
Constant	-0.9076**	-1.1336*		
	(0.4055)	(0.6877)		
Firm FE			✓	✓
Time Trend	✓	✓	✓	✓
Observations	56	56	90186	90326
R-squared	0.995	0.966	0.800	0.999

Notes: All data is annual, 1960-2016 for aggregate data and 1971-2014 for firm-level data. The dependent variable is specified in each column. The Income Gini Ratio is the annual ratio of families available from the US Census Bureau. The

Table 10: Firm Savings: Financial Assets excluding Cash-like Items

	(1) $\frac{illiquid}{assets}$	(2) $\frac{net\,illiquid}{assets}$	(3) $\log(\frac{illiquid}{assets})$	(4) $\log(\frac{illiquid}{assets})$	(6) $\frac{net\,illiquid}{assets}$
Gini ratio	0.5418**	0.8437***	6.5629***	2.6467	0.9607***
	(0.2135)	(0.2834)	(0.6132)	(1.6114)	(0.1976)
Lagged dependent	0.1804***	0.3163**		0.6807***	0.0730
	(0.0385)	(0.1286)		(0.0580)	(0.0436)
Log(real GDP)	-0.0065	0.3261***	-0.1565	0.6882	0.1361
	(0.0648)	(0.1077)	(0.6899)	(0.5434)	(0.1243)
Log(GDP deflator)	-0.0125	-0.1403***	-0.2310	0.6239	0.0676
	(0.0299)	(0.0400)	(1.1820)	(0.6303)	(0.1821)
GDP growth	0.0373	0.1374	-2.2100***	-1.1842***	-0.1150
	(0.0668)	(0.0919)	(0.4154)	(0.3939)	(0.1074)
3-m Treasury rate	-0.0002	0.0007	-0.0008	-0.0110	-0.0061***
	(0.0014)	(0.0021)	(0.0142)	(0.0118)	(0.0022)
10-y Treasury rate	0.0009	0.0019	0.0123	0.0180	0.0093**
	(0.0021)	(0.0032)	(0.0413)	(0.0154)	(0.0039)
Productivity	0.1259***	-0.3847***	1.5396	1.0467*	0.1669
	(0.0485)	(0.0776)	(1.1389)	(0.5756)	(0.1472)
S.d. market return	0.0011***	-0.0002	-0.0030**	-0.0033**	0.0002
	(0.0002)	(0.0003)	(0.0014)	(0.0016)	(0.0006)
Log(real assets)			-0.1199	-0.0439	0.0407***
			(0.1263)	(0.0372)	(0.0093)
Cash flow			0.4839*	0.2338	0.1346
			(0.2726)	(0.1599)	(0.0870)
Capex			-0.7704	0.1097	0.2497
			(0.6972)	(0.3952)	(0.1568)
Market-to-book			0.0246	0.0230**	-0.0322**
			(0.0148)	(0.0106)	(0.0127)
Dividend dummy			0.1196	0.0349	-0.0110
			(0.1423)	(0.0493)	(0.0158)
Acquisitions			-0.1051	-0.0667	-0.0452
			(0.1620)	(0.1266)	(0.0553)
Tobin's Q			-0.1000	-0.0731**	0.0590***
			(0.0613)	(0.0304)	(0.0177)
R&D			1.8941*	0.8320**	0.7252*
			(1.0308)	(0.4109)	(0.3898)
NWC			0.0668	0.0685*	0.7578***
			(0.0671)	(0.0375)	(0.0990)
Leverage			0.0887	0.0723*	-0.5855***
			(0.0863)	(0.0378)	(0.1980)
Constant	0.2125	-2.1112***			
	(0.5563)	(0.7710)			
Firm FE			✓	✓	✓
Time Trend	✓	✓	✓	✓	✓
Observations	56	56	89642	87196	90327
R-squared	0.993	0.968	0.590	0.779	0.999

*Notes: All data is annual, 1960-2016 for aggregate data and 1971-2014 for firm-level data. Illiquid assets are the less-liquid assets according to the definition provided in the footnote [3]. Net illiquid is computed as the difference between less-liquid assets and financial liabilities. The dependent variable is specified in each column. The Income Gini Ratio is the annual ratio of families available from the US Census Bureau. All other variables are available from FRED or computed using Compustat data. The included time trend is quadratic. Observations are weighted by the firm's average real assets times the number of periods in the sample. Standard errors are computed as in previous tables. *** denotes a significance level of 1%, ** 5%, and * 10%.*

Table 11: Firm Savings: Alternative Measures of Inequality

	(1) $\frac{NFA}{assets}$	(2) $\frac{NFA}{assets}$	(3) $\frac{NFA}{assets}$	(4) $\frac{NFA}{assets}$	(5) $\frac{net\,illiquid}{assets}$
Gini households	0.8290***	0.7510**			
	(0.2619)	(0.3608)			
Top 10% stock share			0.2272**	0.2773*	0.5044***
			(0.1122)	(0.1548)	(0.1099)
Lagged dependent	0.7377***	0.0796*	0.7100***	0.0797*	0.0729
	(0.0925)	(0.0448)	(0.1112)	(0.0452)	(0.0438)
Log(real GDP)	0.0390	0.3390**	0.0730	0.3208**	0.1116
	(0.0962)	(0.1523)	(0.1135)	(0.1504)	(0.0776)
Log(GDP deflator)	-0.0175	0.0441	0.0181	0.0493	0.1153
	(0.0243)	(0.2247)	(0.0262)	(0.2197)	(0.1627)
GDP growth	0.1600*	0.1689	0.1446	0.2366	0.0010
	(0.0834)	(0.1576)	(0.0932)	(0.1524)	(0.1253)
3-m Treasury rate	0.0029*	-0.0127***	0.0012	-0.0134***	-0.0078***
	(0.0018)	(0.0026)	(0.0020)	(0.0023)	(0.0016)
10-y Treasury rate	-0.0024	0.0123***	-0.0033	0.0108**	0.0065*
	(0.0025)	(0.0045)	(0.0029)	(0.0042)	(0.0033)
Productivity	-0.0151	-0.2632	-0.1257	-0.4001*	-0.0999
	(0.0473)	(0.1883)	(0.0990)	(0.2182)	(0.1801)
S.d. market return	0.0008***	-0.0000	0.0005*	-0.0003	-0.0002
	(0.0003)	(0.0007)	(0.0003)	(0.0007)	(0.0006)
Log(real assets)		0.0331***		0.0328***	0.0402***
		(0.0103)		(0.0102)	(0.0091)
Cash flow		0.1389		0.1389	0.1346
		(0.0867)		(0.0867)	(0.0870)
Capex		-0.0019		0.0039	0.2627
		(0.2063)		(0.2056)	(0.1600)
Market-to-book		-0.0334**		-0.0334**	-0.0322**
		(0.0125)		(0.0125)	(0.0127)
Dividend dummy		-0.0073		-0.0072	-0.0106
		(0.0201)		(0.0199)	(0.0156)
Acquisitions		-0.1666**		-0.1675**	-0.0463
		(0.0672)		(0.0671)	(0.0568)
Tobin's Q		0.0838***		0.0824***	0.0564***
		(0.0182)		(0.0183)	(0.0177)
R&D		0.7204*		0.7204*	0.7254*
		(0.3936)		(0.3937)	(0.3901)
NWC		0.7497***		0.7497***	0.7578***
		(0.0979)		(0.0979)	(0.0991)
Leverage		-0.5888***		-0.5888***	-0.5856***
		(0.1941)		(0.1941)	(0.1980)
Tax on dividends	0.0168	-0.0687	0.0089	-0.1055	-0.0764
	(0.0414)	(0.0846)	(0.0524)	(0.0829)	(0.0616)
Constant	-0.5512		-0.5428		
	(0.7248)		(0.8487)		
Firm FE		✓		✓	✓
Time Trend	✓	✓	✓	✓	✓
Observations	56	90326	55	90326	90327
R-squared	0.962	0.999	0.957	0.999	0.999

Notes: All data is annual, 1967-2016 for aggregate data and 1971-2014 for firm-level data. The dependent variable is specified in each column. Gini households is the annual income Gini ratio for households available from the US Census

Table 12: Firm Savings: Non-Financial Non-Corporate Business Sector

	(1) $\frac{FA}{assets}$	(2) $\frac{illiquid}{assets}$	(3) $\frac{NFA}{assets}$	(4) $\frac{NFA}{assets}$
Gini families	0.2414	-0.2435	0.4763*	
	(0.1893)	(0.2000)	(0.2575)	
Gini households				0.4489*
				(0.2642)
Lagged dependent	0.8709***	0.0584***	0.7260***	0.7616***
	(0.1294)	(0.0167)	(0.1005)	(0.0970)
Log of real GDP	0.0894	-0.0777	-0.0462	-0.0615
	(0.0605)	(0.0777)	(0.0798)	(0.0817)
Log of GDP deflator	-0.0064	-0.0777**	-0.0793**	-0.0400*
	(0.0295)	(0.0316)	(0.0358)	(0.0227)
GDP growth rate	0.0114	0.0740	0.1129	0.1239
	(0.0590)	(0.0621)	(0.0769)	(0.0773)
3-month Treasury rate	0.0008	0.0008	0.0016	0.0018
	(0.0013)	(0.0014)	(0.0017)	(0.0017)
Productivity	-0.0508	-0.0768*	-0.0732	-0.0435
	(0.0453)	(0.0460)	(0.0542)	(0.0481)
10-year Treasury rate	-0.0006	0.0000	-0.0022	-0.0030
	(0.0020)	(0.0022)	(0.0026)	(0.0025)
S.d. market return	0.0002	0.0003	-0.0007**	-0.0006**
	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Constant	-0.6748	1.1727*	0.4065	0.4215
	(0.4557)	(0.6269)	(0.5922)	(0.6130)
Time Trend	✓	✓	✓	✓
Observations	56	56	56	56
R-squared	0.995	0.992	0.968	0.969

*Notes: All data is annual, 1947-2016. The dependent variable is the ratio of gross financial assets to total assets for the non-financial non-corporate business sector. The Income Gini Ratio is the annual ratio of families available from the US Census Bureau. Gini households is the the same ratio computed for households. All other data is available from FRED. The included time trend is quadratic. X_{t-1} indicates lagged values of the independent variables included in column (2). Standard errors are reported in parentheses and computed according to Newey and West (1987), allowing for autocorrelation of up to 10 lags. *** denotes a significance level of 1%, ** 5%, and * 10%.*

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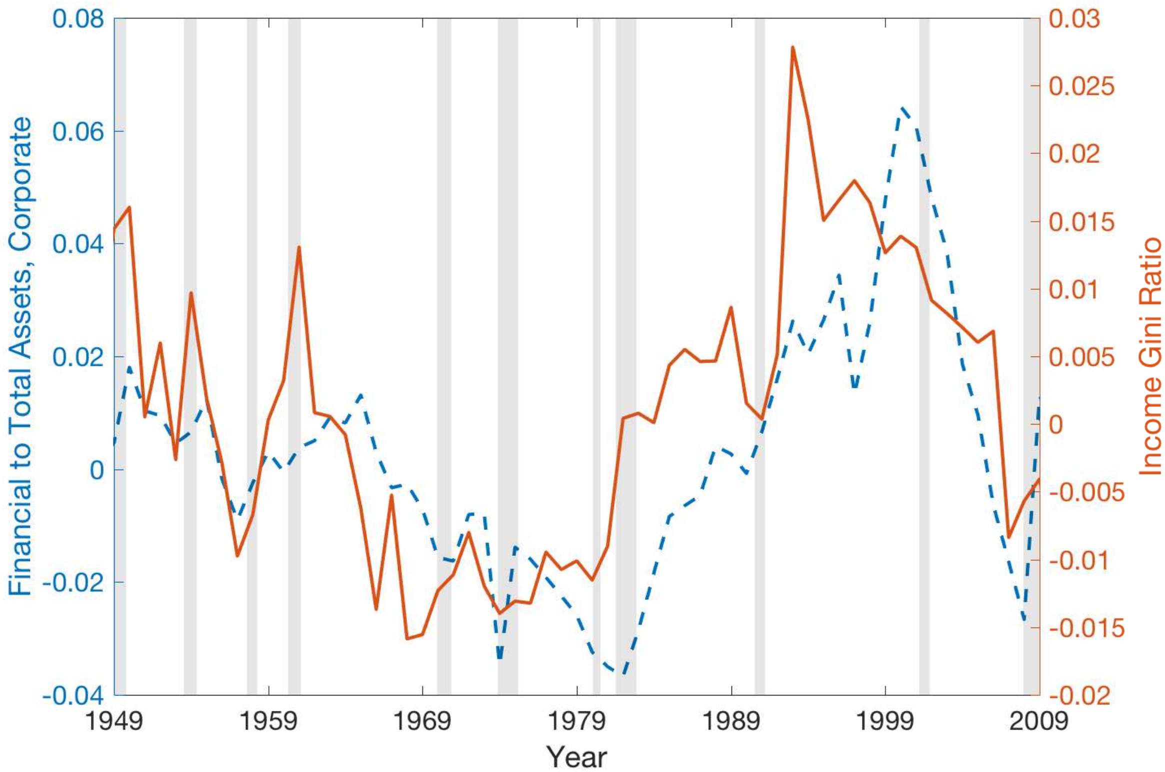
A Motivation

Figure 6: Inequality and Financial Assets, Quadratic Trend Removed



Notes: Annual average financial to total assets for non-financial corporate businesses (left axis, dashed line) and income Gini ratio for families (right axis, solid line), 1947-2016. Series are expressed as deviations from a quadratic trend. Correlation coefficient: 0.719. Asset data comes from the Federal Reserve Financial Accounts. Gini ratio for families comes from the US Census Bureau. Shaded regions correspond to NBER recessions.