On the Way to the Great Depression

The Demand Regime of the US Economy (1900-1929)

Abstract:

This paper investigates the dynamics of income distribution and economic growth in the era before the Great Depression. Based on a Post-Keynesian model; I estimate the effects of the wage share and private debt on aggregate demand for private domestic output. The results of the study show the demand regime was wage-led with a considerable role of private debt in driving aggregate demand. Furthermore, I discuss the Roaring Twenties period and argue that increased income inequality led to the rise of destabilizing channels that propped up demand which contributed to increasing economic fragility on the way to the Great Depression.

Key words: Income distribution; Demand regime; Debt-led growth; Wage-led growth; Private debt, Great Depression, Roaring Twenties.

JEL classifications: E12, E22, D33

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1. Introduction:

The paper employs a Post-Keynesian framework to determine the demand regime of the pre-Great Depression era and find the demand regime to be wage-led, with important role played by private debt. Furthermore, it shows how the increase of income inequality during the Roaring Twenties led to the rise of destabilizing channels that propped up demand, while contributing to the fragility of the economy on the path to the Great Depression.

Following the pioneering models of Michael Kalecki and Cambridge Post-Keynesians, Bhaduri and Marglin (1990) theorized a framework to determine whether a demand regime is profit-led or wage-led. In a wage-led system, an increase in wages boosts demand of goods and services and thereby fosters greater economic growth. In a profit-led system, in contrast, higher profits drive higher demand of investment goods and productive capacity building, which leads to higher output growth in the economy.

Inspired by the framework of Bhaduri and Marglin, most studies of demand regimes have covered the post-World War II period, and in spite of the claims of similarities to current income distribution and growth dynamics, none have studied the era before the Great Depression. Studying the demand regime of the pre-Great Depression Era is a gap in the literature this work attempts to fill.

While the majority of demand regime studies were based on either Neo-Kaleckian or Goodwin models, I draws on Nickolas Kaldor’s late works, to investigate the dynamics of aggregate demand and income distribution in the early twentieth century period.
In a Kaldorian model, investment is derived demand, and in a closed economy either wage-led or debt-led demand regime are possible.

Utilizing available historical data and using statistical methods, a wage share, consumer debt, and investment debt time series for the relevant period is constructed. Then, a single-equation error correction model is used to estimate the elasticity coefficients of wage share and debt variables for private consumption and investment to determine the demand regime for the period.

The Roaring Twenties income distribution and demand dynamics will be discussed for the period preceding the Great Depression. I argue that the drop of demand that could have been caused by the rise of income inequality was compensated by two destabilizing channels. The first is a real-estate boom (1922-1926) financed by higher level of mortgage debt. The second, is a consumer debt boom that sustained aggregate demand in the second half of the Roaring Twenties, but was responsible for the drop in demand in The Great Depression.

Section 2 of the paper gives a theoretical background, Section 3 follows with a description of the historical trends of growth and income distribution throughout the period, Section 4 presents the empirical model, Section 5 presents the test results, Section 6 addresses the Roaring Twenties period, and Section 7 is the conclusion.

2. Theoretical background:

This paper is framed within the Classical-Keynesian tradition. Prominent Classical economist David Ricardo (1951) defined the main question that political economy pursues as an enquiry into the determinants of income distribution among classes. Karl Marx (1894) also
underlined the importance of income distribution in his analysis of the contradictions of the capitalist system. With the Marginalist Revolution of the late 19th century taking a micro-level approach to economic problems, income distribution was endogenized and became an outcome of relative scarcity of factors of production. The importance of investigating income distribution had to wait to be recovered in the hands of Piero Sraffa, Michal Kalecki, and the Post-Keynesians at Cambridge University. This revival underscored the importance of understanding the economy on a class base, and revitalized the role of class conflict and income distribution in explaining economic reality (De Vroey, 1975).

John Maynard Keynes did not address substantially income distribution, but Keynes was the most significant advocate of demand-driven theory of output and employment. Before Keynes (1937), the dominant theory in explaining the level of output was Say’s law “supply creates its own demand.” Keynes strongly refuted this proposition and maintained that output and employment levels are rather determined by the level of aggregate demand in the economy.

Michal Kalecki, who wrote a demand-driven theory of output determination in Polish before Keynes, incorporated income distribution and demand theory in his 1942 article, maintaining that while income distribution is exogenously determined, aggregate demand is affected by income distribution and output adjusts to the change in aggregate demand (Palley, 2005).

Nickolas Kaldor, a Cambridge Post-Keynesian drawing upon Michal Kalecki (1942) and Joan Robinson (1956), proposed in Kaldor (1955) that income distribution is determined by output. Starting from equality of savings to investment, and assuming workers do not save out of their wages and capitalists’ propensity to save is given and positive.
\[
\frac{P}{\bar{Y}} = \frac{1}{Sp} \frac{I}{\bar{Y}} \tag{1}
\]

where \(Y\) is output at full employment, \(P\) is profit, \(I\) is investment, and \(Sp\) is propensity to save out of profit.

This equation implies the profit share of income is determined by the investment share of full employment output. However, this equation is satisfied only in a full employment situation, a condition Keynes showed not to be normally the outcome of the dynamics of the capitalist system. Furthermore, Pérez and Vernengo (2013), commenting on the Cambridge equation, which is directly derived from Kaldor’s (1955) model, asserted that the equation is based on equality between savings and an autonomous function of investment, which ignores investment’s effect on capacity of production.

Kaldor, influenced by his engagement in policymaking and practical economic problems (Palumbo, 2009) in his later works (1970, 1988), emphasized the role of demand in driving investment. Whereas Keynes maintained the importance of effective demand in the short run, Kaldor in his later work expanded the role of demand in determining output to the long run, too. Kaldor (1988, p.157) stated, “Since under the stimulus of growing demand capacity of all sectors will be expanded through additional investment, there are no long-run limits to growth on account of supply constraints; such constraints, whether due to capacity shortage or to local labor shortage, are essentially short-run phenomena – at any one time, they are a heritage of the past."

Kaldor (1970, 1988) incorporated Hicks (1950) super-multiplier concept in explaining the effect of effective demand on output. The super-multiplier concept combines the Keynesian multiplier, by which an increase in autonomous spending leads to an increase of output, and through a chain reaction higher output induces higher spending, which leads to further output growth. The other element of the super-multiplier relation is the accelerator principle, according
to which investment is mainly derived demand; where an increase of output and capacity utilization leads capitalists to invest to enhance production capacity maintaining excess capacity to keep up with unforeseen demand. Although Kaldor talked about the foreign trade multiplier in which export is the only autonomous demand, Hicks (1950, p. 62) maintained the super-multiplier relation ‘can be applied to any given level of [autonomous demand components] to discover the equilibrium level of output [Q] which corresponds to it,’ so the same relation can apply to any autonomous demand components, such as autonomous government spending.\(^3\)

Bhaduri and Marglin (1990) pioneered a framework to determine whether a demand regime was profit-led or wage-led. According to this framework, investment is a function of profit share and capacity utilization. Investment sensitivity to a change in profit share is what determines the type of demand regime. If investment is strongly responsive to a change in profit share, then we have a profit-led system, but if investment is not, then we have a wage-led system in which an increase in wages feeds into an increase in demand and capacity utilization, which in turn leads to higher investment and ‘implies that the investors must respond more strongly (measured by respective capacities) to a variation in capacity utilization than in profit margin/share.’

Following Bhaduri and Marglin (1990), three types of models were used in determining the demand regime for different sets of countries:

1. Goodwin Model: Based on Richard Goodwin’s (1967) growth model, which adopts a common Marxist position of a positive relationship between profit and investment, Barbosa and Tylor (2006) framed the question in a prey-predator model and employed a VAR model to determine the type of demand system between 1948 and 2002. They
found that it was profit-led. Kiefer and Rada (2014) studied the distributional dynamics of economic activity for a panel of OECD country in the last four decades and found that the demand regime for the group was weakly profit-led.

2. Neo-Kaleckian Models: In these models, Stockhammer and Onaran (2013) adopt Kalecki’s position on a possible expansionist role of an increase in wage share and a wage-led system, although they recognize also the possibility of a profit-led system when investment is highly sensitive to profits. Naastepad and Storm (2007) studied 8 OECD countries’ demand regimes between 1960 and 2000 and suggested that whereas France, Germany, Netherland, Italy, Spain, and the United Kingdom demand regimes were wage led, they found the demand regimes in the US and Japan to be profit-led.

3. Kaldorian Model: Unlike the Neo-Kaleckian models whose investment function is partially autonomous, Pérez and Vernengo (2013) argued for a model that is based on later Kaldor works (Kaldor, 1970), in which investment is a derived demand; what drives a higher rate of investment is mainly the need to enhance production capacity to keep up with an increase in demand as reflected in an increased capacity utilization. The effect of output on investment is captured by the accelerator part of Hick’s (1950) super-multiplier relation.

Both the investment function and the possible type of the demand regime are what distinguish each model.4

The demand regime in both Neo-Kaleckian and Kaldorian models could be wage-led. However, they differ in the investment function; the Neo-Kaleckian investment function is partially autonomous and responds positively to profits. The Kaldroian investment function is derived demand and gives a prominent role to the accelerator effect of output growth. As output
grows and production capacity is highly utilized, investors increase their spending to keep up with higher demand.

Another difference between the Neo-Kaleckian models and The Kaldorian models is the case of repressed wage share, where declining wages cannot finance an increase in demand. Neo-Kaleckian models recognize positive effects of profits on investment and propose a profit-led system, whereas in Kaldorian models, the profit-led system is not a possibility, as investment is mainly derived demand and an increase of demand in times of repressed wages could be financed only through an increase in debt. Another difference between these two models is that Neo-Kaleckian models predict a “crisis of accumulation” in wage-led regimes in the long run, as investment responds negatively to a decline in profits (Bhaduri and Marglin, 1990), which means that demand adjusts to supply and not the opposite. Kaldorian models do not foresee this possibility as investment is derived demand and both output and capacity adjust to autonomous demand through the super-multiplier mechanism.

3. Historical trends (1900-1929):

The 1900 to 1929 era in the US economy witnessed the full transformation into an industrial economy, and the deployment of the mass assembly line as the mode of production. By 1929, only 20 percent of the labor force was in agriculture, in contrast to 40 percent at the beginning of the twentieth century. The period was characterized by intense class warfare that increasingly emboldened the position of labor against capital in the first two decades; however, by 1921 employers, with significant help from the judicial system, succeeded in containing and undermining the labor movement (Dulles et al., 2010), which brought an increase in income
inequality, as captured by the increase in the share of income of the top 1 percent and 10 percent income earners, seizing 23.9 percent and 49.3 percent, respectively, of total income in 1928 (Piketty, 2014). Also in an analogy with the post-1980 income distribution trends, there was a rising wage inequality within the wage earners class; the top 10% of wage earners obtained 29.2 percent of the total wage bill in 1929.\(^5\)

Furthermore, in manufacturing, which was the leading economic sector, the white-collar workers to blue-collar workers’ wage ratio was rising (Figure 1), and whereas the share of white-collar workers in manufacturing value-added output was steady – around 11 percent-between 1919 and 1929, production workers’ wage share declined from 40 to 35 percent in the same period\(^6\) (Goldin and Katz, 1999).

Another important development was the rise of wage workers, compared to self-employed workers, accompanying the decline in the farming sector and full-scale industrialization.

Insert Figure 1 here

Output growth throughout the period increased annually by an average of 3.5 percent (Figure 2), but was characterized also by severe fluctuations due to the absence of a stabilizing government role and financial regulations, which were installed in the aftermath of the Great Depression. Meanwhile, the whole period was characterized by high nonfarm unemployment, averaging 7.7 percent (Figure 3).

Insert Figure 2 here
The 1900-1929 period witnessed growth in the importance of durable goods in consumption items. Many household items such as cars, electric washing machines, radios, and mechanical refrigerators were introduced in this period. Accompanying this trend was the rise of consumer credit arrangements and agencies such as installment finance companies, credit unions, and even commercial banks, which were willing to provide credit for consumption purposes (Nugent, 1939) (Figure 4).

Corporate debt increased steadily throughout this period, from 110 percent of investment spending at the beginning of the period, up to a six fold increase in investment spending in 1928 (Figure 5).

Farm mortgage debt also rose noticeably, where mortgage debt as a percentage of value of land and buildings, rose from 27 percent in 1910 to 40 percent in 1930 (Olmstead and Rhode, 2006) (Figure 6). Nonfarm mortgage debt was on increasing path till 1914, then starting in 1918 it increased significantly. (Figure 7)

Overall private debt to output ratio increased from 1900 till World War One and the resumed its accelerating tendency after the war though the Roaring Twenties. (Figure 8)
4. The empirical model:

Drawing upon Kaldor later works (1970, 1988), the aim of this paper is to define the demand regime that best describes the dynamics of income distribution, and aggregate demand during the pre-1929 period. As government spending and international trade were not significant relative to the other Private consumption and investment in this period$^7$, a private closed economy should not be a serious distorting abstraction from the actual economy.

The Keynesian private domestic equilibrium equation is:

$$Y = X = C + I$$  \hspace{1cm} (1)

where $Y$ is private output, $X$ is aggregate demand, $C$ is private consumption, and $I$ is private investment.

Private consumption:

In a Keynesian framework, consumption is function of income, furthermore, in the current Kaldroian model consumption is a function of the exogenous variables of autonomous consumption, wage share$^8$, and debt.

The private consumption equation is:

$$C = C_o + b Y + e W + h N$$  \hspace{1cm} (2)
where $Y$, $W$, and $N$ are output, wage share, and consumer debt, respectively. $C_0$ is autonomous consumption, and $b$, $e$, and $h$, are consumption spending coefficients for the independent variables.

Private investment

In the Kaldorian model the main variables that are assumed to determine investment spending are capacity utilization, wage share, debt.

\[ I = t \ U + s \ W + n \ Z \]  \hspace{1cm} (3)

Where $U$, $W$, and $Z$ stand for capacity utilization ratio, wage share, and investment debt, respectively; $t$, $s$, and $n$ are coefficients of the independent variables.

Capacity utilization is the ratio of current output to potential output. It captures the accelerator effect, which is output effect on investment. Assuming a fixed capital to potential output ratio in the long run, current output to fixed capital ratio could stand for current capacity utilization.

Wage share captures income distribution effect; furthermore, wage share rather than profit share was chosen as the distributive variable in the investment equation, because in a Kaldorian model, there is no place for a profit-led system, as investment is derived demand, and the increase of demand of goods and services in a closed economy, can only actualized through the channels of autonomous spending, wages, and debt (Pérez and Vernengo, 2013). The debt variable included in the investment equation is investment debt, which equals the total of corporate debt and mortgage debt; it captures debt effect on investment.
Consolidating equations (2) and (3) the model states that aggregate demand is a function of the exogenous variables of autonomous consumption, income distribution and debt. Where wage share is the crucial distributional variable:

\[ X = f(A,W,D) \]  

(4)

Where \( X \) is aggregate demand, \( A, W \) and \( D \) are autonomous consumption, wage share and private debt level respectively.

According to the dynamics of aggregate demand, wage share, and private debt, in the case of positive debt elasticity of aggregate demand \( E_D > 0 \), we can recognize 4 cases (Figure 9):

If the wage elasticity of aggregate demand is positive, \( E_W > 0 \), then:

(1) When \( E_W > E_D \), then we have wage-led demand.

(2) When \( E_W < E_D \), then we have debt-led demand.

If wage elasticity of aggregate demand is negative, \( E_W < 0 \), then:

(3) When \( E_W > E_D \), then we have a stagnationist regime.

(4) When \( E_W < E_D \), then we have debt-led demand.

In the case of negative debt elasticity of aggregate demand \( E_D < 0 \), we can recognize four cases (Figure 9):

If the wage elasticity of aggregate demand is positive, \( E_W > 0 \), then:

(5) When \( E_W > E_D \), then we have a wage-led demand.

(6) When \( E_W < E_D \), then the economy is dominated by the debt-deflation effect.

If the wage elasticity of aggregate demand is negative, \( E_W < 0 \), then:

(7) When \( E_W > E_D \), then we have a stagnationist regime.
(8) When $E_W < E_D$, then we have a theoretically impossible situation.

What is meant by stagnationist is equivalent to the “revenge of the rentier" proposition. In line with Kalecki’s thesis on the social and political implications of permanent full employment (Kalecki, 1943); an increase of the wage share accompanied with a decline in aggregate demand could take place if preceded by higher output growth and employment that caused increased bargaining power of the labor class, which would lead to higher inflation if the pace of the growth of wages was outstripping that of productivity growth, or would result in increased ability of labor to control production. The capitalist class response would be to cut production and drive the economy into recession.

To determine the demand regime in a private closed economy, we examine whether the growth of wage share or debt level was the biggest driver of the growth of aggregate demand.

5. The elasticities estimation:

The testing strategy is to construct single equation for each of aggregate demand components in a private closed economy; and estimate wage share and debt elasticity of consumption and investment equations. I use a single equation error correction model\(^\text{10}\) (Banerjee et al., 1998), which estimate the relationships of time series variables that are integrated of the first order. This method has two advantages; it deals with autocorrelation in time series data, and it enables testing for both short-run and long-run relationships between the variables. As we are interested in determining the demand regime for the whole period, I will report only the significant long-run elasticities. The long-run elasticities of the independent variables are calculated by dividing the coefficients by the negation of the adjustment coefficient, where both
coefficients have to be significant (Onaran and Galanis, 2013). Since the method is only applicable to cointegrated data series. I use the Augmented Dickey-Fuller test to test for stationarity of the series. All the variables will be transformed into a logarithmic form, and the series stationarity will be tested in log-level form and first-differenced log-level form to check the order of integration. Given the size of the sample, I implement the test with a model of one lag.

Insert Table 2 here

The error correction method works with variables that are stationary in the first order. As we can see from (Table 2), all the variables are non-stationary at log-level and stationary when first-differenced, indicating that the tested time series are integrated of order (1).

From equation (1):

\[ \Delta C = C_0 + \Delta Y + \Delta W + \Delta N + lC + lW + lN \]

where \((l)\) stands for 1 time lag and \((\Delta)\) stands for difference.

I run the regression of consumption spending equation, using Newey-West standard errors to overcome heteroskedasticity and autocorrelation problems. Where consumption spending, income level, and consumer credit are annual data and in real terms, and in logarithmic form.\textsuperscript{11}
I find the cointegration relationship and the coefficients of the independent variables to be significant. Table 3 includes the statistical results for the consumption equation significant variables.

The significant long-run coefficients show that an increase of 1 percent in wage share, would be associated with an increase in consumption spending of 0.35 percent, which implies wage-led consumption spending. The increase of consumer debt by 1 percent would be associated with an increase in consumption spending of 0.20 percent. As will be discussed later in the paper, the importance of consumer debt increased throughout the whole period and significantly during the Roaring Twenties.

Insert Table 3 here

The tested investment equation includes capacity utilization, wage share and investment debt as independent variables, I also added Tobin’s Q ratio \(Q\) to test for the effect of asset market valuation -wealth effects- on investment.

\[\Delta I = I_0 + \Delta U + \Delta W + \Delta Z + \Delta Q + lI + lU + lW + lZ + lQ\]

where \((l)\) stands for 1 time lag and \((\Delta)\) stands for difference.

I run the regression of investment equation; using Newey-West standard errors to overcome heteroskedasticity and autocorrelation problems. Where all variables are annual data series and in in real terms and in logarithmic form. Investment spending shows a strong response to capacity utilization as a 1 percent increase in capacity utilization is associated with a
2.66 percent increase in investment, implying a Kadorian investment function. An increase of 1 percent of investment debt is associated with an increase of 1 percent in investment spending. A wage share increase of 1 percent is associated with increased investment spending by 1.17 percent, showing that we had in distributive terms a wage-led investment. Furthermore, it must have been through the channel of consumption that the wage share had such an effect over capacity utilization and hence investment spending. As the demand driven model predicts; Tobin’s Q ratio has no statistically significant effect on investment spending.

Insert Table 4 here

Using Kendrick’s (1961) national account data throughout the period, consumption was on average 84 percent of total private output excluding trade, whereas investment was about 16 percent of total private output. Multiplying the wage share coefficients for consumption and investment by their respective weight in private spending, we find that a 1 percent increase in wage share is associated with an increase of 0.48 percent in private output, while a 1 percent increase in private debt is associated with 0.18 percent increase in private output. The results lead us to conclude that the demand regime was wage-led, with an important role of private debt in driving private aggregate demand. I show in the next section, that the rise of the importance of debt in driving demand in the Roaring twenties was partially responsible for the instability of the system. As spending financed by debt outpace spending out of earned income, the economy becomes more vulnerable and prone to crisis (Charpe et al., 2012).
Furthermore, the investment equation test indicates a strongly demand-driven investment function, which given the wage-led demand regime, suggests that a Kaldorian model perform well in describing income distribution and demand dynamics in this period.

6. The Roaring Twenties:

It might be puzzling that we had a wage-led demand regime for early Twentieth Century decades, whereas the Roaring Twenties (1922-1929) was characterized by both rising income inequality and decent economic growth – averaging 4.8 percent. First of all, the increase in income inequality manifested itself not only in the bigger share top income earners were getting, but also in the increased inequality among wage earners themselves; furthermore, even if the wage share did not decline after 1921, blue-collar workers were significantly disadvantaged in their share of the wage share compared to white-collar workers, as I showed in the third section of the paper. The wage inequality reinforced the absorption of income by the top income brackets.

Secondly, the abovementioned results show a significant role of private debt in driving aggregate demand. The drop in demand that could have been caused by the increase in income inequality (Keynes, 1936, p.95), was compensated for by two channels that sustained high level of demand.

The first channel was an increase in mortgage debt that financed a real estate boom, which drove the economy out of the 1920-1921 recession and was busted in 1926. The real estate boom was financed by a significant increase in home mortgage debt, which doubled in value during the boom (Table 5) whereas demand in this period was driven by investment spending,
which was predominantly residential investment.\textsuperscript{16} Eugene White (2009), using a price index of newly built houses, maintains that the 1920s’ real estate bubble\textsuperscript{17} was a nation-wide phenomenon and could be considered larger in magnitude than the 2000s’ real estate bubble. When using the Case-Shiller price index of both old and new houses, the 1920s’ real estate boom is comparable to the 1980s’ boom.

The second channel by which a drop in demand was averted was the increase in consumer debt, which financed a consumption boom (1926-1929). Consumer debt increased in importance to finance consumption and marched to its highest level of 12 percent of personal income in 1929. The increase in consumer debt fed into a consumption boom, which resulted in demand for 1926-1929 being driven mainly by strong consumption spending. In contrast, real investment was sluggish, registering a growth of only 2.18 percent for the last 4 years of the Roaring Twenties (Table 6).

Martha Olney (1998, 1991), who extensively studied consumption and consumer credit in the twenties, demonstrated the role of consumer credit in bringing the collapse of consumption in 1930 (Olney, 1999). It was the fear of indebted households from defaulting on their debt that forced them to cut consumption spending. In 1930, as down payments were a significant part of household income (from autos to appliances, down payments ranged between 5 percent to 48 percent of household disposable income) this development accompanied an increase in layoffs and cuts in weekly hours in the early months of that year.

To avoid defaulting on their debt, indebted families with installment credit –estimated by Olney to be 25 percent of all families-- had as their only option cutting their consumption to meet payments and avoid serious wealth loss, since the default in 1930 had the legal
consequences of repossessing assets by the sellers. Olney estimates the required cut of consumption to meet the payment around 3 percent, and cites Temin’s (1976) estimate of the autonomous drop of consumption to be 3.8 percent in 1930, which implies more than three-quarters of the decline in autonomous consumption was caused by fear of default on consumer debt.  

Furthermore, when we compare profit types from tax return data, we find a significant increase in business profits and investment spending between 1922 and 1925. Then investment spending significantly slowed down, with business profit share of personal income declining. Profits from selling assets, on the other hand, significantly increased between 1926 and 1929, which could indicate that, with the increase in income inequality, the surplus was used to invest in the booming real estate sector, and when it burst, the surplus replaced financing real estate investment with investing in assets; as profits were larger in the asset markets than in real production sector, feeding a financial asset bubble that initiated the Great Depression (Table 7, Figure 10).

So we can see how the change in income distribution with increasing income inequality has led to the destabilizing developments that brought about the Great Depression.

Insert Table 5, 6, and Figure 10 Here
7. Conclusion:

This paper is an attempt to highlight the importance of incorporating income distribution in analyzing the dynamics of demand and growth, and also to focus on the contributions of later works of Kaldor on the role of effective demand in driving growth.

The first three decades of the twentieth century witnessed significant changes in the US economy. There was impressive economic growth, annually averaging 3.5 percent, and structural transformation of the labor force and economic sectors. Accompanying this transformation, the working class successfully mobilized and voiced its demands in the first two decades, to be crushed in the Roaring Twenties by more conservative governments, an antagonistic judicial system, and a successful campaign by employers that materialized in the “American Plan,” which all resulted in diminishing bargaining power and an increase in income inequality in the Roaring Twenties.

Kaldor’s late views offer a consistent long-run demand theory of growth in which investment is a derived demand. Furthermore, in contrast to Neo-Kaeckian and Goodwin demand regime models, the Kaldorian model recognizes two possible demand regimes in a closed economy; Wage-led and debt-led demand regimes. Drawing on Kaldorian model, I investigate the demand regime in the early twentieth century period, I estimated both wage share and debt elasticities of aggregate demand. The results show that the demand regime was wage-led, with a significant role played by debt. Furthermore, the decline in demand that resulted from the increase in income inequality in the Roaring Twenties was compensated for by a real estate boom in the first half (1922-1925) that was financed by mortgage debt. Later the economy
witnessed an increase in the importance of consumer debt, which sustained demand in the second half of the Roaring Twenties (1926-1929), consumer debt was a significant factor in the decline of consumption in 1930.

The importance of income distribution and income inequality in economic dynamics has been increasingly recognized in the last years, however, the dynamics of income distribution and demand as a driver of growth in a Keynesian fashion needs to be emphasized. Furthermore, given all the unstable tendencies of the capitalist system, past and recent experience indicates that the path to relatively stable and prosperous growth is only possible by adopting equitable wage-led growth policy.
Appendix:

Data Description

National Accounts Data:

Output is represented in Gross National Product data from Romer (1986). Consumption data is from Lebergott (1996), and investment data is from Kenrick (1961). Fixed investment data is from the U.S. Bureau of the Census (1966). Capacity utilization is expressed as 1929-based index of the ratio of real private output to real capital stock as calculated by Kendrick (1961) index and reported in Wright (2006).

Labor Force and Factor Shares Data:

Labor force and unemployment data is from Weir (1992). In Weir’s data, self-employed is added to salaried and establishment wage employment. All annual wage and self-employed workers data is from Stanley Lebergott (1964). Manufacturing employees data is from Lebergott, (1964).

Following Gollin’s (2002) treatment of the self-employed earnings, the self-employed are counted as wage-earners, and the wage share is calculated as:

\[ W = \frac{\text{nominal average wage} \times \text{employees}}{\text{Nominal output}} \]

Operating surplus stands for profit share. It equals income residual after subtracting wage share. Earnings of manufacturing workers by skill are from Margo (2006).
Debt Data:

Consumer debt data from 1916-1929 is from the Bureau of Economic analysis estimates in James and Syla (2006). Data for the years 1909 to 1915 come from Nugent (1939) estimates. For the years 1900 to 1908, consumer credit data is extrapolated from bank loans data.

Investment debt data includes both corporate debt and mortgage debt. Corporate debt from 1916 to 1929 is from the Bureau of Economic analysis estimates in James and Syla (2006). For the years 1900-1915, I extrapolated corporate debt data from outstanding private bonds and private bank loans, a procedure similar to that followed by the BEA in estimating pre-1929 corporate debt. For the same period (1900-1916) for mortgage debt, I extrapolated mortgage debt data on private bank real estate loans as both were strongly correlated 1917-1929.


Deflator Data:

The deflator used for consumption spending, investment spending, consumer debt, and investment debt is Christina Romer’s (1986) GNP deflator, taking 1929 as a base year. The deflator used to deflate fixed investment and residential construction is from the U.S. Bureau of the Census (1966) fixed investment deflator series.

Miscellaneous Data:

The value of new construction of private residential buildings is from (Snowden, 2006).
Manufacturing output data is from Atack et al., (2006); deflated using the Romer’s (1968) GNP deflator. Tobin’s Q ratio data series is from Blanchard et al., (1990)

**Main Variables Statistical Summary:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
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<td>30</td>
<td>66455.09</td>
<td>18714.81</td>
<td>38731.58</td>
<td>103900</td>
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<td>Consumption</td>
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<td>52599.11</td>
<td>11452.09</td>
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<td>Investment</td>
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<td>17063</td>
</tr>
<tr>
<td>Consumer Debt</td>
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<td>1528.03</td>
<td>687.24</td>
<td>7100</td>
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<td>Investment Debt</td>
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<td>29920.89</td>
<td>13943.53</td>
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<tr>
<td>Wage Share</td>
<td>30</td>
<td>59.83</td>
<td>3.71</td>
<td>49.48</td>
<td>64.20</td>
</tr>
<tr>
<td>Profit Share</td>
<td>30</td>
<td>40.16</td>
<td>3.71</td>
<td>35.79</td>
<td>50.51</td>
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<td>Capacity Utilization</td>
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<td>86.09333</td>
<td>7.06</td>
<td>76.20</td>
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<tr>
<td>Tobin’Q</td>
<td>30</td>
<td>.810437</td>
<td>.28</td>
<td>.35</td>
<td>1.28</td>
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</tbody>
</table>

Real output (GNP), real consumption, real investment, consumer debt, and investment debt are in million dollars.
Bibliography


Chicago


Endnotes:

(1) Keynes (1937), chapter ii.
(2) Luigi Pasinetti (1962) reached the equation without assuming workers’ propensity to save as zero, and reformulated it into what is known as the Cambridge equation.
(3) Heinrich Bortis (1997) in his formulation of the super-multiplier considers both exports and government spending as the autonomous demand components.
(4) For a recent review of the distinction between Kaleckian and Goodwin models, see Stockhammer and Stehrer, (2011). For the Kaldorian models see Pérez and Vernengo, (2013).
(5) The share of the top 10 percent wage earners declined since World War II to recover in 1984 to the 1929 share. (Piketty, 2014, pp. 298-300).
(6) “The value added of an establishment was calculated by subtracting the cost of materials, supplies, containers, fuels, purchased electric energy, and contract work from the value of shipments for products manufactured plus miscellaneous receipts for services rendered” (Atak and Bateman, 2006).
(7) Exports of goods and services was 5 percent on average through the whole period. While net exports on average was below 5 percent.
(8) Although consumptions takes place out of both profits and wages, consistent empirical tests that show significantly higher marginal propensity to consume out of wages relative to profits do justify such an abstraction.
(9) To test for the significance of the cointegration relationship between the variables. I use the t-distribution critical values reported in (Banerjee et al., 1998) for the speed of adjustment term.
(10) For theoretical and practical motives. It is realistic not to include wealth, as wealth concentration was very high during this period. Saez and Zucman (2014) calculated the bottom 90 percent share of wealth to be around 20 percent in the period between 1917 and 1930.
(12) When I run the investment equation regression using profit share as the income distribution variable. I find that the profit share has statistically significant coefficient of (-0.66) which means an increase of 1 percent in the profit share would cause a decline in investment by 0.66 percent, confirming the wage share positive effect on investment.
(13) The short-term- within a year- wage share propensity to consume was quite significant; 0.55 percent increase of consumption was associated with 1 percent increase in wage share.
(14) The change in private output from an increase in 1 percent wage share is calculated as: (0.35*0.84) + (1.17*0.16) = 0.48 percent.
(15) The change in private output from an increase of 1 percent in private debt is calculated as: (0.20*0.84) + (0.10*0.16) = 0.18 percent.
(16) Residential structures share of fixed investment annual average was 35 percent from 1915 to 1929. During the boom (1922-1926), it was an unprecedented 50 percent or greater (Table7).
(17) White (2009) shows that the boom was not limited to Florida, but rather was a nationwide phenomenon.
(18) Romer (1993,) using Kendrick’s (1961) national account data, estimates the contribution of consumption in the decline of output in 1930 to be at 46 percent. The decline of consumption itself was 5.4 percent.
Figures and Tables

Figure 1

[Graph: Ratio of skilled and semiskilled male workers to unskilled male workers (1920-1929)]

Figure 2

[Graph: Output Annual Percentage Growth Rate (1901-1929)]
Figure 6

Farm Mortgage Debt\% (1890-1930)

- Percentage of farms mortgaged
- Mortgage debt as a percentage of value of land and buildings

Figure 7

Annual Percentage Growth of Nonfarm Real Home Mortgage Debt (1901-1929)

Figure 8

(Private Debt / Output)\% (1900-1929)
Figure 9

Dynamics of Aggregate Demand (AD) and Wage Share (W)

Where $X_g$ is aggregate demand growth rate, and $W_g$ is wage share growth rate.
Figure 10

Business Profit and Asset Profit Percentage Ratio of Personal Income (1922-1929)

- Business Profit/Personal Income
- Asset Profit/Personal Income
<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td>Decade</td>
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<tr>
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</tr>
<tr>
<td>1901-1910</td>
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<tr>
<td>1911-1920</td>
</tr>
<tr>
<td>1921-1929</td>
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<thead>
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<th>Table 2</th>
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</tr>
<tr>
<td>Investment</td>
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<td>Consumer Debt</td>
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<td>Investment Debt</td>
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<td>Profit Share</td>
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<tr>
<td>Capacity</td>
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<tr>
<td>Utilization</td>
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<td>Tobin’s Q</td>
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</table>

*significant at 0.1 level
### Table 3

**Consumption Equation Estimation**

<table>
<thead>
<tr>
<th></th>
<th>1% change in output (t= 2.55) (p=0.019)</th>
<th>1% change in wage share (t= 3.46) (p=0.002)</th>
<th>1% change in consumer debt (t= 3.55) (p=0.002)</th>
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</thead>
<tbody>
<tr>
<td>% change in consumption spending in the long run</td>
<td>0.36%</td>
<td>0.35%</td>
<td>0.20%</td>
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</tbody>
</table>

N= 29, Autonomous consumption coefficient: 2.80, t= 3.01, p=0.007; Speed of adjustment coefficient: -0.74 with t= -4.57 and p= 0.000; F (7, 21) = 19.78, Prop>F= 0.0000.

### Table 4

**Investment Equation Estimation**

<table>
<thead>
<tr>
<th></th>
<th>1% change in capacity utilization (t=3.35) (p=0.003)</th>
<th>1% change in wage share (t=2.70) (p=0.014)</th>
<th>1% change in investment debt (t=1.84) (p=0.082)</th>
<th>1% change in Tobin’s Q (t=1.04) (p=0.310)</th>
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<tr>
<td>% change in investment spending in the long run</td>
<td>2.66%</td>
<td>1.17%</td>
<td>0.1%</td>
<td>insignificant</td>
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</table>
N= 29, Autonomous investment coefficient : -8.0 t= -2.96, p= 0.008; Speed of adjustment coefficient: -.92 with t= -3.92 and p= 0.001; F( 9, 19) = 14.23, Prop>F= 0.0000

### Table 5

<table>
<thead>
<tr>
<th>Year</th>
<th>New Residential Structures Investment/Fixed Investment</th>
<th>Nonfarm Household Mortgage Debt</th>
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<tr>
<td></td>
<td>Billions</td>
<td>Billions</td>
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<td>1921</td>
<td>0.25</td>
<td>11.7</td>
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<tr>
<td>1922</td>
<td>0.43</td>
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<td>1923</td>
<td>0.50</td>
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<td>0.51</td>
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<td>1926</td>
<td>0.52</td>
<td>21.3</td>
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Table 6

Growth Rates of Consumption, Investment, Output, Consumer Debt/ Consumption

(1922-1929)

<table>
<thead>
<tr>
<th></th>
<th>Private Consumption</th>
<th>Private Investment</th>
<th>Total Output</th>
<th>Consumer Debt/ Consumption</th>
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<tbody>
<tr>
<td>1922</td>
<td>3.68</td>
<td>42.84</td>
<td>5.87</td>
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<tr>
<td>1923</td>
<td>9.07</td>
<td>46.60</td>
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<td>-20.70</td>
<td>2.96</td>
<td>6.68</td>
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<tr>
<td>1925</td>
<td>-2.92</td>
<td>32.53</td>
<td>2.45</td>
<td>7.99</td>
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<td>31.09</td>
<td>72.18</td>
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<td>1926</td>
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<td>1.71</td>
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<tr>
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