Monetary Growth and Financial Sector Wages

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Abstract

We investigate the relation between monetary growth and the growth of and compensation in the financial industry since the end of the Bretton Woods system. Estimating structural vector autoregressions, we find that the growth of the monetary base is positively associated with a higher differential between financial and average wages, but not with a larger financial industry.

Keywords: Cantillon effect, inequality, money non-neutrality, financial industry

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1 Introduction

Academics and journalists detail the high remuneration of financial executives (Cuñat and Guadalupe, 2009; McGee, 2019). Such attention reveals that finance represents an increasing proportion of the American economy since the 1970s (Greenwood and Scharfstein, 2013). Monetary variables play little role in studies of the size of and compensation in the financial industry. This lack of attention is surprising because the financial industry includes the banking system, which plays a key role in the monetary system by receiving base money from the Federal Reserve and loaning out new funds. Therefore, we analyze if the rise in the financial industry since the 1970s is not merely an artifact of the deregulation taking place during this time, but was also caused by expansionary monetary policy since the end of the Bretton Woods system and the turn to a pure fiat money system. It is possible that the linkage between the switch to a more elastic currency and the growth in financial industry compensation is purely coincidental, but there are theoretical linkages that make such an explanation plausible: the first receivers of money benefit at the expense of those receiving it later (Cantillon, [1755] 2015).

To fill this gap in the literature, our paper is the first to include measures of the money supply in the analysis of the growth of and the compensation in the financial industry in the United States. In addition, we continue the analysis past the Great Recession. Our paper innovates on the literature on the financial industry through the implementation of sophisticated estimation techniques using previously unavailable data. We find significant evidence that money creation increases wages in the financial industry, but not the fraction of total output that the financial industry represents. Such research is important because central bank policy is assumed to be neutral in real terms. Moreover, the impact of the financial industry on the economy is not yet fully understood. Therefore, investigating the relation between monetary policy and the financial industry will help central banks to understand more nuanced impacts of their policy decisions, and will help economists better understand
the role of finance in the economy by understanding what has driven its growth.

Our theory derives from that of Cantillon ([1755] 2015). New money is injected into the banking system, primarily through Open Market Operations, and this money is lent out. Given that money starts in the banking industry, bankers are able to use the new money first. Therefore, to the extent that bankers are able to loan out this new money and receive interest payments, their profits will rise. The increase in profits will lead to increased desire to enter the banking industry, and we expect banking to become a larger percentage of GDP. As the first receivers of new money, the banking industry has the ability to bid up wages first, and therefore it follows that wages will be higher in this industry. From the perspective of finance more generally, the link between money creation and wealth inequality becomes more important. To the extent that money creation influences wealth inequality, because the wealthy are early recipients of new money, we expect that the goods and services demanded by the wealthy will increase in price sooner than other goods and services. The wealthy are more likely to invest in assets and use financial services, and therefore wages in this industry will increase faster than in other industries. Therefore, the activity of the first receivers of new money bids up wages in the financial industry and increases the importance of the financial industry as a percentage of GDP. Since 1980, wages in the finance industry have grown faster than wages in manufacturing, and finance has represented an increasing share of GDP (Greenwood and Scharfstein, 2013; Philippon and Reshef, 2012). As early receivers of new money, we expect to see wages rise in this industry faster than they rise in other industries.

Our paper focuses on the post-Bretton Woods era. To motivate this choice, we note that the conduct of monetary policy during the Bretton Woods agreement did not allow for the same growth in the financial industry size and executive compensation that occurred once the Bretton Woods agreement collapsed. There is significant evidence that the end of the Bretton Woods system ushered in significantly less constrained monetary policy and
capital market deregulation (Bordo, 1993; Marston, 1993).\textsuperscript{1} US monetary policy was thus significantly less inflationary during Bretton Woods than afterward, and, more importantly, the US desired the ability to pursue and conduct expansionary monetary policy. Moving to a floating exchange rate regime therefore gave the United States the ability to engage in more inflationary policies and represents a significant change in the policy environment.\textsuperscript{2} There is, therefore, evidence to suggest beginning our inquiry into the relation between monetary policy and the financial industry after the Bretton Woods system collapsed. The papers that look at the impact of deregulation miss the impact of monetary policy, and therefore our paper fills a vital gap in the literature.

\section{Relevant Literature}

The financial industry has grown substantially since the 1980s, but the explanation as to why remains an open research question. Data limitations have impeded studying this question. Recent advances in data availability, e.g., EU KLEMS, serve to benefit researchers. In the literature, deregulation plays the major role in explaining why the financial industry has grown, pointing to the deregulation beginning in the 1980s and continuing up until the eve of the Great Recession (Philippon and Reshef, 2012; Witko, 2016). These studies stop before the Great Recession, when regulations were re-introduced, including Dodd-Frank and Basel III. Moreover, deregulation was not the only major event related to finance and banking. The 1980s also saw the confirmation of Alan Greenspan as Federal Reserve Chairman and

\begin{flushleft}
\textsuperscript{1}Compared to the period from 1974–1989 where inflation averaged 5.6 percent per annum, inflation under the Bretton Woods system was 2.4 percent (Bordo, 1993). Similarly, growth in M2 was 2.3 percent lower under Bretton Woods than after, and both long and short term interest rates were lower as well. Perhaps most importantly, the standard deviation of monetary variables was lower, indicating a high level of price stability. The commitment to the fixed exchange rates of the Bretton Woods system allowed monetary policy to be especially effective since inflation expectations were correspondingly lower, and once the Bretton Woods system had ended, inflation persistence and the persistence of inflation expectations in the US increased (Eichengreen, 1993).

\textsuperscript{2}Giovannini (1993) notes that fixed exchange rates, especially those under commodity standards bind central banks ability to inflate the money supply unless they all coordinate. Elaborating on this limitation, expansion of the money supply can only continue as long as holders of the newly created money do not approach the offending bank in hopes of redeeming the new currency (von Mises, 1953, p. 321–3).
\end{flushleft}
the increasingly asymmetric monetary policy that accompanied his tenure (Blinder and Reis, 2005; Hoffman and Schnabel, 2011). The literature does not point to monetary causes directly, and therefore it is possible that the previous investigations into the size of the financial industry are missing a crucial variable.

Deregulation (Witko, 2016), the role that deregulation played in increasing human capital in the financial industry (Philippon and Reshef, 2012), and the growth in the complexity of financial services (Greenwood and Scharfstein, 2013) serve as the three main explanations for the growth in the financial industry.\(^3\) Our paper occupies a place between Witko (2016) and Philippon and Reshef (2012) by seeking to explain the growth in the financial industry and the growth of financial wages through a combination of policy and economic variables. While all three papers do offer explanations for increasing ‘financialization’ of the US economy, they each take different approaches. However, they find comparable results, with deregulation playing a major role whenever it is included.\(^4\)

Looking at the increasing importance of the financial industry from a political perspective, Witko (2016) finds that ‘financialization’ is primarily a function of deregulation, which is more likely to occur when unionization is weak. His findings include two monetary variables, namely the rate of inflation and the volatility of the federal funds rate. Perhaps surprisingly, more volatile federal funds rates increase financialization, and inflation has no impact on the growth rate of the financial industry. However, the lack of significance on the inflation variable may be due to the inclusion of real rates of profit. This paper differs from ours in several key respects. His measure of deregulation is simply an additive value that increases by one whenever financial legislation is passed that eases financial regulations. By contrast, our paper uses the deregulation measure developed by Abiad, Detragiache and Tressel (2008) and continued by Denk and Gomes (2017), which is an index of overall regulatory burden.

\(^3\)Other papers, including Duarte and Schnabl (2019), assert that loose monetary policy has contributed to this growth, but do not offer empirical support for this theory.

\(^4\)This is not to say that deregulation serves only to benefit the bottom line of banks and the financial industry. As Acharya, Imbs and Sturgess (2011) note, branching deregulations help to increase the efficiency of banking firms.
on the financial industry measured using a composite of seven sub-indicators. In addition, Witko (2016) omits productivity variables in explaining the growth of the finance industry and does not analyze the growth in financial wages.

In contrast to looking at the overall size of the financial industry, Philippon and Reshef (2012) look at the growth in financial wages from 1909 to 2006. Their findings are similar to those in Witko (2016). Wages in the financial industry have grown alongside deregulation. As regulations were put in place during the New Deal, wages in the financial industry fell throughout the 1940s through the 1970s; as regulations were removed beginning in the 1980s, financial wages began to rise again. According to their data, the turning point seems to be in 1980. In one specification, deregulation accounts for around 23 percent of the rise in the wages. They find that deregulation boosts wages primarily by requiring more human capital and education in the financial industry. Their finding, however, appears to be undercut by Denk (2015), which finds that wages in the financial industry are higher even after controlling for years of education. Wages in the financial industry are inherently riskier, but this riskiness of wages does not explain all of the difference in wages (Philippon and Reshef, 2012). Including monetary variables in such analysis could be of interest because the monetary regime switched in several stages from no central bank to a central bank with fiat currency.

Abstracting from politics more than either Witko (2016) or Philippon and Reshef (2012), Greenwood and Scharfstein (2013) look more at what aspects of the financial industry are responsible for driving this growth. Their results confirm that finance has grown as a percentage of GDP, and that average wages are higher relative to comparable industries. As their analysis focuses more on economic factors than on political ones, they find that it was the increase in securities and increasing complexity in credit intermediation that drove finance’s growth from the 1980s onward. One of the major ways in which finance has grown has been through increased provision of credit to households and through increasing activity in securities. It is possible that the shift to fiat currency has allowed for the growth in credit intermediation through increased loanable funds, while deregulation has allowed the growth
in securities such as mortgage backed securities through easing restrictions. Their paper, however, remains agnostic to such issues. Lending some credence to the idea of Cantillon effects in finance is that the cost of financial services is high and has remained high over the period under consideration by Greenwood and Scharfstein (2013).

Together, these three papers offer compelling explanations for the growth in the financial industry, whether through political or economic causes. However, these papers suffer from two shortcomings. The first, and most important, is that neither continues its analysis past the financial crisis. Following the financial crisis, there was a large change in the regulatory environment in the US with the implementation of Dodd-Frank and Basel III. To the extent that these represent increases in regulation, we expect the financial industry to be less important now than in 2007. If the financial industry remains important and wages remain high, then it is likely that regulation does not explain the whole story of the rise of finance. We are able to continue our analysis with data through 2015 due to the EU KLEMS database, which measures output by sector (O’Mahony and Timmer, 2009). The second shortcoming is that they devote little attention to monetary variables. Credit intermediation is a monetary transaction, and the growth in credit intermediation may be because of changes in the monetary regime brought about by the end of Bretton Woods. As noted in Issing (2006), there may be a link between loose monetary policy and demand for financial assets owing to the need for a hedge against inflation. However, he does not explicitly test this hypothesis. Our paper represents an important contribution to the literature on the growth of the financial industry by examining potential monetary causes and by seeing how dynamics have changed since the financial crisis.

3 Theory

This discussion echoes that found in Bagchi, Curran and Fagerstrom (2019) and applies it to the financial industry in the United States. The theory employed in this paper is an
application of Cantillon effects (Cantillon, [1755] 2015). The theory of Cantillon effects is that when new money is created, those receiving the new money first are able to augment their spending by purchasing at pre-inflation prices. As they spend their new money, it passes through increasing numbers of hands, raising those prices in tune with the consumption preferences of successive individuals. Those receiving the new money earlier face less price inflation than those receiving it later, as the prices will have been successfully bid up by early recipients. Those receiving the new money later face higher prices before their own wages go up, and therefore have their relative wealth lowered by the increased purchasing power of first receivers. Instead of inflation being general and therefore neutral in real terms, Cantillon argued that prices rise first in those industries most patronized by the creators of new money. In this way, the relative price structure changes when money is created, making money production non-neutral.\textsuperscript{5} Hume ([1752] 2007) posits a similar theory in his essay ‘Of Money’, but limits this distortion to the short run. In Bagchi et al. (2019), the authors argue that the already wealthy receive this new money first and that this receipt of new money increases wealth inequality by enabling the wealthy to purchase capital goods and labor at lower relative prices than those receiving the new money later or not at all.

We argue in this paper that as new money is created by the central bank, this money is not evenly distributed across the economy. Instead, Open Market Operations involve the purchase of treasuries held by banks. The banks receive new money and are able to lend it out. Since new money is injected directly into the banking system, we therefore expect Cantillon effects to cause an increase in the size of the financial industry, and an increase in financial industry compensation. Moreover, we expect that since the wealthy have been proven to benefit from money creation, then the sectors of the economy they patronize will also benefit from Cantillon effects. To the extent that the wealthy demand financial services, we expect Cantillon effects to benefit the financial sector through that channel as

\textsuperscript{5}Such money production was limited in Cantillon’s time to the marginal production cost of gold. That is, gold miners will not expand production if the value of the new gold is not equal to the cost of extraction. Such limits constrain the possible size of Cantillon effects.
well. A similar model developed in Williamson (2008) finds that households connected to financial markets benefit from increases in the money supply and are able to increase their consumption over that of unconnected households. We find, therefore, that theory predicts a positive relation between money supply growth and financial industry compensation and the size of the financial industry.

Because of this positive relation between money creation and financial variables, we would expect to see a larger financial industry and higher financial wages in eras of looser monetary policy than eras of tighter monetary policy. Since the end of Bretton Woods, monetary policy has become increasingly ‘asymmetric’, meaning that monetary policy loosens more in response to crises than it tightens in response to booms (Hoffman, 2009). Empirically, asymmetric monetary policy is seen by finding more negative deviations from the Taylor Rule than positive deviations. As Hoffman and Schnabel (2011) note, money market interest rates in the US have been drifting downwards since the 1980s.\footnote{As an example, Blinder and Reis (2005) notes that Greenspan kept the federal funds rate 47 basis points below what the Taylor Rule suggested in 1998. Such deviation speaks to Greenspan’s prevailing preference to clean up after a bust rather than to stop a boom; such a preference is inherently asymmetric.} Although we cannot say that monetary policy prior to the end of Bretton Woods was excessively tight, as there were credit booms in the 1920s, 50s, 60s, and 70s (Brown, 2017), the gentle decline towards low interest rates since the 1980s is new. Credit expansions did not begin in 1973, but the gradual decline in interest rates with no offsetting increase represents a change that is worth investigating, since lower interest rates allow for more rapid expansion of credit (Dell’Ariccia, Igan, Laeven, Tong, Bakker and Vandenbussche, 2012).

There are theoretical reasons to expect that the other component of expansionary monetary policy, that is, interest rates, will have the opposite correlation with financial industry compensation and the size of the financial industry. In Cysne, Maldonado and Monteiro (2005), the authors construct a model of inflation and interest rates to test a shopping time approach. As both inflation and the interest rate rise, the opportunity cost of holding money increases and those able to shift out of money and into financial assets that earn a return
in line with the rate of interest therefore benefit. To the extent that higher interest rates stimulate demand for financial assets, we expect higher interest rates, which we will measure using the federal funds rate, will lead to an increase in financial industry compensation and the size of the financial industry. In addition, higher interest rates benefit the financial sector by making the search for yield easier. Value investing becomes more difficult when rates are low, partially due to higher frequency of trading and fewer opportunities for arbitrage (Graham, 1949). The theory of Cantillon effects is not dependent on interest rates, but because central banks use Open Market Operations to both expand the money supply and lower interest rates, the reason why these elements of monetary policy produce opposite distributional results deserves investigation.

The standard deviation of the monetary variables is included in part because of its inclusion in Witko (2016). Empirically, Witko finds that higher volatility in the federal funds rate increases the financialization of the economy, but little time is spent investigating why this happens to be the case. The theoretical link between variability in the money supply and the financial industry is ambiguous. To the extent that higher volatility in the money supply encourages the holding of safer assets, we expect this to boost the size of the financial industry as people shift out of money and into assets; nevertheless, the inverse relation between money volatility and stock prices weakens the financial industry if there is less demand for the facilitation of trades on the stock market (Pinno and Serletis, 2016). We therefore expect an ambiguous relation between our volatility variables, measured using the standard deviation of the monthly money supply each year, and the size of and compensation in the financial industry.

The variable receiving most attention in the literature is deregulation. There is strong evidence to suggest that deregulation will increase the size of the financial industry and increase the pay of workers in the financial industry. Witko (2016) explicitly investigates the empirical link between the two variables. Deregulation is expected to increase the size of the financial industry by lowering compliance costs and therefore allowing for the expansion in
output. Financial deregulation is further expected to increase the importance of the financial industry by legalizing new financial instruments and allowing for the merger of different kinds of financial firms. Given the deregulation index developed by Abiad et al. (2008) and continued by Denk and Gomes (2017), we also look at expected linkages between regulation of the capital account and the size of the financial industry.\footnote{There are other indexes that measure capital account openness, such as that of Chinn and Ito (2006). However, because this paper is concerned with financial deregulation as a whole, the Chinn-Ito Index is too narrow to be of use in this paper.} To the extent that capital account liberalization is expected to draw in funds from abroad, this provides additional reasoning to expect that deregulation will grow the size of the financial industry.

The final independent variable in our analysis is unionization rates, which proxies the strength of labor. There are theoretical reasons to expect a negative link between unionization and the size of the financial industry as shown in Witko (2016). Higher rates of unionization mean that organized labor has more bargaining power and will represent a larger portion of the economy. To the extent that financial workers tend to not be part of traditional union sectors, we therefore expect a negative relation. The same logic applies for wages in the financial industry compared to average wages. As unions get weaker, they are less able to organize and demand higher wages in non-financial industries, and therefore stronger unions will impact the ratio by increasing the denominator rather than reducing the numerator.

### 3.1 Theoretical Model

In this subsection, we develop a theoretical model detailing the expected impacts of asymmetric monetary policy, specifically monetary policy that is too expansionary, on relative compensation in the financial industry. The goal of this exercise is not to provide a quantitative model, and so we do not simulate or estimate this model with data. Rather, we stress the intuition arising from building the following stylized two-agent, two-sector monetary model with a cash-in-advance constraint.

Consider an economy with two sectors. Sector $f$ denotes the financial sector and sector
$nf$ denotes the non-financial sector. Each sector contains one person who receives half of the total endowment $e_t$. The person in the financial industry receives a transfer $T_t$ from the central bank at each time $t$. In any time period, people in each sector use money $m_t$ to purchase consumption goods $c_t$ and choose money holdings $m_{t+1}$, but they cannot use their wage bill (endowment and transfer) to buy goods in the current period. In effect, we establish a simple two-agent, two-sector monetary model with a cash-in-advance constraint to demonstrate Cantillon effects.

People in each sector want to maximize their utility

$$\sum_t \beta^t U(c_i^t) \quad i \in \{f, nf\}$$

subject to two constraints: a budget constraint and a cash-in-advance constraint. The budget constraint facing the person in the financial sector is

$$\frac{e_t}{2} + \frac{m^f_t + T_t}{P_t} \geq c^f_t + \frac{m^f_{t+1}}{P_t}$$

and the budget constraint for the person in the non-financial sector is

$$\frac{e_t}{2} + \frac{m^{nf}_t}{P_t} \geq c^{nf}_t + \frac{m^{nf}_{t+1}}{P_t}$$

The budget constraint for the person in the financial sector implies that consumption and cash holdings carried into the next period cannot exceed the wage bill and current cash holdings, including the transfer from the central bank. The budget constraint for the person in the non-financial sector is identical except that this person does not receive the transfer from the central bank. Hence, the first order conditions will be the same for each type of agent. The cash-in-advance constraint is identical in both sectors

$$c^i_t \leq \frac{m^i_t}{P_t} \quad i \in \{f, nf\}$$
Consumption cannot exceed current cash holdings. Essentially, the cash-in-advance constraints of the model mean that the current wage bill is irrelevant in determining how much can be consumed in period $t$.

As $T_t$ represents policy interventions by the central bank, $T_t$ could theoretically be positive or negative depending on the direction of the intervention. To the extent that monetary policy is explicitly asymmetric, the central bank is more willing to respond to negative shocks than to positive shocks, which explicitly limits the likelihood of $T_t$ on the downside because the central bank will extend support to banks hurt in a financial crisis. As $T_t$ increases, financial agents will purchase more goods, raising their prices.

The aggregation of the economy is described by defining

$$M_t = m_t^f + m_t^{nf}$$
$$e_t = c_t^f + c_t^{nf}$$
$$M_{t+1} = \mu_t M_t$$
$$T_t = (\mu_t - 1) M_t$$

Thus, the aggregate money supply $M_t$ is equal to the money held by each agent, and the total endowment is equal to the sum of the consumption of each agent. In addition, the money supply next period is equal to the growth rate of the money supply $\mu_t$ multiplied by the current stock of money, and the transfer is therefore the growth rate minus one multiplied by the current stock of money.

To solve the model in steady state, we must first control for non-stationarity arising from the growth of the money supply. We divide our monetary and price variables by $M_t$ such
that our normalized variables are
\[
\tilde{m}_t^f = \frac{m_t^f}{M_t},
\]
\[
\tilde{m}_t^{nf} = \frac{m_t^{nf}}{M_t},
\]
\[
\tilde{P}_t = \frac{P_t}{M_t},
\]

The sum of normalized financial and non-financial money holdings becomes
\[
1 = \tilde{m}_t^f + \tilde{m}_t^{nf}
\]

We write the normalized versions of the prior constraints as
\[
c_t^f = \frac{e_t}{2} + \tilde{P}_t^{-1} (\tilde{m}_t^f + \mu_t - 1 - \tilde{m}_{t+1}^f \mu_t)
\]
\[
c_t^{nf} = \frac{e_t}{2} + \tilde{P}_t^{-1} (\tilde{m}_t^{nf} - \tilde{m}_{t+1}^{nf} \mu_t)
\]
\[
c_t^f = \frac{\tilde{m}_t^f}{\tilde{P}_t}
\]
\[
c_t^{nf} = \frac{\tilde{m}_t^{nf}}{\tilde{P}_t}
\]

Consumption and the endowment do not need to be normalized, thus the endowment is still equal to the sum of consumption. We thus describe the model in the steady state as
Using equations (3)–(6), we solve for the price level in the steady state.

\[ \tilde{P} = \frac{1}{e} \]

The price level in the steady state is the inverse of the endowment. From equations (1) and (3), we solve for the money holdings of the financial agent

\[ \tilde{m}^f = 1 - \frac{1}{2\mu} \]

From equations (2) and (4), we solve for the money holdings of the non-financial agent

\[ \tilde{m}^{nf} = \frac{1}{2\mu} \]

As \( \mu \) is greater than unity, \( \tilde{m}^f > \tilde{m}^{nf} \). The financial agent holds more money than the non-financial agent in the steady state. Given this money holding, consumption for the financial agent is given as

\[ c^f = \left(1 - \frac{1}{2\mu}\right)e \]
and consumption for the non-financial agent is

\[ c^{nf} = \frac{c}{2\mu} \]  

(8)

Therefore, consumption for the financial agent is higher than that of the non-financial agent because of the transfer the financial agent receives from the central bank. Figure 1 illustrates equations (7) and (8). Cantillon effects hold in this economy given a steady state where \( T \) is given in every time period.

We acknowledge the limitation that long run steady state analysis precludes exploring short run dynamics from shocks to \( T \) or \( \mu \), as opposed to \( T \) being added in every period. To the extent, however, that asymmetric monetary policy tells us that the central bank is more rather than less likely to intervene in any given period, we assume that \( T \) will be added in every, or almost every, time period. The empirical vector autoregression (VAR) analysis of section 4 is dynamic; nevertheless, in section 3.1 we propose a stylized theoretical model and analyze its steady state behavior. Our aim in section 3.1 is to fill a gap in the literature demonstrating Cantillon effects by providing a simple theory example.

4 Data and Results

We obtain annual frequency data over 1973 to 2015. We choose 1973 as the beginning of our sample because it marks the collapse of Bretton Woods (Eichengreen, 2008) and thus a structural shift in the conduct of monetary policy to a more expansionary one as we discussed earlier. By expanding our sample to 2015, we are able to track how the financial industry has changed since the Great Recession and how changes in monetary policy and regulation have impacted financial compensation. To our knowledge, this paper is the first to study the size of and compensation in the US financial industry in the aftermath of the Great Recession.

Data on financial and average compensation come from the Bureau of Economic Analysis. Data on monetary aggregates come from the St. Louis Federal Reserve Economic Database.
(FRED); the standard deviations of those monetary aggregates are calculated in R. Data on financial and total output comes from the July 2018 revision to the September 2017 release of the EU KLEMS database. Deregulation data comes from Abiad et al. (2008) and Denk and Gomes (2017). Data on unionization rates comes from the OECD. A recession dummy is included to control for the counter-cyclicality of monetary policy and is collected from the St. Louis FRED. While the data come from a large variety of sources, no single variable comes from two sources with the exception of deregulation data; the database in Denk and Gomes (2017) is explicitly a continuation of the Abiad et al. (2008) dataset as opposed to a differently tabulated deregulation database, and as such is comparable.

We also estimate regressions on first-differenced and detrended versions of the data to see if our results are driven by non-stationarity. As Enders (2014) notes, however, stationarity is only necessary for hypothesis testing. As we are concerned about the qualitative relations between the variables and not about the magnitude of the coefficients, it is unnecessary for us to look only at stationary variables. Because we are not conducting hypothesis tests, we can examine non-stationary variables within our VAR. Table 1 includes complete summary statistics for the data employed in our paper and Table 2 shows the summary statistics for the first differenced data.\footnote{Summary statistics for the detrended data are in Section 1 of the online appendix.}

Our key dependent variable is the average wage in the financial industry relative to the average wage in the overall economy. This variable increases from 0.994 in 1973, indicating that the overall average wage was marginally higher than the average wage of financial employees, to 1.729 in 2015, indicating that the average wage of employees in the financial industry is over seventy percent higher than average wages in the overall economy. We notice that the relative wage is not rising monotonically, and peaks in 2007 during the height of the housing boom before falling in 2009 and rising as the economy recovered from the Great Recession. What this indicates is that financial wages were hit harder than average wages during the crisis, and that they recovered more quickly. Since monetary policy played such an
important role in the aftermath of the crisis, especially through the use of Quantitative Easing and zero interest rate policies, the theory posited that those in the financial industry benefit from access to new money sooner than others in the economy becomes more plausible. The variable appears to follow a unit root process. The first difference of the data is therefore stationary, but the relation between the level of the variable in general will provide more illumination than the specific estimation coefficients (Enders, 2014).

The size of the financial industry is chosen as an alternate dependent variable because the financial industry has grown non-monotonically from 4 percent of total output in 1973 to 7.3 percent of total output in 2015. As with financial wages, the relative size of the financial industry also peaks in 2007, but the relative size of the financial industry following the Great Recession experiences a slight rebound in 2009 before continuing to fall through 2012. The size of the financial industry, as measured by the ratio of financial industry output to total output, similarly appears to be (first) difference stationary.

The monetary variables, which include the monetary base, the M1 money supply, and the federal funds rate display similar non-stationarity in containing unit roots and therefore cannot be used for hypothesis testing without being rendered stationary. Both the monetary base and the money supply display an increasing trend, and the federal funds rate appears to decrease over time, indicating evidence of the asymmetric monetary policy discussed earlier. The standard deviations of these variables are calculated on a rolling basis, that is, monthly data of the monetary aggregates are used and the yearly standard deviation is calculated based on data from each of the 12 months. The reason for so doing is to control for the Great Moderation of the 1980s and 1990s and also to see if volatility of monetary policy impacts the

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9While both the augmented Dickey-Fuller (ADF) and KPSS tests indicate non-stationarity, both tests suffer from issues of power especially when the root is near unity (Enders, 2014). To combat this, we plot the autocorrelation function (ACF) of the first difference, which rapidly decays to lie within the 95% confidence interval, indicating a lack of a unit root in the first difference.

10The relative size of the financial industry displays non-stationarity from ADF and KPSS tests. The ACF of the first differenced data and corresponding KPSS test suggest first difference stationarity.

11For all three monetary aggregates, the KPPS test indicates non-stationarity and only the federal funds rate appears stationary from the ADF test. For all three, the ACF of their first differences suggests that they do not have a unit root in their first differences.
financial sector more than the rest of the economy. Moreover, volatility of the federal funds rate was used in Witko (2016), and therefore there is precedent for using volatility measures in analyses of the financial industry. Similar to their level counterparts, the standard deviations tend to show evidence of following unit root processes. The monetary base represents the purest form of the Cantillon effect theory because of its more precise control by the central bank and being the narrowest definition of money; the M1 money supply and the federal funds rate are also chosen as robustness checks.

Deregulation is chosen as another explanatory variable because of its importance in both Witko (2016) and Philippon and Reshef (2012), and because of the role that deregulation plays in political discourse surrounding the financial industry. The deregulation index is an aggregate of seven measures: credit controls, interest rate controls, banking sector entry barriers, capital account controls, privatization of bank assets, regulation of securities markets, and macro-prudential regulation and bank supervision. In contrast to Witko (2016), our paper benefits by not placing equal weight on every piece of financial legislation and using a more holistic measure of the regulatory burden. For the United States, deregulation starts with an index value of 0.631 in 1973 and rises monotonically to a value 1, indicating maximum financial liberalization, in 1999. Once the index value reaches 1, it remains constant over the rest of the period. Due to the way the index is calculated, the regulations put in place in the United States following the financial crisis were not stringent enough to lower its value from 1. According to this data, therefore, regulation has not meaningfully changed following the Great Recession. Deregulation follows a unit root process.

Unionization is chosen as a control variable in part due to its inclusion in Witko (2016). While ADF and KPSS tests of standard deviations produce conflicting evidence of stationarity, the ACFs of first differences and KPSS tests on first differences suggest stationarity.

More information on the specific factors constituting the index can be found in Denk and Gomes (2017). As a methodological note, the authors define more prudential regulation as increasing liberalization. Because of this, the United States still scores the highest score of one following the passage of Dodd-Frank and the implementation of Basel III.

When looking at the sub-indexes, there is one small change, but it does not change the overall index value as calculated by Denk and Gomes (2017).

While deregulation appears to be non-stationary from the ADF and the KPSS tests, the ACF and KPSS test indicate that first differences are stationary.
In addition, since union membership mostly include public sector workers and blue-collar workers as opposed to financial workers, the ability of union members to engage in collective bargaining and demand higher wages will therefore raise their wages as opposed to those of wages in the financial sector. Union membership exhibits a clear downward trend, falling steadily from 25.8 percent in 1973 to 10.6 percent in 2015; the decrease is non-monotonic. Although the rest of the variables are first difference stationary, unionization appears to be non-stationary even in its first differences.\textsuperscript{16}

To account for the counter-cyclicality of monetary policy, we include the NBER recession indicator, which is accessed through FRED. The indicator is a dummy variable that takes a value of 1 when the economy is in a recession and a value of 0 when the economy is no longer in a recession. While a recession is defined as two quarters of negative GDP growth, we assign a value of 1 for the year if the economy was in recession at all during that year. The recession dummy is the only variable stationary in levels. Similar results apply to detrended variables.

\subsection*{4.1 Reduced Form Vector Autoregression}

We conduct our empirical analysis through the lens of vector autoregression (VAR). Including lags of the variables, VAR captures that monetary variables have strong impacts at different lags. Romer and Romer (2004) note that monetary policy has its strongest lag effect at two years, but that it impacts output at lags both longer and shorter than two years. Because of the importance of the two year lag found in Romer and Romer (2004), and because of the emphasis on the first receivers of new money in the theory of Cantillon effects, we select a two year lag for this analysis. Our two year lag is both short enough to emphasize the benefits given to the first receivers of new money, and long enough to capture the greatest impact of monetary policy. A lag length of two has also been used in Herradi and Leroy (2019),

\textsuperscript{16}The level of the unionization rate appears non-stationary in both the ADF test and the KPSS test in levels, though the ACF of the first difference decays rapidly. However, both the ADF and the KPSS test on the first differenced data indicate non-stationarity.
which uses a VAR to investigate the link between monetary policy and income inequality in
genral as opposed to inequality across sectors. Therefore, there is empirical precedent for
using a lag length of two. Although not employing VAR analysis, Pinno and Serletis (2016)
find that a lag length of two best relates financial variables, in their case the stock market,
and narrow definitions of the money supply, in their case M1, when using the AIC. We also
use variables related to the financial industry and a narrow definition of the money supply,
hence a lag length of two is warranted. Given the lag structure and variables chosen, the
reduced form VAR takes the following form:

\[ Y_t = B_0 + B_1 Y_{t-1} + B_2 Y_{t-2} + u_t \]  \hspace{1cm} (9)

where \( Y \) is the 6×1 column vector consisting of the relevant financial and monetary variables,
as well as deregulation, unionization, and the recession dummy at time \( t \), \( B \) is the 6 × 6
coefficient matrix, and \( u \) is the reduced form disturbance term.

Figure 2 plots impulse response functions (IRFs) from the reduced VAR(2) in (9).\textsuperscript{17}
Despite preferences derived from theory for a two year lag, the AIC suggests a lag of six
years, and the BIC suggests a three year lag. In addition to being parsimonious, the BIC
is preferable due to low autocorrelation in the first differenced data.\textsuperscript{18} The initial results
confirm that the monetary base (first column) is a good measure of Cantillon effects, as the
IRFs indicates a positive response between an increase in the monetary base and the ratio
of financial to overall wages. In both the level (first row) and detrended data (third row),
there is an initial increase that slowly decays, but the decay is much quicker when using
first differences (second row), falling back to zero by the third period. While the M1 data
(second column) show a positive relation, the confidence bands indicate that this relation is

\textsuperscript{17}Section 2.1 of the online appendix illustrates that responses of the relative size of the financial industry
to shocks to monetary variables are insignificant.

\textsuperscript{18}Results for all variables are robust to selecting a lag length of three. This choice shortens the duration of
the relation between the monetary base and the wage ratio without substantially impacting its magnitude.
Section 2.2 of the online appendix plots IRFs with a lag of three.
insignificant at the five percent level.\textsuperscript{19} The federal funds rate (third column) moves in the direction in accordance with theory but is likewise insignificant, except for in the detrended model, where it is significant and positive in the first two periods. We cannot provide economic interpretation of the shocks from this reduced form VAR, although the resulting IRFs provide a benchmark with which to compare those from structural vector autoregression (SVAR), which allows for economic interpretation of the error terms as structural shocks.

4.2 Structural Vector Autoregression

Short run restrictions allow us to impose fewer assumptions than will long run restrictions, and do away with the need for the rigorous a priori theorizing of sign restrictions as in Uhlig (2005). We use a standard Cholesky decomposition to identify our restrictions, and order our variables from most to least endogenous: recessions, deregulation, unionization, our financial variable, the standard deviation of the monetary variable, and finally the monetary variable itself.\textsuperscript{20} Because our main independent variable is the monetary variable, we place it to allow it to move before the other variables. As in the reduced form VAR, we maintain two lags, but increase our horizon to 25 years. The data in levels are non-stationary, thus we cannot validate confidence intervals and hypothesis tests, but we can refer to these bands as credible intervals from a Bayesian perspective with a flat prior. To remedy this, we also estimate short run restricted SVARs for the data in first differences as a way of confirming the significance of our results. As is to be expected, the persistence in first differences is less than the persistence in levels.

Our baseline specifications are in the first row of Figure 3. On the left, following a monetary shock, that is, an increase in the monetary base, the ratio of financial wages to average wages increases significantly before decaying to zero by around the fourth period.

\textsuperscript{19}As the data are non-stationary in levels, we do not stress discussing the statistical significance from the first row. Because the first differenced and detrended data are stationary, we discuss significance and use the reported confidence intervals for rows two and three.

\textsuperscript{20}The results are qualitatively robust when we place the financial variable before recessions or immediately after recessions.
Our results show that a one percent increase in the monetary base leads to an increase in the ratio of financial wages to average wages of 0.4 percent. Directly below, we display the IRF for the monetary base and the wage differential when using the data in first differences. We see a similar result, but with significance only lasting for around 2 periods, and the coefficient is correspondingly reduced to 0.2. Therefore, a shock to the monetary base increases financial wages compared with average wages, and the response is significant both in levels and first differences. The continued increase in financial wages is not explained by the persistence of the impact of monetary variables, but is rather explained by the asymmetric monetary policy of the post-Bretton Woods era. In line with the theory of Cantillon effects, the monetary base, which most closely resembles new money, increases financial wages. The M1 money supply is not significantly related to the wage differential in either levels or first differences, as the second column of Figure 3 shows. It is new money that matters the most when explaining the increase in financial wages. Despite only the monetary base being significant in the SVARs, both the monetary base and the M1 money supply Granger cause the rest of the variables at the 1 percent level when using two lags, and at the 5 percent level when using first differences.

Our results when using the Federal Funds Rate are generally in line with other results for interest rates and inequality measures. That is, as the third column of Figure 3 shows, there is a significant and positive relation between an increase in the Federal Funds Rate and financial wages. Compared with the relation between the monetary base and the wage differential, the relation is smaller in magnitude; an increase in the Federal Funds Rate of one percent leads to an increase in the ratio of financial wages to average wages of 0.01 percent. However, the results are only significant for 1 period. In addition, the IRF for the data in first differences reveals that the relation is barely insignificant. Our results for monetary variables and the wage differential is therefore both in line with the theory of Cantillon effects, previous research in Bagchi et al. (2019), and the literature on interest rates and inequality. However, our results suggest that the persistence of Cantillon effects, though not long lasting,
are longer in duration than interest channels.\footnote{When using Piketty’s top decile and percentile wealth and income shares, we find further evidence of individual based Cantillon effects. A shock in the monetary base significantly increases the top decile and top percentile income share, as well as the top percentile wealth share, which confirms the results in Bagchi \textit{et al.} (2019). These results suggest that Cantillon effects matter more for the super rich than for just the rich in general, but benefit all high earners.} Moreover, our results with regard to interest rates show that the inequality caused by high interest rates similarly only applies to people and not to the industries receiving new money first.

The structural vector autoregressive model shows a significant but short lasting interaction between the creation of new money and wages in the financial industry. On the other hand, increases in the money supply do not benefit the financial industry itself, as the relations between the monetary base, the M1 money supply, and the federal funds rate and the relative size of the financial industry are insignificant in all specifications.\footnote{See Section 3 of the online appendix.} Perhaps the most novel finding is not that contractionary interest rate policy and expansionary monetary growth both cause increases in sectoral inequality, as the differing impact of these variables on overall inequality has already been widely noted in the literature. The most surprising, and perhaps the most important relation uncovered in the SVAR analysis is the lack of persistence of the relation between a shock in the monetary base and the financial variables. Since the responses quickly decay to zero, there is evidence in favor of the theory of Hume ([1752] 2007), which places a time limit on the distributional impact of new money, and against that of Cantillon ([1755] 2015), who argued that this response is not attenuated by time. These results suggest significant temporary non-neutralities of money that disproportionately benefit workers in the financial industry.

### 4.3 Forecast Error Variance Decompositions and Historical Decompositions

There is more to the story of Cantillon effects in the financial industry than just the IRFs shown in the preceding two subsections. The forecast error variance decomposition (FEVD)
and historical decomposition (HD) from the SVAR of subsection 4.2 also help to illuminate how changes in the monetary environment and deregulation have impacted the financial industry. Looking at the FEVD of the wage differential with the monetary base as our monetary variable, we see that in the top left of Figure 4, the monetary base and deregulation explain most of the changes in the wage differential outside of the differential itself. The monetary base has its largest impact by the fourth period. The impact of deregulation continues to increase into the eighth period. The impact of both variables in first differences is both smaller and more stable over time, as shown in the bottom left of Figure 4. The right hand column of the same figure reveals that none of our explanatory variables explain much, if any, of the changes in the relative size of the financial industry across our sample. Figure 5 shows that for the HDs of the wage differential with the monetary base as our monetary variable, we find that while the relation is positive for most of the sample, the monetary base contributes negatively to the wage differential from 1982 to 1992. We make two key observations. First, we note the magnitude of the positive impact of the monetary base in 2008 through 2012, indicating the impacts of the Quantitative Easing and the monetary environment in the shift from a corridor system to a floor system. Second, we note how important deregulation and the monetary base were during the dot-com and housing bubbles, and how before those two bubbles, deregulation contributed little to financial wages in the HD. The FEVDs and HDs for the monetary base and the wage differential indicate that the two most important variables for explaining the increase in relative financial compensation are the monetary base and deregulation of the financial industry, which both began to change in the 1970s and 1980s. While both are important, neither one alone fully explains why financial workers are better off compared with average workers.
5 Conclusion

There are varying explanations for the increase in the importance of the financial industry, most of which are not mutually exclusive. That is, the explanations offered in Philippon and Reshef (2012), Greenwood and Scharfstein (2013), and Witko (2016) do not conflict, but instead build upon each other in explaining why the financial industry has grown to represent ever increasing segments of the US economy and has benefited workers in the financial industry. Our paper does not seek to overturn these explanations. The FEVDs and HDs confirm the positive relation between deregulation and financial industry compensation. What our paper offers is another channel impacting the growth of wages in the financial industry, which is monetary policy. As outlined in our account of Cantillon effects, expansionary monetary policy will benefit the financial workers at the expense of the workers outside of the financial industry. What this theory and these results suggest is that central banks need to be aware of the distributional impact their policies have on the structure of the American economy. Previous studies of the financial industry were limited both by their samples ending before the financial crisis, and their lack of focus on monetary variables. We overcome these issues by extending our sample to 2015 and testing for Cantillon effects through the use of monetary aggregates.

In addition, our results suggest significant but not long lasting non-neutralities of money due to the relation between the monetary base and the wages of financial workers. Therefore, our results hint at the solution regarding the discrepancy in the first two formulations of Cantillon effects as established by Cantillon ([1755] 2015) and Hume ([1752] 2007). That is to say that the persistent impact suggested by Cantillon has less empirical support than the short run theory developed by Hume. In addition, we find that the impact of interest rates is comparatively shorter lived.\footnote{Interest rates are not part of either theory. Therefore, the counterintuitive result that high interest rates and expansions of the monetary base have the same impact on the financial industry is not evidence against the theory as formulated explicitly by Cantillon and Hume.} Despite what we have shown, however, our research should not be construed as a direct argument that central banks are distorting the economy.
in ways that other monetary institutional arrangements would not. Cantillon effects will exist regardless of where new money enters, and a return to the monetary order that prevailed when Cantillon was writing would simply replace Cantillon effects in finance with Cantillon effects in mining.\footnote{And banking may still benefit as well, assuming miners and mine owners deposit this new gold in banks.} Instead, this research suggests that central banks need to be aware of how their policies will impact the wage distribution of workers and plan monetary interventions accordingly. Cantillon effects remain an understudied area of the monetary economics literature, but due to their impact on overall wealth inequality (Bagchi et al., 2019), and their impact on sectoral inequality in the United States, there is a strong argument that Cantillon effects deserve more attention and recognition in the economics profession.

**References**


<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard Deviation</th>
<th>ADF Test</th>
<th>KPSS Test</th>
</tr>
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<tbody>
<tr>
<td>Relative Wage</td>
<td>1.358</td>
<td>1.303</td>
<td>.981</td>
<td>1.779</td>
<td>0.282</td>
<td>0.693</td>
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<td>Relative Size</td>
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<td>1.065</td>
<td>1.041</td>
<td>1.083</td>
<td>0.014</td>
<td>0.583</td>
<td>&lt; 0.01</td>
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<td>Log of Monetary Base</td>
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<td>6.050</td>
<td>4.392</td>
<td>8.293</td>
<td>1.094</td>
<td>0.927</td>
<td>&lt; 0.01</td>
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<td>33.951</td>
<td>7.126</td>
<td>1.771</td>
<td>324.102</td>
<td>72.124</td>
<td>0.581</td>
<td>&lt; 0.01</td>
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<tr>
<td>Log of M1 Money Supply</td>
<td>6.774</td>
<td>6.983</td>
<td>5.546</td>
<td>8.014</td>
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<td>0.581</td>
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<tr>
<td>Standard Deviation of M1</td>
<td>23.098</td>
<td>10.097</td>
<td>3.255</td>
<td>122.260</td>
<td>26.044</td>
<td>0.140</td>
<td>&lt; 0.01</td>
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<td>Federal Funds Rate</td>
<td>5.493</td>
<td>5.350</td>
<td>0.090</td>
<td>16.380</td>
<td>3.954</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
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<tr>
<td>Standard Deviation of Federal Funds Rate</td>
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<td>0.379</td>
<td>0.013</td>
<td>3.445</td>
<td>0.737</td>
<td>0.044</td>
<td>0.020</td>
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<td>Deregulation</td>
<td>0.885</td>
<td>0.905</td>
<td>0.631</td>
<td>1.000</td>
<td>0.131</td>
<td>0.506</td>
<td>&lt; 0.01</td>
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<tr>
<td>Unionization</td>
<td>15.990</td>
<td>14.900</td>
<td>10.600</td>
<td>25.800</td>
<td>4.734</td>
<td>0.586</td>
<td>&lt; 0.01</td>
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<td>Recession</td>
<td>0.209</td>
<td>0.000</td>
<td>0.000</td>
<td>1.000</td>
<td>0.412</td>
<td>0.020</td>
<td>&gt; 0.1</td>
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</tbody>
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Notes: P-values reported for tests of stationarity. Augmented Dickey-Fuller (ADF) test used to test null hypothesis of unit root removing autocorrelation. Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test used to test null hypothesis of stationarity against alternative hypothesis of unit root. Relative wage: ratio of the average wage in the financial industry to the average wage in the overall economy; source: BEA. Relative size: ratio of financial industry output to total output; source: EUKLEMS. Monetary base (in logs), M1 (in logs) and Federal Funds Rate come from St. Louis FRED. Standard deviation is of raw data. Deregulation is the updated index of Abiad et al. (2008) by Denk and Gomes (2017). Unionization rates are from OECD. Recession is the NBER recession indicator for the United States.
Table 2: Descriptive Statistics for First Differences of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard Deviation</th>
<th>ADF Test</th>
<th>KPSS Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Wage</td>
<td>0.017</td>
<td>0.015</td>
<td>-0.114</td>
<td>0.110</td>
<td>0.038</td>
<td>0.150</td>
<td>&gt; 0.1</td>
</tr>
<tr>
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<td>0.001</td>
<td>-0.006</td>
<td>0.009</td>
<td>0.003</td>
<td>0.169</td>
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<td>0.072</td>
<td>0.012</td>
<td>0.576</td>
<td>0.088</td>
<td>0.225</td>
<td>&gt; 0.1</td>
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<tr>
<td>Standard Deviation of Monetary Base</td>
<td>2.031</td>
<td>0.283</td>
<td>-221.305</td>
<td>295.006</td>
<td>84.403</td>
<td>&lt; 0.01</td>
<td>&gt; 0.1</td>
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<tr>
<td>Log of M1 Money Supply</td>
<td>0.059</td>
<td>0.060</td>
<td>-0.034</td>
<td>0.143</td>
<td>0.044</td>
<td>0.341</td>
<td>&gt; 0.1</td>
</tr>
<tr>
<td>Standard Deviation of M1</td>
<td>0.865</td>
<td>1.133</td>
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<td>71.587</td>
<td>20.185</td>
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<td>Federal Funds Rate</td>
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<td>-0.025</td>
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<td>1.852</td>
<td>0.022</td>
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<td>-0.041</td>
<td>-0.001</td>
<td>-2.019</td>
<td>1.943</td>
<td>0.648</td>
<td>0.022</td>
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<td>Deregulation</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.143</td>
<td>0.027</td>
<td>0.021</td>
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<tr>
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<td>-0.300</td>
<td>-1.500</td>
<td>0.300</td>
<td>0.388</td>
<td>0.449</td>
<td>0.016</td>
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<td>Recession</td>
<td>0.000</td>
<td>0.000</td>
<td>-1.000</td>
<td>1.000</td>
<td>0.494</td>
<td>&lt; 0.01</td>
<td>&gt; 0.1</td>
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</table>

Notes: P-values reported for tests of stationarity. Augmented Dickey-Fuller (ADF) test used to test null hypothesis of unit root removing autocorrelation. Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test used to test null hypothesis of stationarity against alternative hypothesis of unit root. Autocorrelation functions decay to lie within the 95% confidence interval. See notes at the end of Table 1 for details on variables.
Figure 1: Consumption by Financial and Non-Financial Agents and Money Growth

Notes: \( \mu - 1 \): money growth \( (M_{t+1}/M_t = \mu) \); \( c^f \): consumption of financial agent; \( c^{nf} \): consumption of non-financial agent. Figure 1 illustrates consumption of financial agents and consumption of non-financial agents as a function of money growth, which depict equations (7) and (8).
Figure 2: Reduced Form VAR: Impulse Response Functions of the Wage Ratio to a Shock in Levels, First-Differences, and Detrended Data

Notes: data are in levels (first row); data are in first differences (second row); and data are detrended (third row). Plots depict impulse response functions of the wage ratio to unitary shocks to the monetary base (first column), M1 (second column), and the Federal Funds Rate (third column). The straight lines are median responses from the reduced form VAR. The dotted lines are bootstrapped 95% confidence intervals. See notes at the end of Table 1 for details on variables.
Figure 3: Short Run Restricted SVAR: Impulse Response Functions of the Wage Ratio to a Shock in Levels and First-Differences

Notes: data are in levels (first row); and data are in first differences (second row). Plots depict impulse response functions of the wage ratio to unitary shocks to the monetary base (first column), M1 (second column), and the Federal Funds Rate (third column). The straight lines are median responses from the SVAR. The dotted lines are bootstrapped 95% confidence intervals. See notes at the end of Table 1 for details on variables.
Figure 4: Short Run Restricted VAR: Forecast Error Variance Decomposition of the Wage Ratio and the Relative Size of the Financial Industry for the Monetary Base as the Monetary Variable

Notes: data are in levels (first row); and data are in first differences (second row). Wage ratio (left column); relative size (right column). Legend: logmb: monetary base (in logs); mbsd: standard deviation of monetary base; wdiff: wage ratio; relsize: relative size; union: unionization; dereg: deregulation; rec: recession. The prefix, d, for all variables in the second row denotes the first difference of the corresponding variable in the first row. FEVDs are from the SVAR with short run restrictions. See notes at the end of Table 1 for details on variables.
Figure 5: Short Run Restricted VAR: Historical Decomposition of the Wage Ratio for the Monetary Base as the Monetary Variable

Notes: wage ratio of the financial industry to the overall economy. SD(Monetary Base) denotes the standard deviation of the monetary base. Historical decompositions are from the SVAR with short run restrictions. See notes at the end of Table 1 for details on variables.