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Goodwin and Household Credit-Driven Cycles

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Michael Cauvel*and Y. K. Kim†

Abstract

We examine the potential linkages between two empirically-observed patterns in aggregate macroeconomic data. The cyclical relationship between economic activity and the labor share—referred to as the Goodwin pattern—has been well documented by a number of papers in the literature (Barrales-Ruiz et al., 2021). On the other hand, some recent studies have uncovered evidence of a cyclical relationship between economic activity and household credit, suggesting that household debt is a critical driver of macroeconomic cycles (Mian et al., 2017). We study these two cyclical processes in combination with one another. We illustrate the empirical plausibility of a pseudo-Goodwin cycle in which fluctuations in household indebtedness create the appearance of a Goodwin cycle, even in the absence of any causal effects between demand and distribution. Therefore, we argue that it is necessary to consider debt, demand, and distribution as essential elements in an interrelated system. Our analysis of such a three-dimensional system using both U.S. data and a panel of 30 advanced economies suggests that debt is a more important driver of economic activity over the business cycle than income distribution.

Keywords: Goodwin cycle, household debt, income distribution, business cycles

JEL codes: E12, E25, E32, G51

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1 Introduction

In recent decades, the Goodwin pattern, linking functional income distribution and the business cycle, has emerged as a significant structural relationship in heterodox macroeconomics. Although the proper theoretical interpretation of the well-documented co-movements of these two variables is still being debated, one common theory suggests that the business cycle is driven by fluctuations in labor's share of national income, which in turn varies with the business cycle. Concurrently, the dynamics of household credit and debt have emerged as crucial economic variables for understanding cyclical phenomena, particularly following the seismic shock of the 2007 Great Recession. Compelling empirical evidence has underscored the pivotal role of household credit and debt in shaping economic cycles, a recognition evident in the mainstream literature.

Although cyclical movements of the labor share and the dynamics of household credit and debt have been individually explored within the literature as potential factors driving economic cycles, there remains a notable absence of comprehensive analysis that integrates these two strands of inquiry. This paper seeks to bridge the gap between these two perspectives, arguing that the cyclical patterns observed between economic activity and either the labor share or household debt should be considered jointly rather than independently. Considering only the relationship between two of these variables, while ignoring the third, may lead to biased estimates.

We analyze the potential interrelationships between these cycles in multiple ways. We first conduct some preliminary analysis using U.S. data on GDP, the labor share, and household indebtedness to highlight the potential for capturing spurious effects when estimating the relationship between any two of these variables without considering the third. We illustrate the empirical plausibility of the so-called "pseudo-Goodwin cycle" Stockhammer and Michell (2016) in which the apparent relationship between the labor share and economic activity reflects a combination of a profit-squeeze effect and Minskyan fluctuations driven

by the effects of financial activity.[1] Notably, the observed relationship between the labor share and GDP appears —shown either through the co-movements of the two variables or impulse response functions (IRFs) from vector autoregressions (VARs)—quite similar using either the raw data for these two variables or predicted values for these series based only on the level of household indebtedness and the estimated effects of debt on each. In other words, the Goodwin pattern can be empirically reproduced considering only the impact of fluctuations in indebtedness on the income distribution and economic activity.

This analysis underscores the importance of considering the interactions among debt, demand, and distribution together in a single system. To do so, we estimate different specifications of models including all three variables, utilizing VAR analysis of U.S. data and local projections for a panel of 30 countries. Overall, the results suggest that the cyclical fluctuations in economic activity are driven primarily by household debt, rather than income distribution.

The rest of this paper is organized as follows: Section 2 provides a brief summary of the relevant theory and literature, Sections 3 and 4 present the results of our analysis using U.S. data and international panel data, respectively, Section 5 elaborates on the interpretation of these results, and Section 6 offers some concluding remarks.

2 Theory and Literature Review

The Goodwin cycle dates back to the work of Goodwin (1967), who presented a theoretical model illustrating a relationship between the labor share and the employment rate. The original Goodwin model is a supply-side accumulation and business cycle model,

[1] Although we deviate from Stockhammer and Michell (2016) by focusing on household debt rather than the finances of firms, we use their terminology of a pseudo-Goodwin cycle to refer to the broader idea that financial fluctuations can generate spurious dynamics between demand and distribution. Empirically, we find that that household indebtedness may generate similar dynamics to those generated by Minskyan financial fragility in their theoretical model.

wherein saving drives investment, labor is constrained, and the economy operates at the full-capacity level at all times. Barbosa-Filho and Taylor (2006) built upon this work, extending Goodwin's ideas in what has since been referred to as the "neo-Goodwinian model," which incorporates demand-side output determination with flexible capacity utilization.

In this theoretical framework, there is an "effective demand curve," which could be an upward or downward sloping curve in capacity utilization-labor share space. These curves correspond to wage-led demand and profit-led demand, respectively. There is also a "distributive curve", which could be an upward or downward sloping curve in the same space, corresponding to a profit-squeeze or wage-squeeze, respectively.[2] Note that different dynamic configurations are possible depending on the relative slopes of the curves, and the system may be stable or unstable.

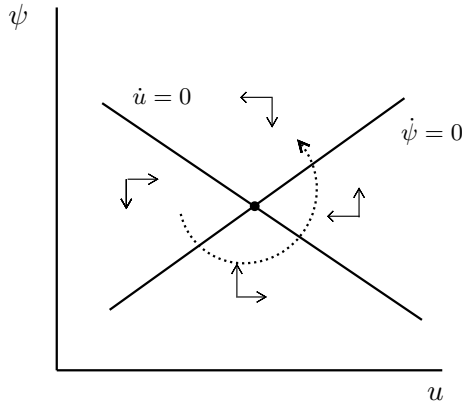


Figure 1: Debt-Demand Dynamics
The plot shows stable household debt-demand dynamics, where ψ stands for wage share and u stands for capacity utilization rate.

Both the theoretical model and empirical evidence offered by Barbosa-Filho and Taylor (2006) suggest a combination of profit-led demand and profit-squeeze effects. The former refers to the negative effect of the labor share (or a positive effect of the profit share) on the utilization rate, whereas the latter refers to positive effect of utilization on the labor

[2]Both curves could be nonlinear in various forms.

share (or negative effect on the profit share). These two effects create a cycle, as increases in output increase the labor share, and this change in distribution results in lower output. This cycle is referred to the "Neo-Goodwinian cycle," although this term and the "Goodwin cycle" are often used interchangeably. Most recent research in this area focuses on the relationship between the labor share and economic activity (often, but not always, measured as the utilization rate), although some studies include a measure of employment in addition to a measure of output (e.g. Mendieta-Muñoz et al., 2020).

The Neo-Goodwinian model positing profit-led demand and a profit squeeze is shown in Figure 1. This is the what Barbosa-Filho and Taylor (2006) label as the "structuralist Goodwin model" and von Arnim and Barrales (2015) refer to as the "Goodwin-Kalecki Growth cycle." Here, aggregate demand (demand curve of $\dot{u} = 0$) appears to be profit-led and the distributive curve ($\dot{\psi} = 0$) shows a profit-squeeze. The model is stable, but the trajectory to the steady state generates cyclical dynamics when it is out of equilibrium.

The Neo-Goodwinian cycle presents a compelling and relatively parsimonious theoretical explanation for the empirically-observed Goodwin pattern. However, recent research has questioned its validity. Barrales-Ruiz et al. (2021) provide an overview of the literature related to the neo-Goodwinian model. There is general agreement that there is an empirically-observed cyclical relationship between the labor share and economic activity, characterized by counterclockwise co-movements of these two variables at the business cycle frequency. However, there is debate about its causal interpretation. For this reason, Rada et al. (2024) differentiate between the "Goodwin pattern" and the "Goodwin mechanism," with the former referring to the cyclical relationship that is visible in the data and the latter referring to the specific theoretical explanation for that pattern offered by Barbosa-Filho and Taylor (2006)—i.e. profit-led demand and profit-squeeze effects. Critics of the story offered by the Goodwin mechanism argue that a two-dimensional model of economic activity and income distribution is not sufficient to explain the Goodwin pattern.

The existing literature has offered at least three other potential theoretical explanations for the Goodwin pattern. These focus on alternatives to profit-led demand effects, as there is more consensus on the profit squeeze (Barrales-Ruiz et al., 2021). The first is based on the argument of Lavoie (2017), who argues that procyclical variation in labor productivity due to overhead labor could be mistaken for profit-led demand effects, as the labor share is the ratio of the real wage rate to labor productivity. Cauvel (2023), Mutlugün (2022), and Rolim (2019) provide some empirical support for this argument. However, Rada et al. (2024) argue that this argument is inconsistent with fluctuations in the aggregate data and show that a basic theoretical model based on these relationships does not produce the Goodwin pattern. It is worth noting that potential explanations for the Goodwin pattern are not necessarily mutually exclusive. Although Rada et al. (2024) argue that the relationship between productivity and the business cycle is not sufficient to produce the Goodwin pattern, these dynamics may still be relevant for explaining the overall dynamics of demand and distribution. The evidence from disaggregated data continues to have implications for the empirical estimation of the demand-distribution relationship, and any theoretical explanation for the Goodwin pattern should ultimately be reconcilable with the disaggregated dynamics.

A second potential mechanism involves fluctuations in economic activity driven by animal spirits, rather than just income distribution. Setterfield and Wheaton (2024) show that such animal spirit fluctuations, along with profit-squeeze effects, can produce the Goodwin pattern even if demand is wage-led. Finally, the Goodwin pattern could potentially reflect financial dynamics. Stockhammer and Michell (2016) present a theoretical model that produces the Goodwin pattern even with wage-led demand based on profit-squeeze effects and fluctuations in demand due to financial fragility (with increases in output leading to higher debt ratios, and higher debt ratios leading to lower output). They refer to this as a "pseudo-Goodwin cycle." Similarly, von Arnim and Eick (2025) present a model showing that the Goodwin pattern can be created with no profit-led demand effects if financial factors are included in the model, which they do by endogenizing Tobin's q. However, Barrales-Ruiz

et al. (2021) find evidence for profit-led demand and profit-squeeze effects even when controlling for q. Although Stockhammer (2017) argues that it is important to consider financial variables in Goodwinian models, little empirical work has done so.[3] Much of the theoretical discussion has focused on financial variables related to firms rather than households. Notably, there is little research connecting household debt to the Goodwin cycle.

The role of household debt is particularly important to consider given the growing literature suggesting that it is an important determinant of the business cycle through demand channels. Of particular relevance is the work of Mian et al. (2017), who find that expansions of household debt have significant positive correlations with GDP in the short-run, but are later followed by downturns in the medium-run. Similarly, Drehmann et al. (2018) find that increases in household debt have significant positive correlations with GDP in the short-run, but rising debt service commitments and lower future credit inflows eventually drive declines in spending, resulting in downturns. There are also a number of studies providing evidence on the effects of household debt expansions at the micro level (e.g. Mian and Sufi, 2009, 2010, 2011, 2013).[4]

Although it has primarily focused on personal, rather than functional inequality, a separate literature has also examined linkages between income inequality and household debt. The relationship appears to be bi-directional, with debt increasing inequality (Vita and Luo, 2021; Wood, 2020) and inequality increasing debt (Berisha and Meszaros, 2018), although some studies suggest that the latter effect may be complicated by asymmetries. These bi-directional effects have the potential to create a cyclical relationship. This literature also suggests connections to economic activity. Piao et al. (2023) find that both inequality and

[3]Stockhammer and Wildauer (2016) examine the relationship between output and the labor share controlling for household debt and firm debt, but income distribution is exogenous in their model.

[4]Recent studies have also explored the role of corporate debt and default in driving the business cycle (Benhabib et al., 2024; Ivashina et al., 2024). Although examining the role of corporate debt in relation to the Goodwin cycle is beyond the scope of this paper, the evidence from this strand of literature further illustrates the need to consider financial dynamics when working with empirical models of the business cycle.

debt increase consumption in the short run, but reduce it the medium to long run, whereas inequality tends to increase debt over different time horizons. Iacoviello (2008) argues that the business cycle explains short-run debt dynamics, but inequality explains its long-run increase.

The evidence from these various strands of the literature suggests a complex web of interconnections between economic activity, debt, and income inequality. We aim to contribute to this literature by further exploring all of these relationships as part of a system, with a focus on functional income distribution.

3 Analysis of U.S. Data

3.1 Data and Methodology

We initially focus on a single country—the United States. Although we are ultimately interested in exploring these relationships across a broader set of countries, cross-country variation creates additional complexity that can pose a challenge when initially trying to understand a set of interrelationships that are already complex. Therefore, we find it useful to first simplify our analysis by focusing on only one country. We chose to examine the U.S. economy to enhance comparability to the literature, as many other studies in the neo-Goodwinian literature have also focused on the U.S. economy (Barbosa-Filho and Taylor, 2006; Kiefer and Rada, 2015; Carvalho and Rezai, 2016; Barrales-Ruiz et al., 2021; Cauvel, 2023; Mendieta-Muñoz et al., 2020).

Analysis of the U.S. economy is based on data from 1952 to 2019. Earlier data is not available for all variables, and later years are omitted to avoid distortions due to the COVID-19 pandemic. We use both quarterly data and the annual average of that quarterly data. All U.S. data were downloaded from the St. Louis Federal Reserve Bank's FRED database. The three central variables are the labor share, real GDP, and household

indebtedness. The labor share measure is constructed by the Bureau of Labor Statistics (BLS) and captured as an index (2017=100) for the business sector. Real GDP (chained 2017 dollars) is calculated and seasonally adjusted by the Bureau of Economic Analysis. We use the log-level of this variable, following Mian et al. (2017). We measure household indebtedness using the ratio of household debt to lagged GDP. This is the preferred measure in Mian et al. (2017), as it captures the size of debt relative to the economy while avoiding distortions from contemporaneous business cycle effects in the denominator. Household debt is measured by the Board of Governors of the Federal Reserve System (Fed) as the total level of liabilities for households and nonprofits, and adjusted for inflation by the authors using the BLS consumer price index. We then take the ratio of this measure to the one-period lag of real-GDP. This calculation is done separately for the quarterly and annual series.

Two other variables are constructed by the authors to control for the effects of business cycle policy following the methodology of Cauvel and Pacitti (2022). These variables are meant to capture the aggressiveness of fiscal policy and monetary policy for a given size of the output gap. These variables are exogenous to the business cycle by construction, as they are calculated by regressing either the primary surplus or deficit as a share of GDP (for the fiscal policy stance) or the change in the effective federal funds rate (for the monetary policy stance) on the output gap (and three of its lags when using quarterly data) and taking the residuals. These residuals represent the part of policy actions that cannot be explained by the business cycle, which we interpret as the aggressiveness of policy to business cycle fluctuations. Negative values of the fiscal stance variable represent more expansionary policy, whereas positive values of the monetary stance variable represent more hawkish policy. The underlying data for the primary surplus or deficit relative to GDP is calculated by the authors using (nominal) BEA measures, and the effective federal funds rate is based on Fed data. These policy stance variables are estimated separately using the quarterly and annual data.

We view the fiscal policy stance, in particular, as an important control variable to consider in the case of the United States, given that substantial changes in the government's

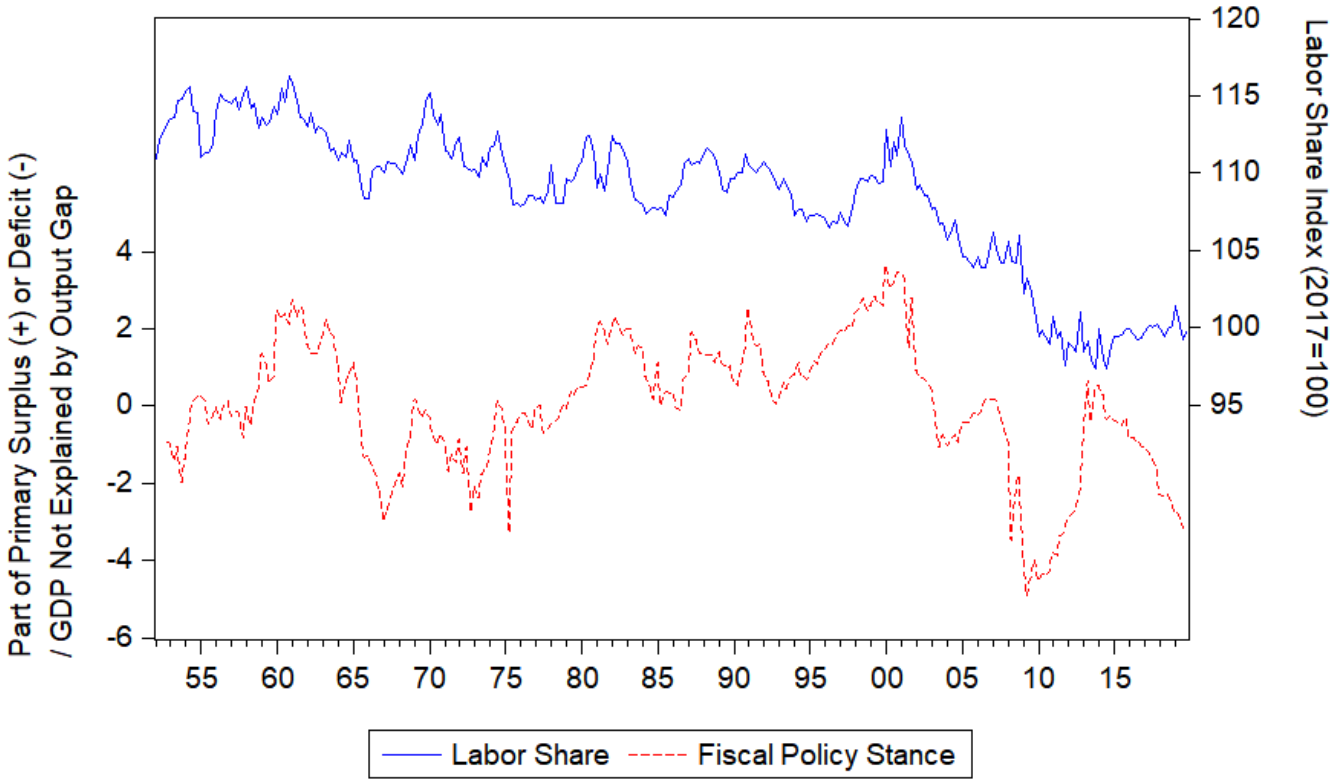


Figure 2: Labor Share and Fiscal Policy Stance 1952Q1-2019Q4

approach to debt have coincided with the accelerated decline of the labor share. As Figure 1 shows, from the beginning of the Bush Tax Cuts and the War on Terror in 2001 to the end of the sample, the U.S. government typically ran larger deficits for a given output gap than those that were common in the preceding decades. The labor share declined rapidly around the same time. Failure to account for the more aggressive fiscal policy stance during this time could bias results towards more profit-led findings if positive effects of these policies on economic activity are wrongly attributed to the declining labor share. Moreover, fiscal and monetary policy can also have implications for income distribution and debt.

We first illustrate the potential for spurious effects by examining the relationships between predicted values of the labor share and GDP based on the level of household indebtedness and its effects on these two variables. To do this, we utilize quarterly U.S. data to

separately regress the labor share and the log of GDP on the contemporaneous value and 40 lags of household indebtedness. We also include a constant and a linear trend and control for the fiscal and monetary stance variables. We include 10 years of lags to ensure that we are capturing longer-term relationships, given that Mian et al. (2017) find some delayed effects of debt on the business cycle that occur only after a lag of several years. The predicted values of these two regressions capture the effect of debt on demand and distribution, showing the expected level of each variable based only on the levels of household indebtedness and the policy variables and their effects on the dependent variables.

We then conduct two forms of analysis to compare the relationship between these debt-predicted variables and the relationship between the labor share and GDP based on the actual data. First, we examine IRFs from VAR models. We identify structural relationships using Cholesky decomposition, which imposes the assumption that each variable has no contemporaneous effect on variables that appear before it in the ordering. We place the labor share before GDP—assuming that demand affects distribution only with a lag—as most evidence for the Goodwin mechanism is based on this variable ordering (Barrales-Ruiz et al., 2021). For each model we use the lag length that minimizes the Akaike Information Criterion (AIC). This results in lags of 4 quarters for the model based on the raw data and 9 quarters for the model using the debt-predicted values. Both models include a constant and a linear trend. The similarity of the estimated IRFs illustrate the empirical plausibility of a pseudo-Goodwin cycle. However, these results alone do not provide evidence that estimated Goodwin cycle effects are spurious.[5] Indeed, we expect that we could similarly reproduce a semblance of the relationship between any two of these variables based on the effects of the third.

[5]Moreover, we note that the exact results should be interpreted with some caution as diagnostic tests reveal some econometric issues with both of these models—non-normal residuals in both cases and heteroskedasticity using the raw data. Such issues are common when using this methodology to estimate the relationship between demand and distribution for the U.S. over a long sample (see e.g. Cauvel, 2023). We reiterate that these results are not meant to be used for inference, only to highlight the potential for spurious effects.

The second comparison involves visual examination of the relationships in *labor share*, *GDP growth* space. We plot the raw data or the forecasts in this space to compare the dynamics. We focus on the growth rate of GDP to highlight the cyclical dynamics, by taking the difference of either *ln GDP* or its forecast value. For this analysis, we use the annual average of either the raw data or the forecast values. The use of lower frequency data reduces the number of data points to allow for clearer visual inspection. The resulting plots show that the debt-predicted variables exhibit the same type of counter-clockwise co-movements that are found in the raw data. In other words, it is possible to reproduce the Goodwin pattern based on debt dynamics. These findings further illustrate the empirical plausibility of a pseudo-Goodwin cycle. However, these findings alone are not sufficient to discern whether the Goodwin pattern results from debt dynamics, or whether the debt dynamics are driven by the interaction of demand and distribution. To better understand these interrelationships, it is necessary to examine these variables as a three-dimensional system.

We first estimate such a three-dimensional system for the U.S. using the VAR methodology. Unreported experimentation revealed that the exact results are at least somewhat sensitive to differences in many aspects of empirical specification, including lag length, data frequency (annual or quarterly), the inclusion or exclusion of the policy stance variables, identifying assumptions, variable measurement (e.g. the level of debt vs. the ratio of debt to lagged GDP), and variable transformation (e.g. levels vs. logs vs. growth rates). Given such a wide range of potential permutations, we have aimed to keep our presentation manageable by focusing primarily on the specifications that are most strongly motivated by the literature and indicators of the quality of econometric specification (including information criteria and diagnostic test results). However, we also present some results from other specifications to illustrate the sensitivity or robustness to some of these key choices.

The choice of identifying restrictions is particularly important, as previous research has indicated that evidence for the Goodwin mechanism is sensitive to this choice (Mutlugün,

2022; Cauvel, 2023). Each model is identified using short-run structural restrictions, which impose the assumption of no contemporaneous effect of one variable on another. In most cases we use Cholesky decomposition—a special case of this more general approach—with an ordering that is motivated by the literature. As discussed above, we place the labor share before GDP in the ordering as most evidence of the Goodwin mechanism is based on this set of assumptions. Therefore, we maintain these assumptions to see if this evidence is sensitive to the inclusion of household indebtedness in the model. We place GDP before household indebtedness in the ordering, in line with Mian et al. (2017). This results in an ordering of *labor share, ln GDP, household indebtedness*. The labor share has a contemporaneous effect on the other two variables, GDP has a contemporaneous effect on indebtedness but only a lagged effect distribution, and indebtedness has only a lagged effect on the other two variables. We present one specification with an alternative set of identifying assumptions in which the labor share and GDP affect one another contemporaneously, indebtedness has a contemporaneous effect on GDP, and all other effects are lagged only. We present this specification to show the sensitivity of the results to allowing for an immediate effect of demand on distribution, in line with the suggestions of Mutlugün (2022); Cauvel (2023). Of course, many other potential sets of ordering assumptions are possible. We view further unpacking the theoretical relationships among these variables and the timing of their effects to be an important area for future research.

For each model we test for residual normality using the Jarque-Bera with the Lutkepohl orthogonalization method, serial correlation from lag 1 up to 10 annual or 40 quarterly lags (or as many as estimable given the amount of data in the sample) using the Lagrange multiplier test, and heteroskedasticity using the White test with no cross terms. We also ensure model stability by checking that the roots of the characteristic polynomial fall within the unit circle. Unless otherwise noted, these diagnostic tests did not indicate any issues with the specifications presented below. In our baseline specification, lag length is chosen to minimize the AIC. However, we present some results based on specifications with longer

lag lengths to ensure that we are not missing any important effects. This is potentially important, as Mian et al. (2017) show that there are important delayed effects of debt on output. Moreover, Stockhammer and Stehrer (2011) show that some of the neo-Goodwinian effects found by Barbosa-Filho and Taylor (2006) are sensitive to longer lag lengths. We focus primarily on the results found using annual data, as these specifications typically yield better diagnostic test results. Similarly, we typically include the policy stance variables, as we wish to avoid omitted variable bias and the diagnostic test results are often better when these variables are included. However, we present one specification in which they are excluded to illustrate the importance of this choice. All models include a constant and a linear trend. Finally, we have tried to rely on the literature for our choice of measurement. As described above, we use the log-level of GDP and the ratio of household debt to lagged GDP to mimic influential studies on credit-driven cycles, and we utilize a measure of the labor share that is common in the Goodwin-cycle literature.

3.2 Results

We first illustrate the empirical plausibility of a pseudo-Goodwin cycle by comparing IRFs for a two-dimensional VAR with the labor share and GDP to those found using the predicted values of these variables based on the level of household indebtedness and its relationship with each variable, using data for the U.S. economy. Figure 3 presents the off-diagonal IRFs, with those for the model using the actual data in the left column and those for the model using the debt-predicted values in the right column. The IRFs show the estimated change in the response variable (on the vertical axis) as the result of a one-standard deviation positive shock to the impulse variable in each quarter after the shock (shown on the horizontal axis). The impulse variable is the labor share (GDP) in the first (second) row. The dotted lines show ± two standard errors, which correspond roughly to a

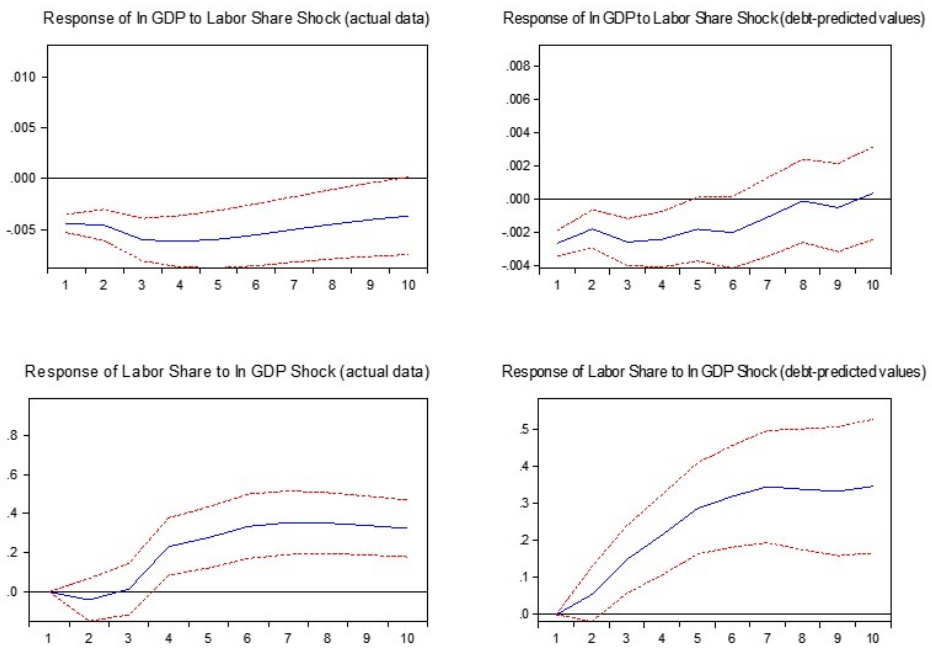


Figure 3: Labor Share-GDP IRFs Using Actual Data vs. Debt-predicted Values

95% confidence band. Therefore, the effects are statistically significant if 0 falls outside of the confidence band.

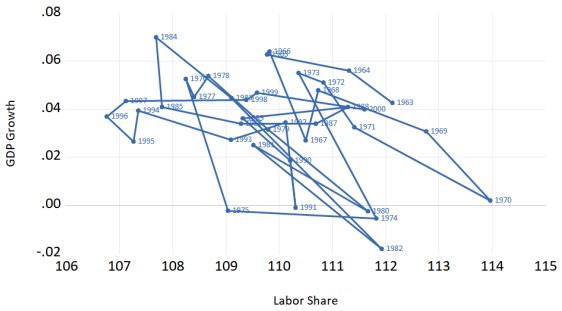
The results for the model using the actual data display the expected results in line with the Goodwin mechanism, as there is evidence of profit-led demand (upper-left panel) and a profit squeeze (lower-left panel). Both effects are statistically significant. This is not surprising, as the model is identified using the traditional neo-Goodwinian ordering. The IRFs in the right column allow us to gauge the empirical plausibility of a pseudo-Goodwin cycle driven by household indebtedness. We examine whether the same relationships identified by a VAR using actual data could also be generated solely by fluctuations in household indebtedness and its effects on the these two variables. The impact of household indebtedness on either variable is captured in the debt-predicted values of the labor share and GDP—i.e. the residuals from a regression of either variable on debt (contemporaneous and 40 quarterly lags), along with a constant and the fiscal and monetary policy stance variables.

Notably, results similar to those found using the raw data can be estimated using these debt-predicted values, as there is also evidence of significant profit-led demand effects

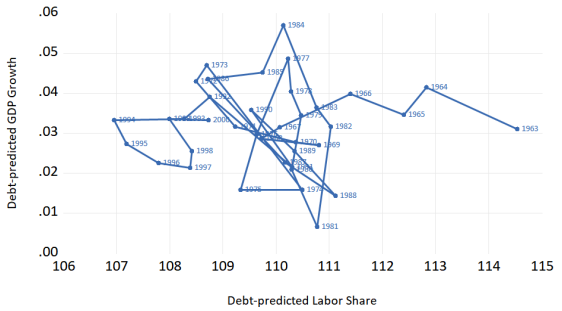
(upper-right panel) and profit-squeeze effects (lower-right panel). The estimated profit-led demand effects are smaller in magnitude using the debt-predicted values, but the IRFs have similar shapes, and the interpretation of the two sets of results is qualitatively similar in either specification. This suggests that evidence supporting the Goodwin mechanism could be produced even in the absence of any direct relationship between demand and distribution, as a similar estimated relationship between these two variables can arise considering only the effects of debt (and the policy stance variables) on each. As fluctuations in debt are capable of generating effects in line with the Goodwin cycle, these results suggest that a pseudo-Goodwin cycle is empirically plausible.

The cyclical dynamics of the two debt-predicted series in *labor share*, *GDP growth* space further illustrate the potential for debt dynamics to produce the Goodwin pattern. As shown in Figure 4, the same counter-clockwise co-movements are found in both the actual data (Panel a) and the forecasts based on household indebtedness (Panel b) throughout the period of 1963 to 2000. In other words, the Goodwin pattern can be reproduced when looking only at the effects of indebtedness (and the policy variables) on demand and distribution. In the later period of 2001-2019, the Goodwin pattern is no longer as readily apparent in the raw data (Panel c), as previously observed by others such as Setterfield (2023) and Barrales and von Arnim (2017). Notably, the dynamics of the debt-predicted series remain similar to those found in the raw data. This suggests that debt dynamics provide one potential explanation for the changing nature of the Goodwin pattern, although exploration of that hypothesis is beyond the scope of this paper.

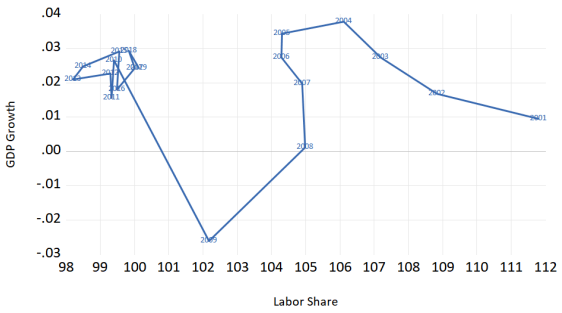
To our knowledge, this is the first empirical evidence to support the possibility of a pseudo-Goodwin cycle in which the Goodwin pattern materializes as the result of financial fluctuations. However, this evidence alone is not sufficient to suggest that the Goodwin cycle is spurious, as it is likely that the relationships between the labor share and debt or debt and GDP could also be produced by looking at the predicted values of each variable in the pair to the variable outside the pair. However, this evidence does illustrate the strong



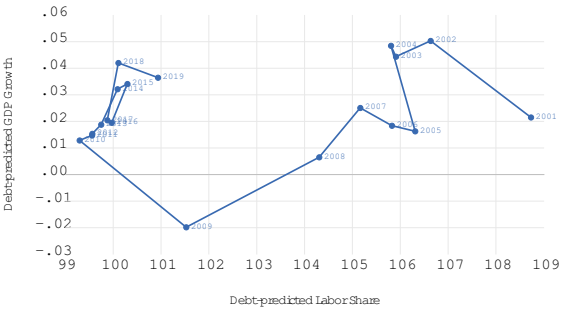
(a) Actual Data 1963-2000



(b) Debt-predicted Values 1963-2000



(c) Actual Data 2001-2019



(d) Debt-predicted Values 2001-2019

Figure 4: Comparison of Goodwin Dynamics Using Actual Data vs. Debt-predicted Values

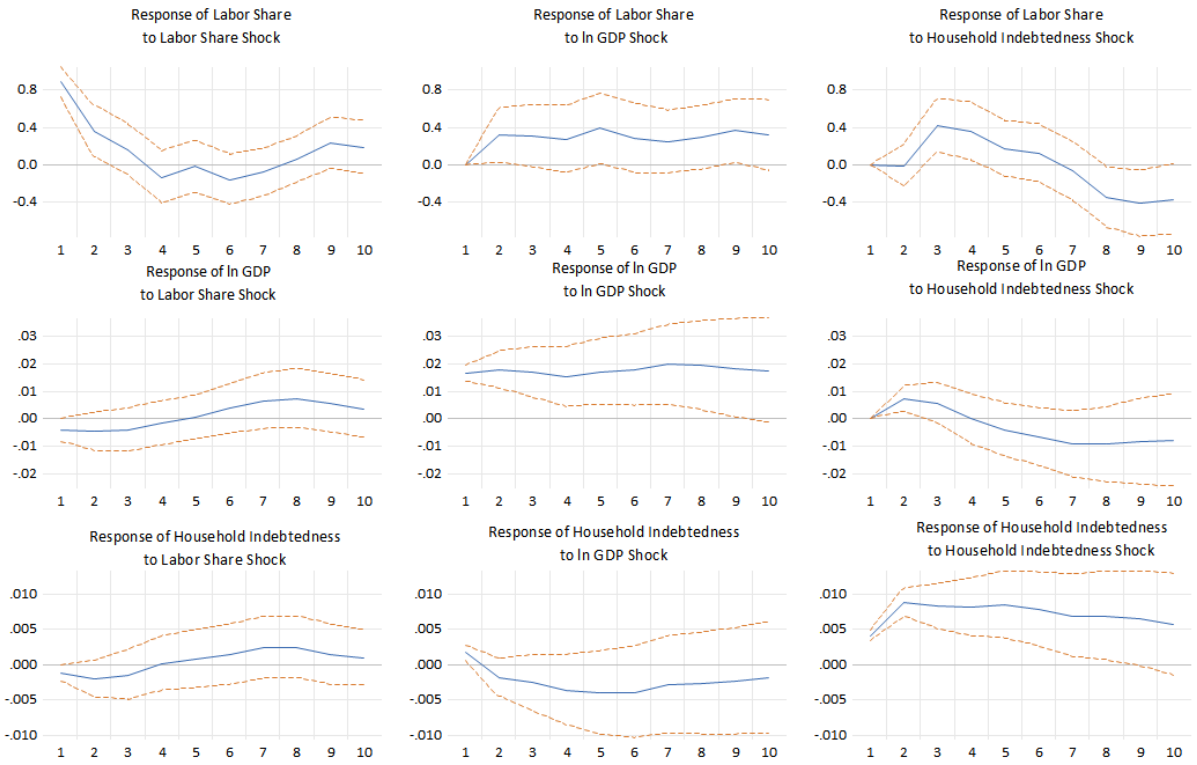


Figure 5: Baseline U.S. IRFs

interconnections between these three variables, highlighting the necessity of considering debt, demand, and distribution as part of one system.

We next estimate a VAR system including the labor share, GDP, and household indebtedness (in that order) using U.S. data. The baseline results are shown in Figure 5 and based on a specification that includes 5 annual lags (as suggested by AIC), a constant and a linear trend, and the two policy stance variables included exogenously. When including household indebtedness in the model, there is not strong evidence for the Goodwin mechanism. Considering the effect of distribution on demand (center-left panel), there is an initial negative effect of the labor share on GDP, but these effects are statistically insignificant and followed by larger (but also insignificant) positive effects. In the other direction (top-center panel), evidence of the profit squeeze remains, as there is a significant positive effect of GDP on the labor share.

Results relating GDP and debt are generally in-line with those found by Mian et al. (2017). We find medium-run household debt-led demand effects to be significant, based on the positive effect of debt on GDP (center-right panel). An increase in household debt initially increases GDP, but the boost to GDP proves to be short-lived, as GDP eventually declines just as household debt begins to decline. We find a statistically significant effects of GDP on debt (bottom-center panel) and debt on GDP (center-right panel). We also find a negative lagged effect of debt on GDP, although these effects are statistically insignificant.

Considering the final pair of relationships, we find that household indebtedness declines as the labor share increases (bottom-left panel), although this result is only statistically significant in the first quarter. Debt initially increases but later decreases the labor share (top-right panel), perhaps because lending defers financial profits for a greater lagged return in the form of interest. Notably, debt has similar effects on both GDP and distribution, although the negative lagged effects are significant only in the case of the latter in this specification.[6]

Although the AIC suggests an optimal lag length of 5 years, we want to ensure that we are not missing any relevant effects. Therefore, we estimate the same model with 9 lags.[7] The results are shown in Figure 6. The results are qualitatively similar to those in the baseline specification with one notable exception—the negative lagged effects of debt on GDP are significant in this case (center-right panel). Using more lags, the results are,

[6]Some of these effects are sensitive to the exclusion of the exogenous policy stance variables. Figure 11 in the Appendix shows the IRFs for a specification without these control variables that is otherwise identical to the baseline specification. These results should be interpreted with some caution, as there is evidence of serial correlation in this specification. The most notable difference is that the initial profit-led demand effects are significant in the short-term (center-left panel). There are also some differences in the labor share-debt relationship, as the positive effects of debt on the labor share (top-right panel) becomes insignificant, the initial negative effect of the labor share on debt becomes insignificant and the lagged positive effect of the labor share on debt becomes significant (bottom-left panel). We prefer our baseline specification, given the lack of econometric issues and our desire to limit omitted variable bias.

[7]We initially experimented with 10, but found the resulting model to be unstable, as one of the roots for the characteristic polynomial fell outside of the unit circle. Using 9 lags, the heteroskedasticity test is not estimable given the large number of parameters relative to the number of observations, but we found no evidence of econometric issues using the diagnostic tests that we could estimate.

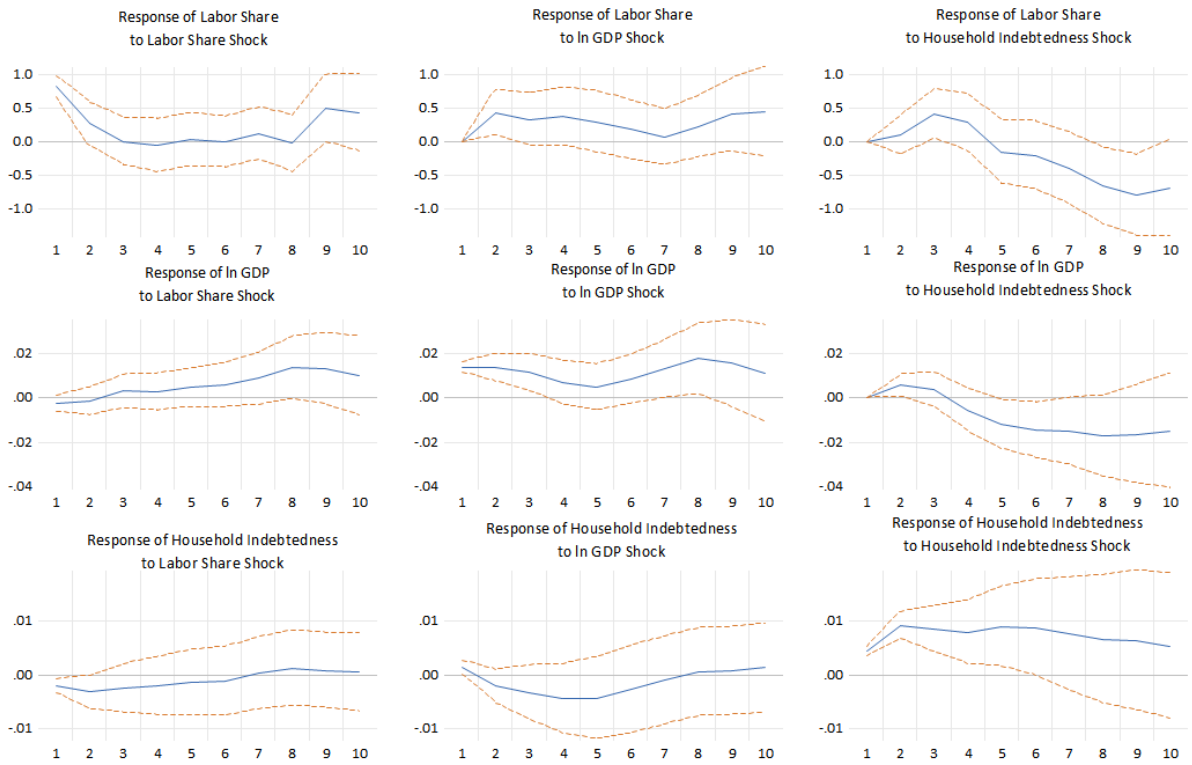


Figure 6: U.S. Estimates Using 9 Lags

therefore, further in line with those found by Mian et al. (2017). When considering longer-term effects, it appears that both booms and busts in economic activity can be explained by increasing debt, as both of these effects are statistically significant in this specification. Moreover, increasing debt appears to have similar effects on both the labor share and GDP. Models that exclude household indebtedness may wrongfully attribute some of these effects as causal effects of the labor share on economic activity, or vice versa.

In these initial specifications, we have primarily focused on the variable ordering suggested by the literature. However, it is important to note that the results are highly sensitive to the choice of identifying restrictions. We present results using one alternative set of restrictions to illustrate this sensitivity. This specification is identical to the one discussed in the previous paragraph, but using identifying restrictions that allow for contemporaneous effects in both directions of the labor share-GDP relationship, assume a contemporaneous

effect of debt on GDP, and assume all other effects occur only with a lag. Allowing GDP to have a contemporaneous effect on the labor share is potentially important based on the argument that results can be biased if they do not (Cauvel, 2023; Mutlugün, 2022). The IRFs are presented in Figure 7. There are at least slight differences for each pair of variables. Most effects for the labor share-debt relationship are qualitatively similar, but there is now a significant negative effect of debt on the labor share in the first year (top-right panel). The effect of debt on GDP is qualitatively similar, but the response of debt to a GDP shock (previously positive and significant) is now negative and statistically significant (bottom-center panel). Notably, there are also important differences in the relationship between demand and distribution. Most strikingly, this specification suggests that there are statistically significant wage-led demand effects (center-left panel). There are also some changes in the opposite direction, as there is a negative effect of GDP on the labor share in the first year—potentially capturing procyclical variation in labor productivity (the denominator of the labor share) (Cauvel, 2023; Mutlugün, 2022)—although lagged effects continue to suggest there is ultimately a significant profit squeeze (top-center panel) in at least one quarter.

Although the results relating the labor share and GDP are sensitive to identifying assumptions and many other restrictions are possible, it is notable that the range of estimates for the effect of distribution on GDP is fairly limited when including household debt and controlling for the fiscal and monetary policy stance variables. Using the traditional neo-Goodwinian ordering, which is most likely to produce profit-led estimates, we find no significant effect of the labor share on GDP—although this finding is potentially sensitive to other aspects of empirical specification besides identifying restrictions.[8] Using an alternative ordering that allows for a contemporaneous effect of GDP on the labor share, we find significant wage-led effects. In other words, when including debt in the model, the results

[8]Unreported results show that the insignificance of the profit-led demand effects in our baseline specification is not sensitive to the placement of household indebtedness in the Cholesky variable ordering.

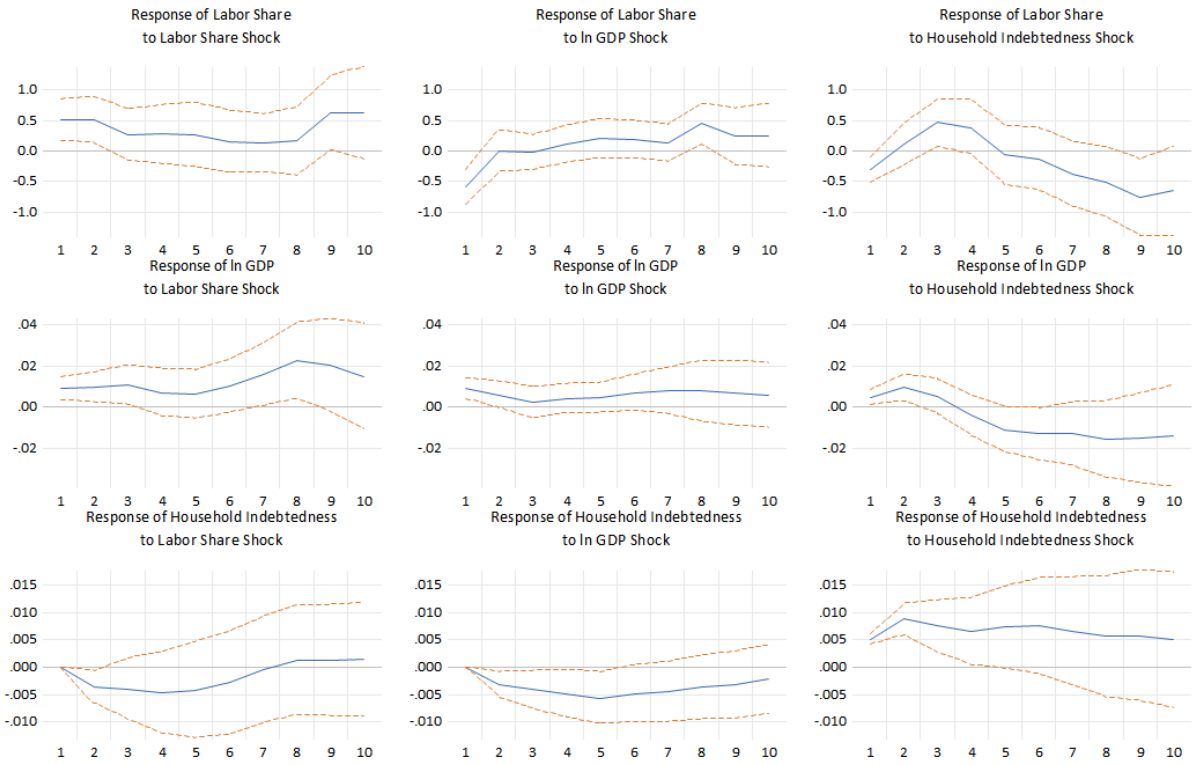


Figure 7: U.S. Estimates Using 9 Lags and Alternative Identifying Restrictions

are largely incompatible with the Goodwin mechanism, but potentially compatible with a wage-led regime. Many other sets of identifying assumptions are possible, and untangling the timing of the relationships among these three variables to better motivate identifying assumptions remains an important area for future research.

Taken as a whole, these results suggest that the credit-driven cycle is a stronger explanation for fluctuations in economic activity than the Goodwin mechanism. Although we consistently find significant profit-squeeze effects, the effect of the labor share on GDP is either positive or insignificant. We consistently find positive effects of debt on GDP at earlier time horizons, and there are significant negative lagged effects when using a longer lag length. Moreover, our results suggest that the Goodwin mechanism might not be the best explanation for the Goodwin pattern observed in the data. Our preliminary analysis shows that a pseudo-Goodwin cycle is empirically plausible, as fluctuations in debt can

create evidence of a Goodwin mechanism even with no direct relationship between demand and distribution. As the IRFs for our VAR models typically indicate that debt has similar effects on both the labor share and GDP which could potentially lead to spurious estimates if debt is omitted from the model.

4 Analysis of Panel Data

4.1 Data and Methodology

This section examines the empirical relationship between household debt, labor share, and economic activity using an unbalanced panel dataset covering 30 economies. Following Mian et al. (2017), the sample includes Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, Indonesia, Ireland, Italy, Japan, South Korea, Mexico, the Netherlands, Norway, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, Turkey, the United Kingdom, and the United States. The analysis relies on annual observations spanning 1950–2019.

Consistent with our analysis of the United States, household indebtedness is measured as the ratio of household debt to lagged GDP, while economic activity is measured by the natural logarithm of real GDP. Data on household debt are obtained from the Bank for International Settlements (BIS).[9] Data on labor share and real GDP are taken from the Penn World Tables (Feenstra et al., 2015).

To investigate the dynamic interactions among household debt, labor share, and output, we employ the local projections (LP) approach developed by Jordà (2005). The LP framework is particularly well suited to our analysis because it allows us to trace dynamic responses without imposing the restrictive lag structure required by vector autoregressions.

[9] We construct annual observations by averaging quarterly data. Because the BIS reports household debt and the household-debt-to-GDP ratio, but not GDP itself, we recover GDP by dividing household debt by the debt-to-GDP ratio. Household indebtedness is then calculated as household debt divided by lagged GDP.

Specifically, we estimate the following regression model:

$$y_{it+h} = \alpha_i^h + \sum_{p=1}^{P} \beta_{HD,p}^h d_{it-p} + \sum_{p=1}^{P} \beta_{\psi,p}^h \psi_{it-p} + \sum_{p=1}^{P} \gamma_p^h y_{it-p} + \varepsilon_{it+h-1}^h \tag{1}$$

where y_{it} is the logarithm of real GDP, d_{it} denotes the household debt-to-GDP ratio, and ψ_{it} denotes the labor share. The term α_i^h represents country fixed effects. We include five lags of each variable to account for persistence and dynamic interactions among debt, distribution, and output.

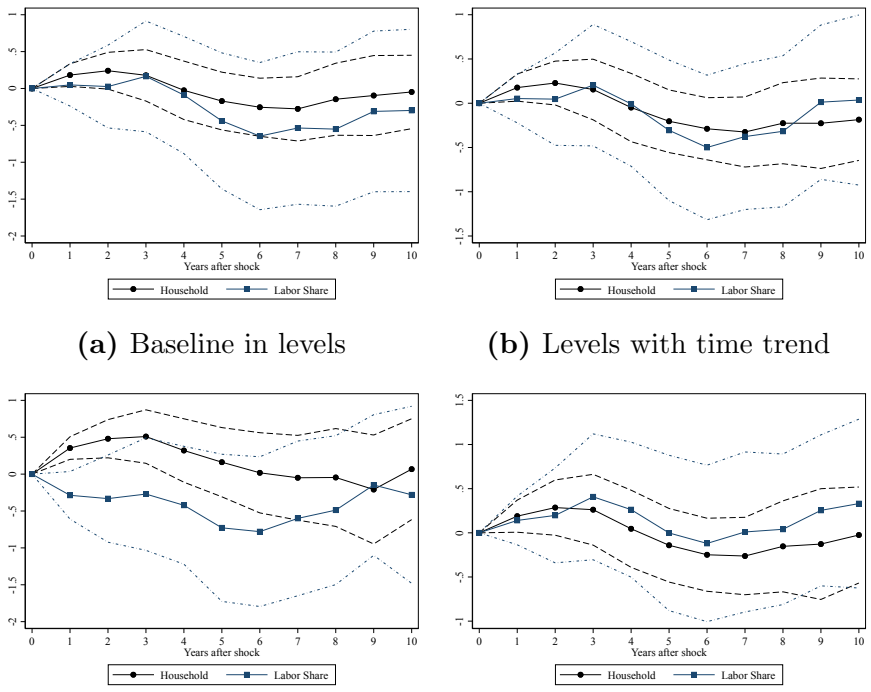
The estimated coefficients trace the response of future output to changes in household debt and the labor share over horizons $h = 1, \ldots, 10$. To examine the bidirectional relationships implied by our theoretical framework, we also estimate analogous specifications in which household debt and labor share are treated as dependent variables. This allows us to characterize the cyclical feedbacks linking debt accumulation, functional income distribution, and economic activity.

4.2 Results

Figure 8 reports the local projection estimates of the response of real GDP to a one-percentage-point increase in household debt and the labor share over a ten-year horizon. Across the baseline specifications in levels, a rise in household debt is followed by a short-lived expansion in output, which subsequently reverses into a medium-run decline. This boom-bust pattern is broadly consistent with the evidence reported by Mian et al. (2017), suggesting that debt accumulation may support demand in the short run but weighs on economic activity over longer horizons. By contrast, the response of output to the labor share is statisitcally insiginificant and imprecise and there is no evidence of profit-led output.

The broad shape of the debt response is robust to alternative specifications, including the inclusion of a time trend and the use of first differences. In particular, the differenced

Figure 8: Local projections: the response of output (y_{it+h}) to household debt and labor share shocks



(a) Baseline in levels

(b) Levels with time trend

(c) First Differences

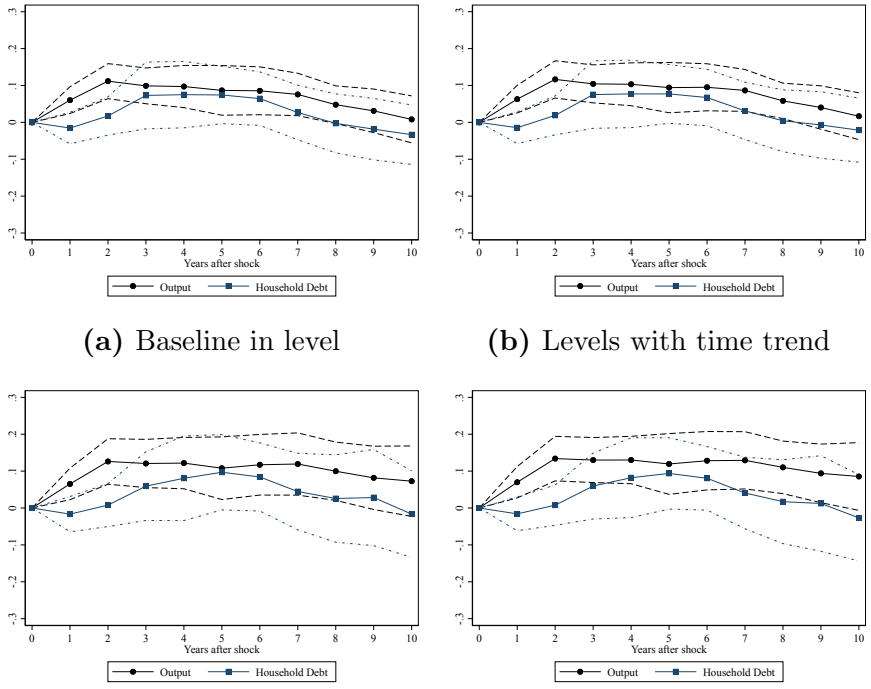
(d) First Difference with time trend

This figure reports local projection estimates of the response of real GDP to a one-percentage-point increase in the household debt-to-GDP ratio and the labor share. Panels (a) and (b) use variables in levels, while panels (c) and (d) use first differences. Panels (b) and (d) additionally include a linear time trend. All specifications include country fixed effects.

specifications continue to show that increases in household debt are associated with stronger output growth in the short run but downturn over the medium run. The labor-share response, by contrast, remains less precisely estimated and insignificant throughout specification. Overall, consistent with the analysis on the US, our panel evidence also points to household debt as a main variable associated with medium-run output dynamics than the labor share in this panel sample.

Figure 9 reports the response of the labor share to a one-percentage-point increase in household debt and output over a ten-year horizon. The estimates indicate that an increase in output is followed by a persistent rise in the labor share. In the baseline level specification, the effect is positive for several years and remains statistically significant over the short-to-

Figure 9: Local projections: the response of labor share (ψ_{it+h}) to output and household debt shocks



(a) Baseline in level

(b) Levels with time trend

(c) First Difference

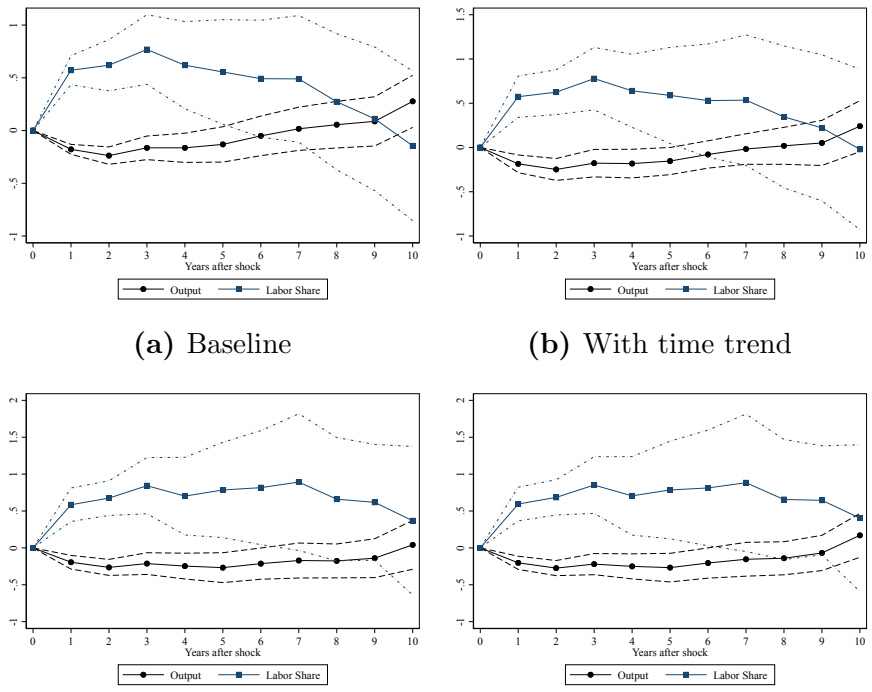
(d) First Difference with time trend

This figure reports local projection estimates of the response of labor share to a one-percentage-point increase in the household debt-to-GDP ratio and output. Panels (a) and (b) use variables in levels, while panels (c) and (d) use first differences. Panels (b) and (d) additionally include a linear time trend. All specifications include country fixed effects.

medium run. This pattern is consistent with the view that stronger economic activity is associated with profit-squeeze.

By contrast, the response of the labor share to household debt is generally statistically insignificant. Although a few horizons display weakly positive coefficients in some specifications, the debt effect does not exhibit a robust pattern across the alternative specifications. The inclusion of a time trend and the use of first differences leave the main result unchanged: output has a clear positive effect on the labor share, whereas the direct effect of household debt on labor share appears weak.

Figure 10: Local projections: the response of household debt-to-GDP ratio(d_{it+h}) to output and labor share shocks



(a) Baseline **(b)** With time trend

(c) First Differences **(d)** First Differences with trend

This figure reports local projection estimates of the response of household debt-to-GDP ratio to a one-percentage-point increase in output and labor share. Panels (a) and (b) use variables in levels, while panels (c) and (d) use first differences. Panels (b) and (d) additionally include a linear time trend. All specifications include country fixed effects.

Figure 10 plots the response of household debt to a one-percentage-point increase in output and the labor share over a ten-year horizon. Following an increase in output, the household debt-to-lagged-GDP ratio initially declines, before gradually reversing in later years. By contrast, an increase in the labor share is followed by a sizable rise in household debt, especially over the short-to-medium run. This suggests that improvements in labor income may expand households' borrowing capacity and support higher levels of indebtedness. The broad pattern is robust to the inclusion of a time trend and to the use of differenced variables.

Taken together, Figures 8–10 suggest a cyclical interaction between household debt, output, and income distribution. Increases in household debt are associated with a short-

run expansion in output followed by a medium-run slowdown, consistent with a boom-bust pattern. Higher output, in turn, raises the labor share, while increases in the labor share are followed by a sizable rise in household debt. By contrast, the direct effect of labor share on output and the direct effect of household debt on labor share are weaker and less precisely estimated. Overall, the panel evidence suggests that household debt is central to medium-run output fluctuations, while the labor share matters primarily through its effect on household borrowing.

5 Discussion

Our evidence suggests that medium-run macroeconomic dynamics are driven primarily by the interaction between household debt and output rather than by a Goodwin-type distribution-demand mechanism. Household debt is central to output fluctuations, while the labor share matters less through a direct effect on output than through its relationship with household borrowing. In this sense, the empirical patterns point to a cycle in which debt-driven changes in demand shape output dynamics, output movements affect distribution, and distribution feeds back into household borrowing. The main implication is that the cyclical interaction among debt, output, and distribution is not well captured by a framework that focuses exclusively on the relationship between the labor share and output.

These findings do not support the canonical Goodwin mechanism. Although the results are consistent with a profit-squeeze effect—in the sense that stronger output raises the labor share—we do not find robust evidence that a higher labor share systematically depresses output, as would be required for a Goodwin-cycle mechanism. In some specifications the estimated effect of labor share on output is even weakly positive, suggesting a wage-led demand effect rather than a profit-led one. For this reason, the empirical patterns uncovered here are difficult to reconcile with a cycle driven by the interaction of profit squeeze and profit-led demand alone.

Instead, the results are more consistent with a pseudo-Goodwin cycle in which distributive conflict interacts with household credit dynamics. In this interpretation, the observed cyclical comovement between output, labor share, and indebtedness arises not because distribution directly drives aggregate demand in the Goodwin sense, but because changes in labor income affect household borrowing and thereby shape the debt-driven cycle. This reading is broadly consistent with Stockhammer and Michell (2016), who emphasize the role of financial dynamics in generating Goodwin-like patterns, although our evidence points more specifically to a household credit-driven mechanism rather than to a Minskyan cycle centered on firms' financial fragility. More broadly, the results suggest that medium-run cyclical dynamics may be better understood as the interaction of household finance and distributional change than as the outcome of a purely distributive Goodwin process.

6 Conclusion

The neo-Goodwinian tradition has provided a powerful framework for linking functional income distribution to cyclical fluctuations, but the growing importance of household borrowing suggests that household debt must also be treated as a central macroeconomic variable. We therefore examine output, labor share, and household indebtedness as a joint system and ask whether observed Goodwin-like patterns are better explained by distributive conflict alone or by the interaction of distribution with household credit dynamics.

Our analysis of the United States provides little support for the canonical Goodwin mechanism. While we find evidence consistent with a profit-squeeze effect, we do not find robust evidence of profit-led demand once household indebtedness is taken into account; if anything, some specifications suggest weak wage-led demand effects. By contrast, household debt displays a clear boom-bust relationship with output: rising indebtedness supports output in the short run but depresses it in the medium run. These results suggest that the cyclical interaction between debt and output is central to understanding U.S. macroeconomic

fluctuations, and that the Goodwin pattern may partly reflect the effect of household debt on both demand and distribution rather than a direct interaction between the labor share and output.

The panel analysis of 30 economies points to a similar conclusion. Across countries, household debt expansion is associated with stronger output in the short run and weaker output in the medium run, in line with Mian et al. (2017). By contrast, the labor share does not exhibit a robust direct effect on output. At the same time, output tends to raise the labor share, and increases in the labor share are followed by higher household debt. Taken together, these findings suggest that the strongest cyclical feedbacks run through the debt-output nexus, while distribution matters primarily through its interaction with household borrowing. In this sense, the evidence is more consistent with a pseudo-Goodwin cycle driven by household credit than with a standard neo-Goodwinian cycle.

Taken together, our results suggest that distribution-led and household debt-driven approaches to economic-cycle analysis should be integrated rather than treated separately. For the Goodwin-cycle literature, the main implication is that household finance may mediate the relationship between distribution and economic activity, and that Goodwin-like fluctuations need not imply a canonical Goodwin mechanism. For the household debt-driven cycle literature, the results highlight the importance of distributional dynamics in shaping borrowing behavior and the transmission of credit expansions to aggregate demand. Future work, both theoretical and empirical, should investigate how output, distribution, and debt interact in both the medium and the long run. Greater attention to cross-country heterogeneity—especially to the institutional factors shaping income distribution and household borrowing—would also be an important avenue for future research.

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A Appendix

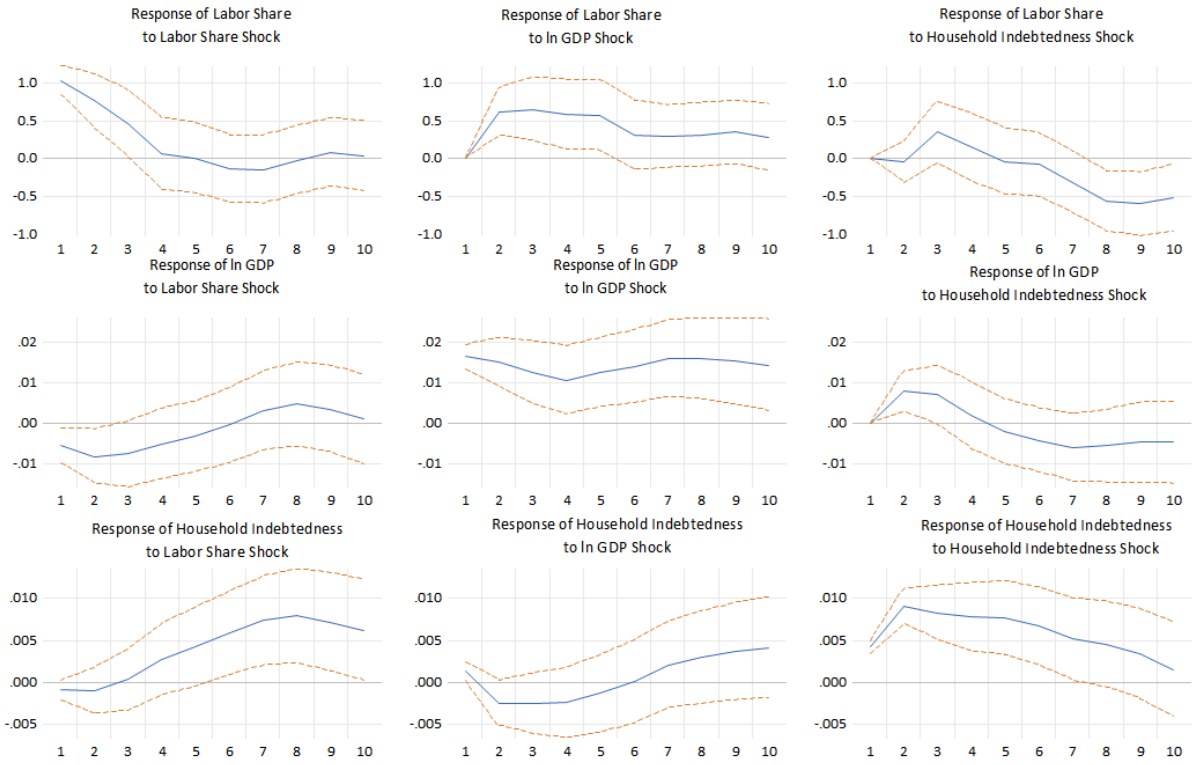

Figure 11: Specification Excluding Exogenous Control Variables