Monetary Easing, Leveraged Payouts and Lack of Investment

Viral Acharya[1] Guillaume Plantin[2]

[1]New York University, NBER and CEPR

[2]Sciences Po and CEPR

Introduction

- Low policy rates in the US since 2008
- Corporate debt to GDP at historically high levels
  - Share in the shadow-banking system at all-time high
- Payouts to shareholders (share buybacks in particular) exceed high-water marks
  - Under public and political scrutiny
- Fixed business investment remains below pre-2008 trends
  - Despite robust corporate profits and favorable tax reforms

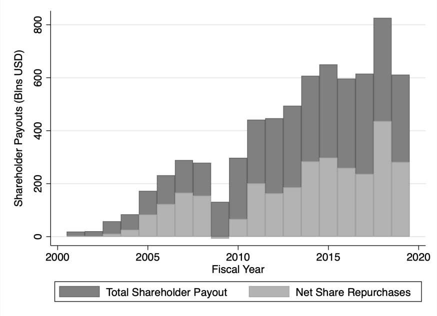
Introduction

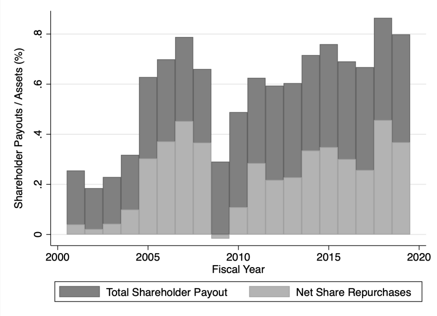
Leveraged loans:

- Doubled in size since 2010 $\simeq$ Junk-bond market
- $> 90\%$ in the shadow banking system
- Use of funds mostly dividends and buybacks, leveraged buyouts, or mergers and acquisitions

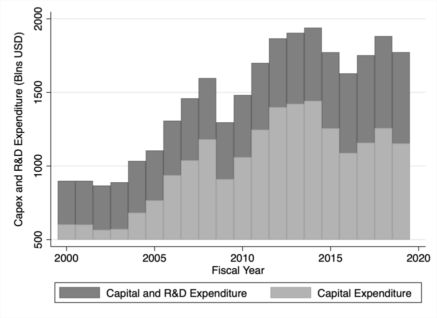
Introduction

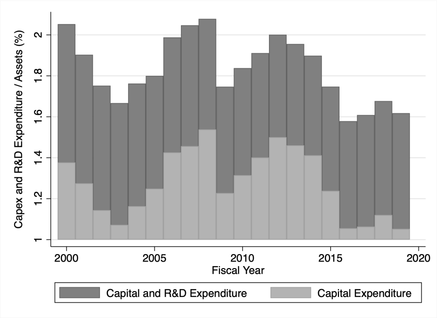
Increased leverage has been coincident with larger shareholder payouts...





...and lower normalized real investment.





This paper...

...offers a model in which three features jointly develop in equilibrium following a negative productivity shock:

- low official interest rate
- a surge in corporate leverage to fund payouts to shareholders...
- ...at the expense of business investment from a social perspective

Gist of the argument (1/2)

An agent who values consumption at two dates 0 and 1

- owns an investment technology with decreasing marginal returns
- is price-taker in a bond market

As the required return on bonds decreases, the agent

- invests more until marginal return on investment equates bonds return on bonds
- borrows more against future output until so does her marginal rate of intertemporal substitution. Akin to a leveraged payout to shareholders

Gist of the argument (2/2)

- Suppose now moral hazard: output stochastically increases in costly private effort by the agent

$\rightarrow$ Tension between producing an output and borrowing against it as the interest rate decreases

- The agent sets her leverage at the level that optimally trades off consumption-smoothing and incentives
- Wedge between privately and socially optimal tradeoff: Reduced effort and investment are deadweight social losses, benefits from leveraged payouts at a subsidized rate are a social wash because they must be paid for by other agents—in the form of taxes in our setup

Implications

- Implications for financial regulation
  - First best if the public sector can control the (real) interest rate and private leverage
  - Rise of shadow banking affects transmission of monetary policy: less investment and more (socially useless here) leveraged payouts
- Implications for optimal monetary policy
  - Monetary policy should be less aggressive with than without shadow banking
  - Monetary policy may in fact consist of "leaning against the wind," i.e., not stimulating the economy at all in order to fully contain leveraged payouts and maintain productive efficiency

Related literature

- Malinvestment
  - Old idea in Austrian economics (Hayek, 1931). Low policy rates subsidize socially undesirable investments
  - This paper connects the idea that leverage payouts are at the expense of business investment to this old idea
- Adverse effect of low cost of capital on corporate incentives
  - Bolton, Santos, and Scheinkman (2016), Martinez-Miera and Repullo (2017) or Boissay, Collard, and Smets (2016)
  - low cost of capital due to exogenous shocks in their setups, from an endogenous and optimal monetary-policy decision here
- Failure of monetary easing to stimulate investment
  - Brunnermeier and Koby (2018), Coimbra and Rey (2017)
  - We jointly explain low investment and high leveraged payouts

Roadmap

1. Cost of capital, investment, and leveraged payouts
2. Investment, leveraged payouts, and optimal monetary policy
3. Descriptive empirical evidence supporting model implications

1. Cost of capital, investment, and leveraged payouts

Cost of capital, investment, and leveraged payouts

- Two dates 0,1
- Risk and time neutral entrepreneur with large date-0 endowment $W > 0$
- Investment technology that transforms I date-0 units into $f(I)$ date-1 units with probability e or zero with prob. $1 - e$
- Moral hazard: Entrepreneur controls e at a private cost $e^2 f(I)/(2\pi)$ where $\pi \in (0, 1)$
- Can trade securities at a gross expected return $r > 0$

Cost of capital, investment, and leveraged payouts

- Suppose $r \geq 1$. Entrepreneur solves:

$$\max_{e,I} \left\{ \left(e - \frac{e^2}{2\pi} \right) f(I) + r(W - I) \right\}$$

maximized at

$$e = \pi,$$
$$\frac{\pi}{2} f'(I) = r.$$

- prob. of success π does not depend on r
- I and expected output $\pi f(I)$ decrease with respect to r

Cost of capital, investment, and leveraged payouts

- Suppose $r < 1$. Entrepreneur solves:

$$\max_{e,I,x} \left\{ \frac{(1-x)ef(I)}{r} + W - I + \left(xe - \frac{e^2}{2\pi} \right) f(I) \right\}$$

s.t.

$$e = \arg\max_{y} \left\{ xy - \frac{y^2}{2\pi} \right\}$$

- $x \in [0,1]$ is the skin in the game
- Borrowing against future output akin to a leveraged payout

First-order conditions with respect to e, x, I

$$e = \frac{\pi}{2 - r}$$

$$x = \frac{1}{2 - r}$$

$$\frac{\pi f'(I)}{2} = r(2 - r)$$

- Note: effect of r on expected output $ef(I)$ unclear
- If $f(I) = \gamma I^{1/\gamma}$ then expected output increases in r for $r \in [2/(\gamma + 1), 1]$, and decreases otherwise

Summary

Let $\overline{r}(r) = \min\{r; 1\}$. The entrepreneur chooses investment I, effort e, and skin in the game x such that

$$e = \pi x = \frac{\pi}{2 - \overline{r}(r)}, \frac{\pi f'(I)}{2(2 - \overline{r}(r))} = r$$

- For $r \in (1, +\infty)$, a reduction in the cost of capital r is irrelevant for corporate leverage, payout policy, and incentives. It spurs investment and expected output
- For $r < 1$, a reduction in the cost of capital r spurs leveraged payouts that reduce the entrepreneur's incentives and thus degrade asset quality. Investment is less sensitive to r than in the case $r > 1$

2. Investment, leveraged payouts, and optimal monetary policy

Setup

- Time is discrete
- Single consumption good used as the numéraire
- 2 types of private agents:
    - Workers
    - Entrepreneurs
- Public sector
- Bond market. There is a competitive market for one-period bonds denominated in the numéraire good

Workers

- Unit mass born at each date and live for two dates
- Supply one unit of labor when young
- Consume when old. Risk neutral
- Each worker owns a technology that transforms l units of labor into $g(l)$ contemporaneous units of the consumption good

Entrepreneurs

- Unit mass born at each date and live for two dates
- Same as before:
  - Risk and time neutral with large date-0 endowment $W > 0$
  - Investment technology that transforms l date-t units of labor into $f(l)$ date-$t+1$ units of consumption with probability e or zero with prob. $1-e$
  - Moral hazard: controls e at a private cost $e^2 f(l)/(2\pi)$
- We deem f the capital-good sector and g the consumption-good sector

Public sector

The public sector

- Does not consume and maximizes the total utility of the private sector, discounting that of future generations with a factor arbitrarily close to 1
- Monetary policy. The public sector announces at each date an interest rate at which it is willing to absorb any net demand for bonds
- Fiscal policy. The public sector can tax workers as it sees fit, and can, in particular, apply lump-sum taxes. It cannot tax nor regulate entrepreneurs

Comments

Monetary model of a "cashless" economy where

- Money only serves as a unit of account
- The public sector sets the nominal interest rate
- and this affects the real interest rate in the presence of nominal rigidities

Simplification here: extreme nominal rigidity—fixed price level for one good—to abstract from price level determination and focus on controlling the real rate

Steady-state

- Steady-states in which the public sector announces a constant interest rate r.
- Denote w the market wage, l the quantity of labor that workers supply to entrepreneurs.
- Need to characterize (w, l, e, x) associated with r

Entrepreneurs

$$\max_{e,l,x}\left\{(1+r-\overline{r}(r))\left[\frac{(1-x)ef(l)}{r}+W-wl\right]+\left(xe-\frac{e^2}{2\pi}\right)f(l)\right\}$$

s.t.

$$e=\arg\max_{y}\left\{xy-\frac{y^2}{2\pi}\right\}$$

F.O.C:

$$x=\frac{1}{2-\overline{r}(r)}, e=\pi x, \frac{\pi f'(l)}{2(2-\overline{r}(r))}=rw$$

Entrepreneur's net position in the bond market when young:

$$\mathbb{1}_{\{r\geq 1\}}(W-wl)-\frac{(1-x)ef(l)}{r}$$

Workers

Young workers' income:

- labor income in the capital-good sector wl
- labor income in the consumption-good sector $w(1-l)$
- profits from the consumption-good sector $g(1-l) - w(1-l)$ (maximum when $g'(1-l) = w$)

Since they consume only when old, workers invest the resulting total income

$$g(1-l) + wl$$

in the bond market thereby receiving a pre-tax income

$$r[g(1-l) + wl]$$

when old

Surplus of a cohort

$$\underbrace{(1+r-\overline{r}(r))\left(\frac{(1-x)ef(l)}{r}+W-wl\right)+\left(xe-\frac{e^2}{2\pi}\right)f(l)}_{\text{Entrepreneurs' surplus}}$$

$$+\quad\underbrace{rwl+rg(1-l)}_{\text{Old workers' pre-tax income}}$$

$$+\underbrace{(1-r)\left[\mathbb{1}_{\{r\geq 1\}}(W-wl)-\frac{(1-x)ef(l)}{r}+g(1-l)+wl\right]}_{\text{Rebate to old workers}}$$

$$=W+\left(e-\frac{e^2}{2\pi}\right)f(l)+g(1-l)$$

Social versus private optimum

$$W + \left(e - \frac{e^2}{2\pi}\right) f(l) + g(1 - l)$$

- The interest rate r affects total surplus only indirectly through e, l
- Whereas it affects entrepreneurs' welfare directly via leveraged payouts
- Social optimum:

$$e^* = \pi$$
$$\frac{\pi f'(l^*)}{2} = g'(1 - l^*)(= w^*)$$

implemented with $r^* = 1$

Monetary easing

- Suppose now that the date-0 cohort of workers have a less productive technology than that of the others
- Transforms x units of labor into $\rho g(x)$ contemporaneous units of the consumption good instead of $g(x)$, where $\rho \in (0, 1)$
- Three cases in turn:
  - Flexible wage
  - Rigid wage, regulated leverage
  - Rigid wage, unregulated leverage

Monetary easing

- Let $\rho_t = 1 + (\rho - 1)\mathbb{1}_{\{t=0\}}$
- The first-best is reached when the output of cohort t net of effort costs

$$\left(e_t - \frac{e_t^2}{2\pi}\right) f(l_t) + \rho_t g(1 - l_t)$$

is maximum for all t, or

$$e_t = \pi$$
$$\rho_t g'(1 - l_t) = \pi f'(l_t)/2$$

Monetary easing - Flexible wage

- With a flexible wage, setting $r_t = 1$ for all t implements the first-best. This induces $x_t = 1$ and thus

$$e_t = \pi, \rho_t g'(1 - I_t) = w_t = r_t w_t = \pi f'(I_t)/2,$$

which characterizes the first-best

- The date-0 wage decreases to $w_0 < w^*$ such that investment grows at the optimal level $I_0 > I^*$
- Note: The cohort born at date -1 subsidizes that born at date 0
- Let I_ρ and w_ρ denote these first-best date-0 values of I and w

Rigid wage

Assumption. (Downward rigid wage) *The wage cannot be smaller than w^* at any date*

Rigid wage and regulated leverage

Monetary easing and prudential regulation implement the first-best:

The public sector implements the first-best outcome with the following policy:

- It sets $r^* = 1$ at all other dates than 0 (and thus need not regulate leverage at these dates)
- It sets $r_\rho = w_\rho / w < 1$ at date 0 and imposes $x_0 = 1$ to young date-0 entrepreneurs.

The cohort born at date -1 subsidizes that born at date 0, more so than under flexible wage

Rigid wage and regulated leverage

- Capital-good sector is interest-rate sensitive, consumption-good sector is not
- Public sector can correct the absence of appropriate price signals in the date-0 labor market by distorting the date-0 capital market: By setting the date-0 policy rate at

$$r_\rho = \frac{w_\rho}{w^*}$$

and imposing

$$x_0 = 1$$

- Entrepreneurs hire up to the optimal level l_ρ :

$$\frac{\pi}{2} f'(l_\rho) = r_\rho w^* = w_\rho$$

Rigid wage and unregulated leverage

1. The optimal interest rates are $r^* = 1$ at all other dates than 0 and $r_u \leq 1$ at date 0.
2. Surplus is strictly lower when leverage is unregulated than when it is because date-0 investment is strictly lower: Entrepreneurs use a quantity of labor l_u strictly smaller than the first-best one l_ρ.
3. The cohort born at date -1 subsidizes that born at date 0, more so than under rigid wage and regulated leverage. There are no other transfers across cohorts.

- Monetary easing induces leverage payouts and so effort below first-best
- Suboptimal investment to maintain skin in the game

Optimal monetary policy with rigid wage and unregulated leverage

There exists $\overline{\rho} \in [0, 1)$ such that

- If, ceteris paribus, $\rho \geq \overline{\rho}$, then it is optimal to ignore the shock ρ and leave the date-0 interest rate at its steady-state value:
  $r_u = r^* = 1 > r_\rho$.
  Investment is strictly below the first-best level but productive efficiency is at the first-best ($I_u < I^*$ but $e^* = \pi$).
- If $\overline{\rho} > 0$, then for $\rho \in (0, \overline{\rho})$, the optimal monetary policy is more accommodative than when leverage is regulated: $r_u < r_\rho$.
  Investment and productive efficiency are both strictly below their first-best levels ($I_u < I^*$ and $e^* < \pi$).

Optimal monetary policy

- Stein (2012): in the presence of some unchecked credit growth in the shadow-banking system, a monetary policy that leans against the wind raises the cost of borrowing in all "cracks" of the financial sector
- Similar to our result when shocks are small and/or the transmission of monetary policy to investment is weak

Extensions and Other Implications

- Extensions
  - Risky corporate debt
  - Adverse selection instead of moral hazard
  - Rollover risk
- Other Implications
  - Shadow banking
  - Taxing entrepreneurs
  - Zero lower bound and asset purchases

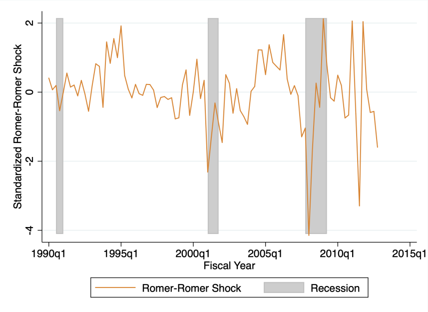
3. Descriptive empirical evidence supporting model implications

Empirical Overview

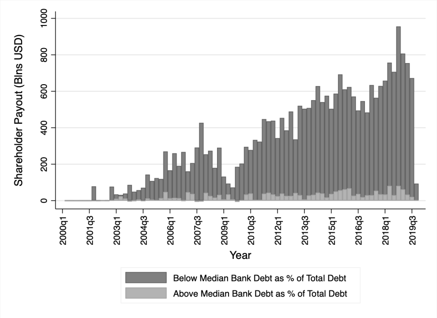
- We present descriptive evidence in support of our model implications:
  - Payout (net repurchase and dividend) financing generally arises from unregulated leverage (bond financing) rather than regulated leverage (bank financing)
  - Payouts are supported in part by accommodative monetary policy
  - Increased payout activity is not coincident with higher real investments
- Existing empirical evidence is also supportive of these implications:
  - Elgouacem and Zago (2019), Farre-Mensa, Michaely, and Schmalz (2018)
  - Both connect payout activity to leverage; the former shows some causal evidence that repurchases lead to lower real investments

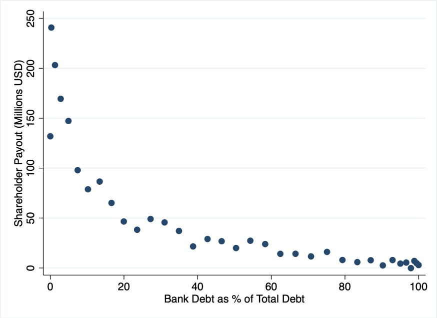
Data

- Time period: 2000 - 2012
- Firm fundamentals and repurchasing activity: Compustat
- Sources of firm leverage: S&P Capital IQ
- Monetary policy shocks: Romer-Romer (2004)
  - Changes in the Fed Funds rate not explained by the Federal Reserve's internal (Greenbook) forecasts of real GDP, inflation, unemployment



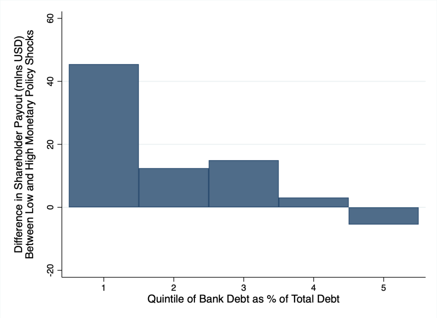
Payout financing often arises from unregulated leverage

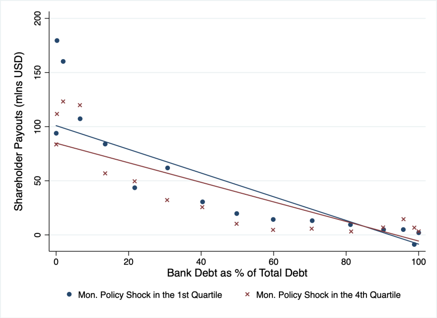




- The vast majority of shareholder payouts are conducted by firms which are financed by unregulated (non-bank) debt

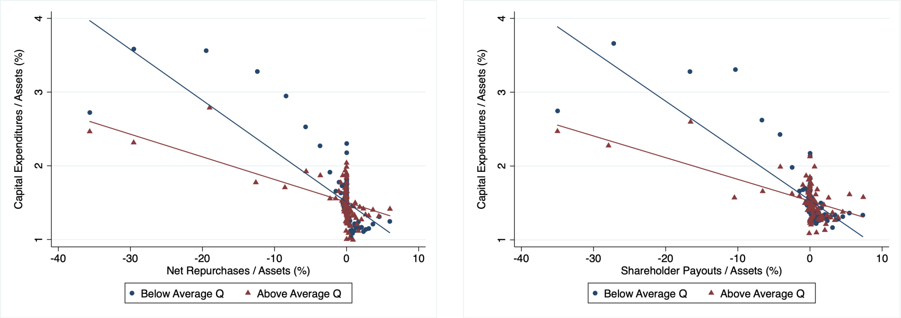
Payouts are supported by accommodative monetary policy





- Payouts are higher during periods of accommodative policy (Romer-Romer shock in the 1st quartile) relative to periods of tighter monetary policy (Romer-Romer shock in the 4th quartile)
- This pattern is particularly pronounced for those firms which rely chiefly upon unregulated (non-bank) debt financing

Payout activity is not coincident with real investments



- There is a negative relationship between real investment (capital expenditure) and both net repurchases as well as shareholder payouts
- The same trend remains when we include R&D expenditures in the metric of real investments

Conclusion

- This paper:
  - Presents a model examining how accommodative monetary policy can lead firms to conduct socially suboptimal leveraged payouts
  - Shows implications for financial regulation and optimal monetary policy, particularly in the presence of a large shadow-banking sector
  - Provides suggestive descriptive evidence in support of our model's predictions
- Future extensions:
  - Consider risks undertaken by regulated entities (banks) in low interest rate environments (i.e. the interaction of monetary easing and heterogeneous risk across firms)
  - In the context of the current pandemic: how leveraged payouts may affect rollover risk in the presence of a profitability shock