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THE GENERAL THEORY OF EMPLOYMENT, INTEREST, AND MONEY AFTER 75 YEARS: THE IMPORTANCE OF BEING IN THE RIGHT PLACE AT THE RIGHT TIME

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ABSTRACT

This paper studies why the General Theory had so much impact on the economics profession through the 1960s, why that impact began to wane in the 1970s, and why many economic policymakers cling to many of the tenets of the General Theory. We discuss three key elements along these lines, including the fact macroeconomic time series through the 1960s seemed to conform qualitatively to patterns discussed in the General Theory, that econometric developments in the area of simultaneous equations made advanced the General Theory to a quantitative enterprise, and that the General Theory was published during the Great Depression, when there was a search for alternative frameworks for understanding economic crises.

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The General Theory of Employment, Interest, and Money After 75 Years: The Importance of Being in the Right Place at the Right Time

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1 Introduction

There is no doubt that Keynes's *The General Theory of Employment, Interest, and Money* (GT) significantly influenced the economics profession and economic policymakers. "Google Scholar" currently shows more than 12,000 citations to the GT. To put this in perspective, Robert Lucas's famous 1972 paper "Expectations and the Neutrality of Money", and Finn Kydland and Edward Prescott's famous 1982 paper "Time to Build and Aggregate Fluctuations", both of which helped supplant the GT as the dominant macroeconomics paradigm, and both of which were cited by the Nobel committee when these economists won Nobel prizes in 1995 and 2004, respectively, have combined citations that account for less than half of the number of GT citations. And the GT's citation count doesn't fully reflect the fact that the Keynesian revolution was perceived by many economists between the late 1930s and 1970, including Nobel Laureates Laurence Klein, Paul Samuelson, Robert Solow, and James Tobin, as the only game in town for analyzing business cycle fluctuations and for developing government policies to stabilize the economy. For much of this period, Milton Friedman's pathbreaking work on the quantity theory of money and the associated tenets of monetarism took a backseat to the GT. Perhaps the best one-liner that represents the influence of Keynes, at least in policymaking circles, was

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President Richard Nixon's statement "I am now a Keynesian in economics" after he eliminated the United States' remaining ties to gold in 1971 [Pearlstein, 2008].

This essay discusses the GT from the perspective of neoclassical macroeconomics, which is the macroeconomics that in many quarters replaced the GT over the last 40 years. We focus our analysis on understanding the impact of the GT on economic theory and on policymaking, why beginning in the 1970s research economists largely abandoned the GT, and why some ideas from the GT continue to have significant impact, particularly among economic policymakers.

The GT was published during the Great Depression, one of the most devastating international economic crises, and one in which the GT offered hope for understanding what otherwise seemed inexplicable, and that also offered a promise for economic policies that could restore prosperity. Our view is that the GT had such significant and long-lasting impact because Keynes was in the right place at the right time, involving two key elements. For at least some time, the evolution of macroeconomic variables seemed to conform to the predictions of the theory, as wartime spending, at least in the United States, coincided with a wartime economic boom, lending credence to the view that increasing government spending fosters higher employment and output. And the relative economic stability of the 1950s and 1960s convinced many economists that the tenets of the GT were responsible for curing depression and providing an economic management blueprint for governments. The second element is that fundamental econometric breakthroughs occurred just after publication of the GT, and these econometric developments provided a methodological basis to advance the ideas in the GT and provide a quantitative framework for analyzing macroeconomic problems.

But the same broad features that gave the GT such prominence in theory and policymaking for so many years – methodological developments that made it feasible to build and quantify economic models and the empirical features of the macroeconomies – were ultimately the reasons why the GT was replaced as the dominant macroeconomic paradigm. In particular, the evolution of Muth's approach of rational expectations [Muth, 1961], combined with the integration of dynamic general equilibrium theory with recursive methods, made it feasible to develop formally specified dynamic macroeconomies with deeper theoretical foundations than was present in the GT. And the recognition that supply-side factors were important for fluctuations, together with the breakdown of the Phillips curve, also contributed to the end of the Keynesian Revolution, at least among research economists.

This paper is organized as follows. Section 2 summarizes the elements of the GT that we choose to discuss. Section 3 discusses why the GT had such a long-lasting impact on economic theory and policymaking. Section 4 details the reasons

for the decline of the GT among research economists. Section 5 briefly discusses theoretical innovations in equilibrium macroeconomics that helped supplant the GT as the primary macroeconomics paradigm. And finally Section 6 concludes.

2 Some Defining Features of The General Theory

Keynes certainly intended the General Theory to be just that – an overall framework for understanding the macroeconomy, not just an analysis of business cycle fluctuations. As in his essay, "Economic Possibilities for Our Grandchildren", Keynes opined about what the world might look like in the future. Some of his long-run assessments are of considerable interest in their own right, including Keynes's view that society might become sated with consumption of physical goods, which could lead to solving the problem of scarcity, and the idea that society could run out of profitable investment opportunities. The idea of satiation was discussed in Ohanian (2008), while the notion that there was a finite number of profitable investments sheds light on Keynes's views about the social creation of new ideas, and their importance for growth. That is, either society would run out of ideas, which is an issue that has been explored recently by Chad Jones (2002), or alternatively, that ideas are not that relevant for future growth. And while these and other long-run visions of Keynes are fascinating, both for understanding Keynes and understanding his social views, we focus on some of the most well known components of the GT, those which are commonly cited as important passages and which have specific impact.

These include the broad view that economic fluctuations are largely demand-driven, that some of that change in demand is not due to fundamentals, but rather "animal spirits" that impact expectations about future profitability, and that in turn impact capital investment, that expanding government demand is useful for stabilizing an economy and in particular helping to restore employment loss from a recession, that wages are countercyclical, that there is a tradeoff between inflation and measures of labor utilization, such as unemployment, that consumption, which represents roughly 2/3 of output, is largely determined by concurrent income, which leads to a multiplier related to government spending. All of these ideas have been advanced along many dimensions by other economists during the heyday of the Keynesian revolution.

3 The Impact of the General Theory on Economic Theory and Policymaking

The GT had a major impact on economic thinking among economists and policymakers for a long time, and in some circles, still remains influential today. The substantial and long-running influence of the GT is due in our view to a "perfect storm" of timing of events that surrounded the GT and turned it into a paradigm shifter that dominated macroeconomics until the 1970s. Specifically, the GT was written during the Great Depression, a catastrophic episode in which the economic theory of that time seemed to be of little use, and in which there was demand for new ideas that could aid in restoring prosperity. And there are two developments around the time of the GT that advanced its prominence substantially. One is that the theory seemed to be consistent with the subsequent evolution of economic time series, at least for a while. A second fundamental component is that the major developments in econometric identification and estimation of simultaneous equations models made possible the large-scale econometric models which featured a number of ideas from the GT.

The GT was published in 1936, and seems to have been written in 1935, but it is likely that Keynes was presenting these ideas before this, which is to say that the GT had its genesis during the Great Depression. This is very important, because the Depression was not only the most broad-based international crisis, involving most of Europe and other advanced countries, but it was also the deepest and most persistent crisis in many of those countries, including the U.S., Canada, France, and Germany.

The persistence and depth of the Depression seemed to defy explanations based on the equilibrium reasoning of the standard theory of that time, which held that price adjustments would bring supply and demand into balance. But the market-clearing implications of standard equilibrium theory seemed to have little to say about the very high and persistent unemployment that characterized the U.K. throughout the 1920s and much of the 1930s, and for the U.S. for the entire decade of the 1930s.

And while there is debate over how to measure unemployment in the U.S. during this period, reflecting whether or not to count individuals on government work relief programs, employment statistics clearly indicate more than a decade of labor market weakness in the U.S. Cole and Ohanian (1999) report that per-capita hours worked, including those who worked government jobs, had recovered very little by 1939 as compared to the trough levels of 1933. Specifically, total hours worked per adult fell by about 27 percent between 1929 and 1933, and remained about 22 percent below its 1929 level in 1939, a decade after the Depression began in the U.S.

Keynes jumped on the tension of using standard equilibrium reasoning to ana-

lyze a prolonged depression in the GT by reviewing Pigou's analysis of the labor market. Pigou's model, which was presented in his 1933 text *The Theory of Unemployment*, develops a fairly representative model of the labor market by today's standards. The model features a standard labor-leisure tradeoff that is now embedded in the familiar intratemporal first order condition that appears in many models in which a household equates the marginal rate of substitution between consumption and leisure to the marginal product of labor. But as Depressions stretched out for decades across both the U.K. (whose Depression began after World War I), and the U.S., it became increasingly difficult to reconcile the chronically persistent high rates of unemployment with a theory that posited wage adjustments in response to variations in nominal prices that ultimately reduced unemployment by equilibrating labor supply and labor demand. Moreover, the persistence of high unemployment that coincided in some countries with rising – not falling – real wages, seemed to be well outside the bounds of equilibrium theory. The GT was written partly in response to this tension about economic depression and equilibrium theory. Keynes wrote:

"This (specification of Pigou's model) amounts, of course, to assuming that there is no involuntary unemployment in the strict sense, i.e. that all labour available at the existing real wage is in fact employed" [Keynes, 1936, p. 274].

Pigou's view was that wage adjustments would bring the supply of labor and demand for labor into balance, just as was the case for any commodity in which competitive market mechanisms were working well. This is where Keynes declared victory, and in which there was not much of a rejoinder. How could Pigou's equilibrium model, or any equilibrium reasoning that was founded on the view that prices would adjust to bring supply and demand together, shed light on such deep and prolonged depressions?

Specifically, it seemed implausible that individuals were unwilling to work at observed wages. And the fact that real wages were rising in some countries during the Depression, including the U.S., made equilibrium reasoning seem even more off base. The impact of the GT was partly due to the view that it provided a description of how depression could be so deep and last so long, reflecting the idea that negative expectations – animal spirits – reduced demand, which in turn reduced output and employment. Perhaps even more seductive, Keynes offered policy prescriptions for combating depression that not only promised recovery, but in some sense seemed too good to be true. The GT argued that depression was the result of insufficient spending, and that employment and output could be restored by increasing government demand for goods and services. In this sense, higher expenditures could make *everyone* better off. Fiscal policy seemed to offer a free lunch when households or

businesses were not spending "enough".

In the absence of any other economic theorizing that could provide a framework for analyzing the Great Depression, Keynesian economics ultimately became the only game in town. Moreover, following the publication of the GT, U.S. macroeconomic time series seemed consistent with the predictions of the GT. Specifically, World War II seemed to provide a major empirical victory for the GT. A central component of the Keynesian model is that deficient nominal demand is the key factor behind recession and depression, and that expanding demand from government increases employment and output. As government spending soared in the 1940s, rising from about 16 percent of GDP in 1939 to 48 percent of GDP in 1944, employment, which had been depressed for more than a decade, jumped sharply, with the unemployment rate falling from 17.2 percent in 1939 to 1.2 percent in 1944 [Margo, 1993, p. 43].

The presumption that higher government wartime spending expanded aggregate demand, and brought the U.S. economy out of the Depression, set the stage for increasing economists' confidence in the Keynesian model. And data from the 1950s and 1960s further solidified the apparent empirical support for the Keynesian model. The 1950s was stable and the 1960s boomed. The decade-long depression of the 1930s never returned, and even recessions, when they came, were relatively mild.

There was growing consensus that economic stability, featuring low and stable unemployment, reflected the expansion of government economic management consisting of activist monetary and fiscal policy. The 1960s were the heyday of the Keynesian Revolution, which seemed well summarized by Walter Heller, a University of Minnesota economist and adviser to President Kennedy, who coined the term "fine tuning" to mean the discretionary use of fiscal and monetary policy to keep the economy as close as possible to its "full employment" level. And many economists believed that the principles of the GT had conquered the business cycle, as unemployment fluctuated within very narrow bands. Between 1966 and 1969, unemployment ranged between 3.4 percent and 4 percent.

But perhaps the most fundamental component that fostered the longevity of the GT were the breakthroughs in econometric methods that started in the 1940s, shortly after the publication of the GT. These methodological developments were key in advancing the *qualitative* ideas in the GT into *quantitative* propositions. More specifically, whether a macroeconomic paradigm achieves long-run influence ultimately lies in how it can be transformed from abstract ideas to concrete quantitative applications. Kydland and Prescott's (1982) real business cycle model had so much influence because it came with a ready-made quantitative framework, featuring a method for approximating recursive equilibria, choosing parameter values, and comparing model economy simulated time series to actual national income and product

account data. For the GT, the econometric developments of the 1940s and 1950s provided a quantitative framework for showcasing Keynes's ideas and for developing a full-fledged quantitative Keynesian toolkit.

Much of the GT's impact was based on method, perhaps as much from this quarter as from ideas, despite the fact that there is virtually nothing in the way of methodology in the book. Beginning in the early 1940s, the foundations for modern econometric analyses of simultaneous equations models began to develop, including Trygve Haavelmo's 1944 paper which integrated more formally probability theory with econometric methods, with a focus on simultaneous equations that later earned Haavelmo a Nobel Prize. Just a few years later, the Cowles Commission published important monographs in econometric theory that would become true classics, including *Studies in Econometric Method* edited by William C. Hood and Tjalling Koopmans (1953). This volume included major pieces such as Herb Simon's "Causal Ordering and Identifiability", which still has considerable impact today, as it relates to the causal ordering that identify many systems in the VAR literature, and "The Estimation of Simultaneous Linear Economic Relationships" by Tjalling Koopmans and William Hood. A second volume edited by Koopmans in 1950, *Statistical Inference in Dynamic Economic Models*, contained classics on identification by Wald, Hurwicz, and Haavelmo, estimation, by Wald, T.W. Anderson, Koopmans, and Hurwicz, and precursors to issues about trends, including Hurwicz's small sample bias, and what is structural, including a classic by Koopmans.

These pathbreaking advances were central for the continuation of the Keynesian revolution and the impact of the GT, as they explicitly made it possible to take the ideas from the GT and make them concretely quantifiable. These econometric developments formed the basis of the main toolkit used in analyzing business cycles in the 1950s and particularly the 1960s. The large-scale econometric models, developed in concert with the Federal Reserve Board, MIT, with Nobel Laureate Franco Modigliani, and Penn, with Albert Ando, as well as the Wharton model under the direction of Nobel Laureate Laurence Klein, were impressive technical feats, as these models ultimately would include hundreds of equations, with each equation summarizing demand or supply behavior in some part of the economy. These models were used widely within policy-making circles and formed the basis of dozens of Ph.D. dissertations at top economics departments in the 1960s. Chances are, if you ask a macroeconomist who received their Ph.D. in the 1960s about their dissertation topic, they will likely say "I worked on the 'x' equation in the MPLS model".

The breadth of impact that these models had can't be overstated. Ed Prescott, an Assistant Professor at the University of Pennsylvania, and his Ph.D. student, Thomas Cooley, wrote papers on varying parameter regression [Cooley and Prescott, 1973;

Cooley and Prescott, 1976] to try to formalize the ad-hoc practice of add-factoring in these models, in which practitioners would subjectively adjust estimated equations, often by changing the constant term of the equation, depending on whether the forecast from that equation seemed implausibly high or low. These contributions by Cooley and Prescott are hard to fathom today, given both scholars' current views towards Keynesian macroeconometrics. The contributions by Cooley and Prescott are an important example of the interplay between the development of economic ideas and the associated quantitative applications of those ideas.

The large-scale models had the biggest impact among policymakers, and not surprisingly so. Time series during the 1960s seemed to be consistent with the predictions of the Keynesian model, there was a sense that fine tuning or more broadly, aggregate demand management, had conquered the business cycle, and the models were at the stage where they could easily be used to make unconditional forecasts as well as the more challenging task of conditional forecasting, in which policymakers would make forecasts under various "what if" assumptions, such as how much would the unemployment rate change if tax rates, or other policy variables, were changed? Quantitative analyses at virtually all central banks in advanced countries were largely based on large-scale, Keynesian, econometric models. Throughout the 1960s, the legacy of the GT was vibrant in and out of policy circles, as the economy continued to grow with remarkable stability. And for many observers, this stable prosperity was due in considerable part to the tenets of the Keynesian model.

To gain a better idea of how much the Keynesian model changed aggregate economics, note that it was almost radical in its departure from standard, classical economic thinking, which was founded on incentives, opportunity costs, and marginal choices. In the entire GT, we found only seven references to the word "incentive(s)", no references to the phrase "opportunity cost" and few references to "marginal productivity" outside of his discussion of classical economics.

4 The Decline of the Keynesian Model

By the early 1970s, macroeconomic time series in the U.S. and other economies began to evolve in patterns that were difficult to reconcile with the Keynesian model. And much like the criticism Keynes leveled at equilibrium theory for failing to provide a framework to make sense of chronically high unemployment in the 1920s and 1930s, the 1970s began as a decade in which empirical criticisms were advanced against Keynesian models. These critiques included the forecasting performance of the large-scale Keynesian econometric models, the increasing recognition that supply-side factors were central for understanding fluctuations, that Phillips curve

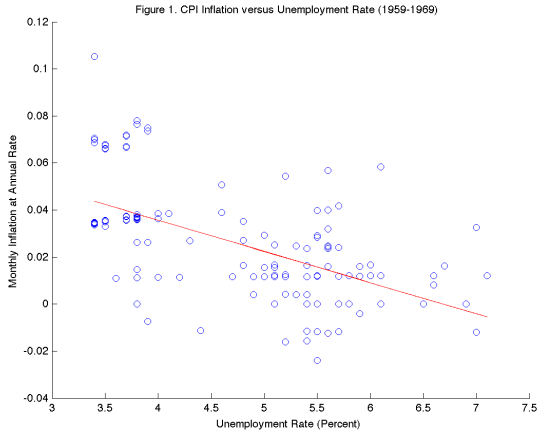
relationships shifted in ways that were inconsistent with the Keynesian model, and critiques regarding the theoretical foundations of the Keynesian model.

The first significant empirical criticism came from Charles Nelson's (1972) influential paper that showed that low-order integrated autoregressive-moving average (ARIMA) models produced lower mean square error forecasts than the large-scale Keynesian econometric models. This was particularly important, because ARIMA models do nothing more than generate forecasts from historical serial correlation patterns. This meant that a purely atheoretic model which did nothing more than exploit historical patterns captured in autocovariances was more accurate than the very detailed Keynesian models that were the industry standard. Nelson's work, and subsequent work on relative forecasting performance by others, including the pseudo-Bayesian VARs developed by Robert Litterman (1986), led to considerably less reliance on Keynesian models for unconditional forecasting.

Additional empirical challenges with the Keynesian model began to emerge. These included the fact that empirical relationships were changing in ways that were at variance with the Keynesian model. Perhaps nowhere was the breakdown in relationships more evident than in the Phillips curve. Figures 1 and 2, which are drawn from Atkeson and Ohanian (2001), demonstrate the significant changes in the relationship between unemployment and inflation that have occurred over time. Figure 1 shows monthly observations on CPI inflation and the unemployment rate between 1959-1969, the heyday of the Keynesian model. This relationship, which is the focus of Samuelson and Solow's (1960) famous discussion of the Phillips curve, shows a clear negative relationship between these variables, with a correlation of around -.6. This pattern was interpreted by some economists that unemployment could be permanently kept at low levels provided that there was at least some inflation. But this pattern changes substantially after the 1960s.

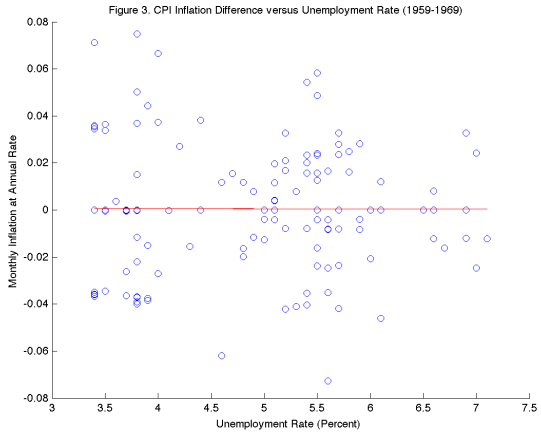
Figure 2 shows no relationship whatsoever between these variables between 1970-1999, as the regression line has a slope very close to zero. Some economists tried to salvage the Phillips curve by adopting a modification, based on the idea of a non-accelerating rate of inflation level of unemployment, or NAIRU. This suggested a relationship between the change in the inflation rate and the unemployment rate. But as figures 3 and 4 show, there is no systematic relationship between these variables either. Lucas and Sargent (1979) jumped on this empirical failure of the Keynesian labor market, much as Keynes had jumped on the apparent empirical failure of the Pigouvian labor market in the 1930s.

Additional evidence that challenged the Keynesian foundation of the dominance of the demand side of the economy is the empirical relationship between nominal prices and real output and real wages and real output over the cycle. An important



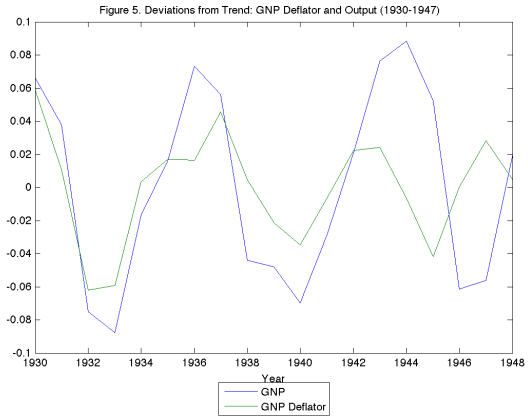
prediction of some classes of the Keynesian model, and one which was taken up more broadly in other theories, including those of Lucas (1972), is the procyclical behavior of prices. Figures 5 and 6, which draw in part from Cooley and Ohanian (1991), show the relationship between detrended real GNP and the GNP deflator between 1930 and 2010. Note that prices are indeed procyclical in the 1930s, which is consistent with the GT, and they continue to be procyclical through World War II, as the correlation between detrended output and prices is about .57 between 1930 and 1947. But after World War II, prices are countercyclical, with a correlation of -.24 between 1948 and 1999, and -.53 between 1970 and 2010. Note that changing the measure of prices to inflation does not change this very much, since the relationship is .18 between 1970 - 2010.

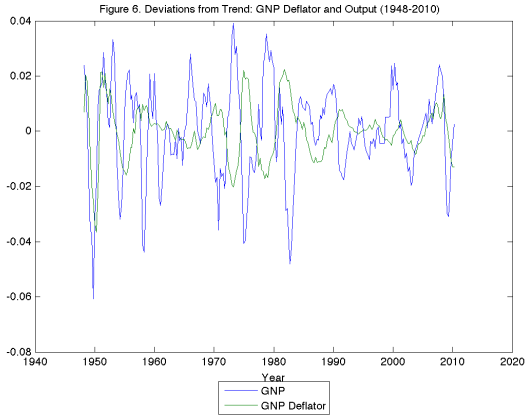
Figure 7 depicts the real wage, measured by real employee compensation, and



real GNP net of an HP trend between 1948 and 2010. These data clearly show a positive relationship, which indicates that when the economy is above trend, so are wages, and when the economy is in recession (below trend), real wages are also below their trend level. This stands in sharp contrast to Keynes's view regarding countercyclical real wages. It is interesting that the implied Keynesian pattern of the cyclicality of real wages was addressed early on by Tarshis (1939) and Dunlop (1938) who studied the cyclicality of real wages. Using annual wage data from the U.K. from 1860 to 1937 and monthly wage data from the U.S. from 1932 to 1938, Dunlop and Tarshis found nominal and real wages to be positively correlated over this period. In addition, Tarshis uncovered a negative relationship between real wages and hours worked in the U.S. during the 1930s.

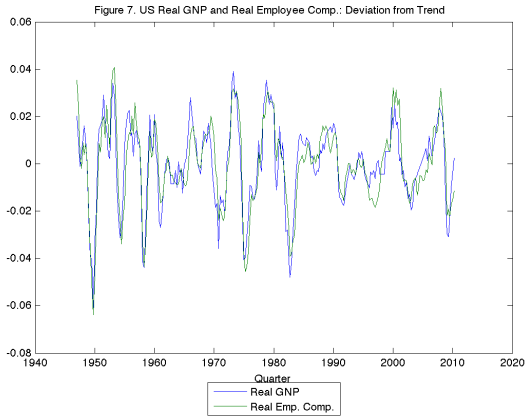
While the Tarshis findings appear to be consistent with the Keynesian model,



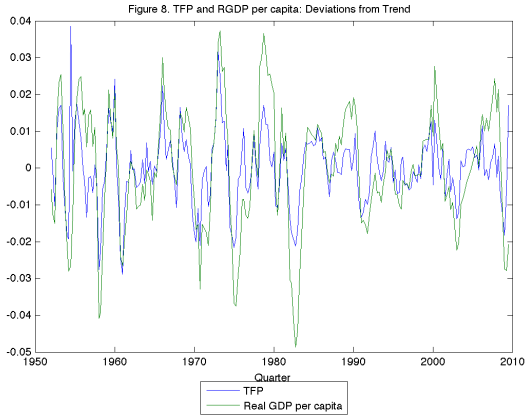


recent research paints a very different picture of this period. Specifically, Ohanian (2009) and Cole and Ohanian (2004) present theory and evidence that government cartelization policies were responsible for raising real wages and depressing the economy. Ironically, this cartelization view indicates that the depth and persistence of the U.S. Great Depression were because of activist government policies that tried to raise demand, and not because government stood on the sidelines.

The facts that prices are typically countercyclical, and that real wages are typically procyclical, suggests that a substantial fraction of fluctuations may arise from the supply side of the economy, which Keynes largely ignored in the GT. To address the importance of one supply-side component, Figure 8 shows detrended real GDP and detrended total factor productivity (TFP). The graph shows that TFP is clearly procyclical, as TFP is above trend when the economy is above trend, and similarly



TFP is below trend during recessions, with a correlation of .73 between these two series. Of course, the fact that TFP historically is procyclical and relatively volatile is what led Kydland and Prescott and the large body of research that followed to develop the real business cycle program, in which fluctuations arise from a source not considered in the GT.



Taken together, this evidence indicates that supply-side factors are quantitatively and systematically important determinants of business cycles. The growing recognition of the importance of supply-side factors, which increased considerably in the 1980s and 1990s, reduced interest in the Keynesian model, as it is largely silent about the supply side of the economy.

Economists also have critically examined detailed elements of the GT regarding the foundations of consumption and investment. The GT posited that consumption depended significantly on current income. Many developments of the Keynesian model simplified the Keynesian consumption function to just this single argument:

$$C = C(Y).$$

Friedman's permanent income theory (1957), however, provided a very different view about the determinants of consumption. Friedman's model connects closely to modern models of consumption, which stress the importance of intertemporal elements, the smoothing of temporary fluctuations, and the importance of wealth in determining consumption. Friedman argued that consumption was largely determined by permanent income, or wealth. Friedman's theory attracted considerable attention, as it shed light on what appeared to be an anomaly from the perspective of the Keynesian model. Specifically, the marginal propensity to consume was around one in the cross section, but was significantly less than one in time series observations. Friedman's permanent income theory is consistent with both of these relationships, as cross-sectional data tends to capture long-run features, while relatively high frequency time series captures short-run features. In time series observations, transitory income, which according to Friedman had little impact on consumption, is operative, and thus the regression coefficient in the time series will be biased downwards, which follows from the standard errors-in-variables problem in econometrics. In the cross section, however, transitory income becomes irrelevant and the marginal propensity to consume is significantly higher.

In terms of investment, Keynes spoke about the importance of animal spirits impacting the quantity of investment in physical capital. Many readers of the GT interpret this as the notion that expectations can change suddenly and significantly, which then leads to large changes in the quantity of physical investment. Keynes wrote in the GT:

"Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits - a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities" [Keynes, 1936, p. 162].

But is investment impacted in a quantitatively substantial way by large and sudden changes in expectations about the future? To address this question, we use historical data from the United States to construct Euler equation residuals under the assumption of perfect foresight. This provides a useful test of Keynes's animal spirits view, as the perfect foresight assumption means that investment takes place

in a deterministic environment in which those investing correctly see the entire future path of the economy. This extreme assumption regarding expectations is very different from the Keynesian view, in which expectations change suddenly and dramatically over time. Under the Keynesian view, the Euler equation errors should be very large and volatile, representing these large changes in expectations. Moreover, depressions should be periods with very large negative residuals, as this case represents negative expectations about future returns to capital.

To conduct this analysis, we use a standard model economy with separable utility between consumption and leisure, log preferences over consumption, and in which there is a Cobb-Douglas production technology. The Euler equation is:

$$\frac{\gamma c_{t+1}}{c_t} = \beta[r_{t+1} + 1 - \delta]$$

which yields the Euler equation residual:

$$\varepsilon_{t+1} = \frac{\gamma c_{t+1}}{c_t} - \beta[r_{t+1} + 1 - \delta].$$

We first consider the post-World War II evidence. In contrast to the Keynes view of large swings in expectations of investors, the Euler equation errors are small and appear to be uncorrelated. Figure 9 shows quarterly Euler equation residuals from 1947 to 2010. While Keynes provides no benchmark for understanding how big these changes should be, it seems difficult to interpret these changes as having quantitatively important effects. Of course, postwar fluctuations are small - but what about those during the Depression?

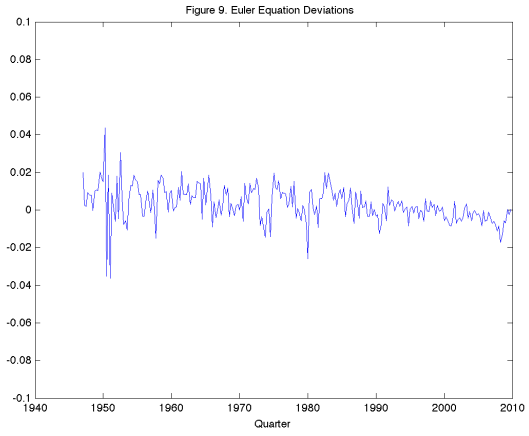


Figure 10 shows the Euler residuals for the Depression. The residuals are larger, but they are of the wrong sign. Specifically, the GT implies these residuals should be negative, indicating that investors expected low returns relative to the intertemporal marginal rate of substitution. Instead, the residuals are positive, suggesting that investors were optimistic in expecting higher returns than those that materialized.

5 Equilibrium Macroeconomics

The Keynesian paradigm dominated macroeconomics, particularly in policy circles, for more than 40 years. And despite the shortcomings of the Keynesian model noted above, there has been considerable effort involved at resuscitating the paradigm (see Gordon, 2009). But the Keynesian model as presented in the large econometric models, with hundreds of equations that were not microfounded, was not well suited for the theoretical developments occurring in the 1960s and 1970s in economic theory. Muth (1961) and subsequent research developed the theory of modelling expectations in dynamic settings. Lucas and Prescott (1974) and Mehra and Prescott (1980) showed how to integrate infinite dimensional economies with recursive methods to make it feasible to quantitatively assess fully microfounded dynamic stochastic equilibrium economies. And this all came together in 1982 with Kydland and Prescott's "Time to Build and Aggregate Fluctuations", which was about as far from the Keynesian world as you can get.

Kydland and Prescott's analysis was one in which fluctuations were entirely from the supply side of the economy; there was no mention of monetary or fiscal policy,

or unemployment, and in which the welfare theorems held, such that equilibrium allocations were Pareto optimal. The many innovations in Kydland and Prescott, including an algorithm to approximate the equilibrium, a procedure for choosing parameter values, and a procedure for comparing the model to the data, led to a paradigm shift. This work motivated a number of extensions of the Kydland-Prescott framework, including the incorporation of imperfectly flexible prices and wages such that the model could more closely feature Keynesian ideas (see Chari, Kehoe, and McGrattan (2000)). Much macroeconomic research today takes as a foundation the Kydland-Prescott model, even if the features of the model differ considerably from Kydland and Prescott.

Moreover, equilibrium macroeconomics has also addressed questions that previously were considered beyond its grasp. Specifically, equilibrium macroeconomic frameworks are now being used to analyze issues that largely led to the abandonment of equilibrium theory in favor of the GT, including major economic disruptions such as the Great Depression or World War II. And equilibrium models are generating very different answers for understanding these episodes than the GT.

In addition to the work on the severity and persistence of the Great Depression cited above (see Ohanian (2009) and Cole and Ohanian (2004)), more recent work has considered the economic boom that occurred during World War II. McGrattan and Ohanian (2010) study how various factors, including higher government spending, impacted the U.S. economy during World War II in a purely neoclassical model. They find that higher government spending did spur economic growth, but not through the channels emphasized in the GT. Rather, the enormous resource drain of government spending - which exceeded 50 percent of trend output at the peak of the war - led to higher employment and output through large wealth effects. Specifically, the size and persistence of the war reduced the present value of resources available to households for consumption and investment, which then led to increased employment under the assumption that leisure is a normal good. Thus, higher government spending also expands employment and output in the neoclassical model, but the welfare consequences of this spending differ remarkably from that in the GT. Specifically, higher wartime spending - which contributes relatively little to private consumption or investment - reduces welfare, whereas raising aggregate demand in the Keynesian model when the economy is below trend employment improves welfare.

6 Conclusion

There is no doubt that the GT was one of the major economic events of the 20th century, reflecting the genesis of the GT during the Depression, the subsequent evolution

of macroeconomic time series that seemed to support the predictions of the GT, and econometric breakthroughs that made the ideas in the GT quantitatively operational. From the perspective of these two latter events, Keynes was in the right place at the right time. However, this should not detract from the fact that Keynes produced a framework that provided economists and policymakers with a remarkably different way of assessing and fighting depression, which was in itself a major achievement. From this standpoint, the impact of the GT, which dispensed with equilibrium aggregate economics, was at least as important as the impact of Kydland and Prescott (1982), which at some level dispensed with Keynesian economics.

But some ideas from 1936 persist, at least in policymaking circles. In fact, some of the forecasting models utilized by the Federal Reserve are in many ways similar to the Keynesian models of the 1960s [Brayton, Levin, Tryon and Williams, 1997]. The notion of an inflation-unemployment tradeoff and aggregate demand management to stabilize the economy remain at central banks, and the Keynesian vision provides a well-established framework for carrying this vision on within the context of policies that tie central bank behavior to the joint mandate of promoting both low unemployment and price stability.

Because of this joint mandate, it is politically unimaginable that a central bank could ever respond to a crisis by indicating either that there was little they could do to increase output, or that attempts to do so might make matters worse. The GT will continue to have a large audience among policymakers as long as governments are pressed to boost nominal spending during periods of crisis, whether or not those efforts are effective.

7 References

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