Publish and Perish: Creative Destruction and Macroeconomic Theory

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Abstract

Macroeconomic theories of the 1980s faced accelerated depreciation when not sudden death. By contrast with econometrics and microeconomics and despite massive progress in access to data and the use of statistical softwares, macroeconomic theory appears not to be a cumulative science so far. When attempts are done to settle controversies by "nature" (testing the theories), they are designed to fail due to Gresham's law of selecting theories based on *too many* parameters, which are weakly or non-identified when testing them. Two examples are provided, one in growth theory and testing convergence, one in business cycles theory and testing inflation persistence.

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"Nothing is vanity; on to science, and forward!" cries the modern Ecclesiastes, that is to say Everyone in the world. *And yet, the cadavers of the bad and the lazy fall on the hearts of others... Ah! quick, quick a bit, over there; beyond the night, these future, eternal, rewards... do we escape them?...*" Rimbaud A. (1873), *A Season in Hell*, Lightning.

1 Introduction

Mainstream macroeconomic theories of the 80's (monetarism, real business cycles, fixed-price disequilibrium theory, *ad hoc* dynamic models not based on Ramsey (1928) optimal saving) all faced creative destruction. They belong to the history of economic ideas. They were replaced by the new-Keynesian dynamic stochastic general equilibrium (DSGE) theory in the 2000s. Controversies on macroeconomic theory did not go away: "*For more than three decades, macroeconomics has gone backward*" (Romer (2016), p.1). This paper investigates *why controversies are not settled in macroeconomic theory so far, despite creative destruction.*

Drakopoulos and Karayiannis (2004) and Duarte (2016) suggest to limit the call for Kuhn's scientific revolutions for explaining the creative destruction of paradigms. The creative destruction of short-lived attempts to expand knowledge, with limited scope of explanation and with fragile empirical validation, is not equivalent to a major scientific revolution.

Duarte (2012) initially put forward Blanchard's view that stylized facts "*do not go away*" as key driver of the new-Keynesian DSGE models' creative destruction of other theories. After detailed investigation, Duarte (2015) is more balanced. Stylized facts on business cycles remained controversial with trend versus cycle decomposition. Demand shocks versus supply shocks did not lead to clear-cut results. Duarte acknowledges that other factors than "facts" may explain the new-Keynesian DSGE theory takeover.

Juselius and Franchi (2007), Spanos (2009) and Poudyal and Spanos (2016) contrast a "theory first" or "pre-eminence of theory" approach (where facts do not go away, but *should* adjust to the theory) such as new-Keynesian DSGE theory versus cointegrated or Student's t vector auto-regressive models (C-VAR) "data first" approaches, where theory has to change due to econometric results found using data. Juselius and Franchi's (2007) replication of Ireland's (2004) real business cycle (RBC) model and Poudyal and Spanos (2016) replication of Smets and Wouters (2007) show how a careful investigation of the properties of time-series suggests to change the theory.

Colander (2009) asks why new-Keynesian DSGE theory is more successful as a theory-first approach than data-first approach of cointegrated vector auto-regressive models (C-VAR). He suggests that new-Keynesian DSGE theory may not require "judgment" and may be more fitted for natural selection in academic journals and the academic labor market.

Latour's (1988) approach suggests that long-lasting scientific controversies signal a failure to accumulate knowledge in ready-made science. Macroeconomic theory appears to be an extreme case, where data and facts seem to be unable to settle its controversies so far, so that other factors decide on what could be the prevalent theory at a given point in time (Colander (2009)).

Firstly, the object of study of macroeconomics is prone to controversy. Secondly, macro-econometrics faces more difficulties than micro-econometrics, with a difficult treat-

ment of endogeneity and parameter identification issues. Thirdly, there is a complementary between these prevalence of controversy in macroeconomics and macro-econometrics and the researcher's incentives to preserve the theoretical "discipline" of their theory-first approach while *deliberately forgetting discipline with respect to identification issues when using econometrics*. We relate Canova and Sala's (2009), Blanchard's (2016) and Romer's (2016) critique on identification issues of new-Keynesian DSGE models to Colander's (2009) researcher's incentives and career concern.

The theoretical discipline of micro-foundations is justified by the endogeneity of macroeconomic policy instruments leading to parameter identification problems (Lucas (1976)). Omitting the endogeneity of the policy instruments may lead to biased parameters of macroeconomic policy transmission equations. This endogeneity bias may change if the policy rule parameters determining the endogeneity of the policy instruments change. This mis-measurement of macroeconomic policy transmission mechanisms may lead to policy mistakes.

But micro-foundations do not solve all identification and observational equivalence issues when testing theory. Some micro-foundations correspond to *misspecified* models which do not fit the data at all. Some micro-foundations may imply *too many structural parameters* with respect to reduced form parameters (*under-identification*) of the statistical model supposed to test the theory. *Scientific discipline* is forgotten when using *ad hoc* exogenous auto-regressive forcing variables in order to force the fit of the "theory" to the persistence of observed macroeconomic time-series. Alternative theories suggest that these auto-correlation parameters are endogenous and depend on macroeconomic policy.

A macroeconomic theory-first approach is likely to select non-identified and weakly-identified ways of designing theories, of designing the way to test them and of selecting the data. The evolutionary fitness rule of successful theories attracts many allies among researchers; it is based on a simple idea: *Design "not even wrong" under-identified theories with too many parameters for testing them.* Controversies on parameters *cannot* be settled when they are not (or weakly) identified. These theories allow multiple interpretations, numerous variations and combinations in subsequent papers, controversies, citations and fame. Ockham's razor of parsimony of the number of parameters of a theory is not rewarding for academic careers. It removes too many opportunities of publications and citations.

"*The treatment of identification now is no more credible than in the early 1970s but escapes challenge because it is so much more opaque.*" (Romer (2016), p.1). In new-Keynesian DSGE models, equation are linearized with respect to variables, but they include reduced form parameters which are *non-linear* functions of preferences and technology structural parameters. These technicalities have been handled in several papers following Canova and Sala (2009). So far, they had no impact on changing the new-Keynesian DSGE theory.

We present two examples of identification issues which can be easily understood by undergraduate students in economics. The first example deals with optimal growth theory: testing the convergence hypothesis. The second example deals with business cycles theory: testing the new-Keynesian theory of inflation persistence.

Our plan is as follows. Firstly, we mention the accelerating depreciation of the macroeconomic theories prevailing 25 years ago. Secondly, when attempts are carried out to settle macroeconomic controversies by "nature" (testing the theories), Gresham's law selects macroeconomic theories that are designed to be based on weakly or non-identified parameters when testing them. Thirdly, two examples are provided, one in growth theory,

one in business cycles theory.

2 Ex-Fan of 80's: The Accelerated Depreciation of Macroeconomic Theories

2.1 Dead macroeconomic theories

It is the average fate of scientific papers to face a decay of citations. Two cases are in order. Either the citations' decay is related to the fact that a given area of knowledge is now in ready-made cumulative science. Researchers decided to expand the variety of knowledge elsewhere. Else, the citations' decay is related to partial or complete creative destruction of the knowledge brought by these papers. There is a graduation in order to evaluate how a particular macroeconomic theory dies, although a few one may resurrect. Besides citations' decay, a number of indicators may measure the lack of interest of theories: no use or mention in current research, no recent PhD thesis building on this theory, no mention in current policy advice argument, no mention in current master level textbooks, no mention in current undergraduate level textbooks, ... and finally mostly mentioned and cited by historians of economic thought.

We mention, *in memoriam*, four deceased mainstream macroeconomic theories of the 80s and a short obituary notice. In doubt, ask yourself. If a master student comes in your office and argues that he would like to do a PhD using the following 80s theories, would you accept to be his PhD advisor?

1. Monetarism

Monetarism stressed the importance of policy rules for monetary aggregates in order to fight inflation, based on an old economic idea: the quantitative theory of money, with already an impressive literature emerging in the 50s. It was American-based with a prominent Chicago Nobel prize winner with political clout, institutional support in the Fed, the Bundesbank, and other central banks. Monetarism is credited for the monetary policy success of the sharp disinflation of the early 80s in the US, the UK, and continental Europe. Since the 2000s, no PhD in monetary economics hired in a Central Bank research department refers to Friedman's monetarism. In Taylor (2001) interview with Friedman, the official obituary notice is short: "*the estimate of the velocity of money is not stable*" (De Vroey (2016)). A Taylor rule on the federal funds rate replaced Friedman's monetary rules. In the 80s, monetarists would have ironically grinned at forecasts (nobody made) of the death of such a powerful theory in the 90s. A resurrection of monetarism in the near future is unlikely. Quantitative easing seemingly led to negligible increases of inflation and of real output in Japan, US, UK, and the Euro-area in recent years.

2. Real business cycles

Kydland and Prescott's (1982) real business cycle (RBC) theory claimed monetary policy ineffectiveness while rejecting econometrics. It was referred to as « dark ages » by John Taylor. It was American-based with two future Nobel-prize winners. A bureaucratic labour market of policy makers may have killed RBC theory. The Fed and later the ECB and other central banks have a large market share of jobs for PhD's in monetary macroeconomics. It was not sustainable in the medium run to hire staff and consultants only able to produce variations of RBC denying any use of central banks.

3. Ad hoc rational expectations or Keynesian models not based on optimal savings

A large market share of macroeconomic models in the 80s were Keynesian or rational expectations models (for example, the over-shooting of exchange rate) not based on optimal savings. In the 90s, optimal savings based on the intertemporal substitution effect of the interest rate on consumption, with infinite (Ramsey) or finite horizon in overlapping generation models, turned to be of compulsory use in mainstream macroeconomic models. This was fostered by theories of endogenous growth, of the open macroeconomy, and of real business cycles. Their obituary notice mentions: either they were static or they lacked micro-economic foundations.

4. Disequilibrium macroeconomics assuming quantity rationing on goods and labor market

As a subset of the models of section 3, this theory assumed price rigidity with excess supply or excess demand using static models and econometrics. It was French and Belgium-based without a Nobel prize awarded. The obituary notice mentions: it did not find allies among US-based macroeconomists. Researchers and their PhDs shifted to endogenous growth theory or overlapping generation (OLG) models or macro-econometrics or real business cycles or microeconomics or retired.

Graduate-level macroeconomic theories which emerged in the 70s and flourished and prospered in the 80s faced accelerated depreciation in the 90s. By contrast, a few economists emphasized the surprising resilience of the 40s IS-LM model in undergraduate macroeconomic textbooks to understand economic policy during the 2007... economic crisis.

The explanation for this lack of cumulative knowledge is puzzling. Are modern macroeconomic theories only driven by creative destructions, by new theories, doomed to be destructed later on? As asset price bubbles, are they only driven by fads and fashions for a given generation of macroeconomists with a time-period of 25 years?

2.2 The new-Keynesian DSGE theory

Is the new-Keynesian DSGE theory the new paradigm of a scientific revolution? The new-Keynesian model is a bargain between leaders of opinions in the real business cycle group and in the new-Keynesian group between 1992 to 1997, at the expense of Friedman's monetarism. It is a combination of five existing elements:

(1) Kydland and Prescott's (1982) exogenous auto-regressive forcing variable, adding as many exogenous serially correlated forcing variables as time-series used in the estimation of new-Keynesian DSGE models.

(2) Calvo's (1983) staggered price-setting, leading to the new-Keynesian Phillips curve, where the expectation of future inflation is negatively correlated to an increase of the current output gap, as opposed to the accelerationist Phillips curve.

(3) Ramsey's (1928) optimal saving, where the future consumption is expected to increase following a rise of the real interest rate. The monetary policy transmission mechanism is based on this intertemporal substitution effect of the interest rate instead of the cost of capital.

(4) A Taylor (1993) rule: the monetary policy interest rate responds to inflation deviation from its target and to the output gap. Monetary aggregates are not necessary to explain monetary policy.

(5) Blanchard and Kahn's (1980) unique solution for dynamical systems, with the *ad hoc* assumption of the policy instrument (interest rate) and the policy targets (inflation and output gap) to be *simultaneously* forward-looking variables.

The core of the bargain was on agreeing to assume simultaneously assumptions (1) and (2):

On the real business cycle side, King agreed to include assumption (2) *ad hoc* price rigidity for a proportion of firms over time (Calvo's (1983) price setting), which the Real Business Cycles group had doctrinally refused to assume for ten to fifteen years before.

On the new-Keynesian side, Rotemberg, Woodford, and Gali agreed to include assumption (1) *ad hoc* auto-regressive and possibly negative productivity shocks (Kydland and Prescott (1982)), which the new-Keynesian group had doctrinally refused to assume for the ten to fifteen years before.

On these five compulsory elements are added a large number of variations (credit frictions, search on the labor market, open economies,...), which defines the field of new-Keynesian DSGE models. Because there is a large number of variations, some consider this approach as a paradigm. But is it a scientific methodological revolution equivalent to the Keynesian invention of macroeconomics? Instead of a revolutionary paradigm, it may be a *patchwork* of already existing elements that do not go together well, if the target is to explain the relationship between macroeconomic policy and macroeconomic variables and to advise policymakers.

As an example of elements that do not go together well, the combination of (4) and (5) with the *ad hoc* assumption of the policy instrument and the policy target to be *simultaneously* forward-looking variables led to the unbelievable mechanism of a *positive-feedback* policy rule in order to stabilize inflation. "*In new-Keynesian models, higher inflation leads the Fed to set interest rates in a way that produces even higher future inflation. For only one value of inflation today will inflation fail to explode.*" (Cochrane (2011)).

This *ad hoc* positive-feedback policy rule is the *opposite* of the negative-feedback mechanism of the two original papers. Taylor's rule (1993) is a negative-feedback rule leaning against inflation spirals assuming that inflation is backward-looking (Cochrane (2011)). Blanchard and Kahn's (1980) condition for a unique solution (determinacy) is a copy and paste of the unique solution of the optimal control linear-quadratic regulator (Vaughan (1970)) for optimal *negative-feedback* rules of *ad hoc* linear rational expectations linear systems. Blanchard and Kahn (1980) rename "costate" variables (policy instruments) of an Hamiltonian system in Vaughan (1970) "forward-looking" variables of an ad hoc linear system, and "state" variables (policy targets) of an Hamiltonian system "backward-looking" variables.

The new-Keynesian DSGE theory took over the four theories mentioned above. It contradicts characteristic features of each of the above theories, while picking in some cases some of their assumptions:

Monetarism: The new-Keynesian DSGE theory claims that monetary policy matters but not monetary aggregates. For the monetary policy transmission channel, it substituted a dynamic version of the quantitative theory of money (monetary aggregates have an effect on future output and prices) by the new-Keynesian Phillips curve. For the monetary policy rule, it substituted any type of monetary rule by the Taylor rule, using the interest rate as a policy instrument responding to the output gap and to the deviation of inflation from its target.

Real business cycles: The new-Keynesian DSGE theory assumes staggered price-setting and price rigidity. It states that monetary policy matters. It expands the number of auto-regressive shocks to be equal to the number of forward variables (instead of using only one measured time series of the productivity supply shocks). It claims some of the

shocks to be demand shocks. It uses econometric (Bayesian) estimation of some of the parameters instead of calibrating all parameters.

Ad hoc macroeconomic models without optimal savings: The new-Keynesian DSGE theory assumes that savings behavior is derived from Ramsey intertemporal optimization. In downturns, the poorer the representative household is and the lower its relative fluctuation aversion, the larger are his savings in order to get back to its equilibrium stock of wealth. In booms, the richer the representative household is and the lower its relative fluctuation aversion, the lower are his savings in order to get back to its equilibrium stock of wealth.

Disequilibrium macroeconomics: The new-Keynesian DSGE theory does not assume that there is disequilibrium in quantities (neither excess demand nor excess supply) on the goods and the labor market, although it includes Calvo's (1983) assumption that a proportion of firms exogenously face price rigidities in each period.

The new-Keynesian model is a bargain on two elementary theoretical assumptions between leaders of opinions in theoretical macroeconomics around 1997. This new model had no formal and mathematical difficulty, adding together components already available in the economic literature.

Most macroeconomists abandoned their former "school of thought" of the 80s. They were versatile and recycled themselves quickly to a new one. In despair of cumulative science, a few positivists may appeal to a nostalgia narrative: "There may remain a flavor of the spirit of 80s theory where we could decipher a far-fetched analogy, inheritance, influence in the new-Keynesian DSGE theory, with at least the reference to two common very broad stylized facts, price rigidity and monetary policy."

2.3 Facts that do not go away?

In order to explain the above creative destruction, Blanchard's arguments of "facts that do not go away" is challenged by a timing issue. The empirical evidence of monetary policy effectiveness and price stickiness was available at least in 1982, and not only in 1997. "Facts that do not go away" was not sufficient to change the point of view of macroeconomists in the 80s.

(1) Monetary policy is effective. Statistics on inflation, federal funds rate, monetary aggregates, output, and unemployment during Volcker's disinflationary policy 1980-1982 were available and mentioned in the economic policy debates.

(2) The stylized fact of staggered price rigidity was also known in the 70s and 80s. Go to a supermarket and check whether the prices of your favorite consumer goods change every week, even in the time of two digit inflation.

(3) The stylized fact that the econometric estimate of the velocity of money is not constant did not stop monetarism in the 70s and 80s.

(4) The stylized facts that do not go away of housing price bubbles and of financial crisis (Reinhard and Rogoff (2010)) were set aside of the consensus of the new-Keynesian DSGE synthesis before 2008.

3 Macroeconomic Theory and Tests

3.1 A question of purpose and design

Either macroeconomic theory need not, cannot, and should not be tested (1) or macroeconomic theory need, can, and should be tested (2).

(1) Microeconomic, macroeconomic, and general equilibrium economic theories are only deductive and normative theories, seeking the best allocations of resources, as a branch of applied mathematics. *Deductive* theories need not, cannot, and should not be tested. For nearly two centuries, many economists, including Marshall, Walras, Keynes, Debreu, and Austrian economists among others, did not design their theories in order to test them. Spanos (2009) describes this pre-eminence of theory approach.

(2) Economic theory is designed to face the challenge of statistical tests. It is then facing induction and shifts to positive economics. If an economist intends to test his theory, he needs to design it in such a way that parameters are identified for tests with an available data set. If at least two distinct sets of parameters of a theory predicts exactly the same observations ("observational equivalence"), there is an identification problem for testing the theory. This problem requires an additional theory which adds an identification restriction. The researcher also implicitly accepts that his theory may be rejected by the data and that theory should be modified accordingly.

These two views corresponded to a division of labor which prevailed until the 90's between macroeconomic theorists versus macro-econometricians, with each group being unable to master the distinct and highly specialized skills of the other group.

3.2 Controversies and tests of macroeconomic theory

Can observations of "nature" settle the macroeconomic controversies, as in other fields of science? After Latour's (1988) "*science in the making*" controversies, "nature" may finally settle the controversy where knowledge accumulates into Latour's (1988) "*ready-made science*" in the store of no-longer controversial "*scientific facts*".

In Krueger's (2003, p.189) interview, Malinvaud mentions: "*It was easy to study problems in microeconomic theory, which were well defined, and where a brain educated in mathematics could bring contributions. But macroeconomics was a more difficult domain to conduct research, because the questions were so involved and had many aspects. Let's say we were not on a clean land.*" Econometrics can be viewed as a branch of applied statistics. Microeconomics can be viewed as a branch of applied mathematics, dealing with economic choices based on applied optimization under constraints. Both of them are "*well-defined*" and likely to follow a cumulative path for knowledge similar to the field of applied mathematics.

Firstly, macroeconomic theory with its links to macroeconomic policy and politics, political economy, the choice of the design of market institutions, ideology and ideas, the vested interests of social groups, structural changes brought by technical innovations, by history and by the geopolitics of power and conflicts against nations is prone, not only to country-period specific knowledge, but also to unstable and non-cumulative knowledge and potentially never-ending controversies.

Secondly, it is more difficult to test macroeconomic theory than microeconomic theory for the following reasons: endogeneity, small samples and confounding and competing causal factors and explanatory variables, unit roots, and structural change.

(1) All macroeconomic variables are endogenous (except geography and rainfall or information far remote in the past). Testing macroeconomic theory faces the lack of identification, arbitrary identification restrictions, and weak identification using weak instrumental variables. Macroeconomic monetary and fiscal policy and their endogeneity and interactions with expectations complicate the estimations of macroeconomic policy effects.

(2) Small samples and population. When not pooling time-series cross-countries, macroeconomics does not benefit from large samples in microeconomic data. Structural change may limit the relevant time-dimension of time-series. Natural experiments between comparable countries in order to evaluate causality with the effect of a policy treatment are frequent but the sample of observations per country is very small. Statistical inference is therefore limited. One may compare North versus South Korea, East versus West Germany, Haiti versus St Domingue, but the number of observations is equal to two.

(3) Natural experiments are not done in isolation: there are always several confounding effects. The determinants of economic growth may go up to fifty factors, with up to a dozen of different measures of each of the factors (up to 500 explanatory variables). A government budget cut appears at the same time as a GDP expansion, because exports increased in the short run due to a devaluation of the currency at the same time (for expansionary austerity in Nordic countries in the 80s). In Ireland in the 1990s, labour market reform occurs at the same time as foreign direct investment low-tax incentives and European Union subsidies.

(4) Macroeconomic time-series may have large auto-correlation parameters close to one ("unit-root"). This may lead to spurious regressions. Those spurious regressions can be published on the ground that the statistical power of unit-root tests is small for small samples, such as forty years of quarterly data.

(5) The correlations between macroeconomic time-series are not stable for periods longer than 10 to 20 years (40 to 80 quarterly observations). This is caused by structural changes such as breaks in the growth of productivity and technical change, changes of exchange rate regimes, changes of regulations on capital flows and cross-border banking and finance (financial globalization and its reversal), changes of political preferences for macroeconomic policies along with the learning process of structural changes in macroeconomic policy transmission mechanisms, changes on trade agreements and current account imbalances, demographic transition, wars, increases of inequalities...

3.3 Pressure from Stata-evidence revolution

The prestige of "pure" macroeconomic theory has been challenged in the 2000s, because of a massive expansion of the data-first approach in macroeconomics and microeconomics. Starting in the mid-90s, the instant and free access of economic data on the internet (without the time-consuming issue of typing them), the ease of use of statistical software (surprisingly Stata), the increased computational capacities of the personal computers created a crowd of young applied econometricians. All graduate students in economics are able to obtain quickly statistical results which were primarily the production of near-genius Nobel-prize level researchers in the 30s-60s and then of engineer-like nerds using mainframe computers in the 70s-80s. In the 90s-2000s, this lead to a loss of market share of published articles in pure macroeconomic theory vis-à-vis applied or theory-with-estimation papers.

Empirical work and VAR are also fit for academic and central banks' research department careers, as much as new-Keynesian DSGE theory. A p-value below 5% leads to statistical significance is easy to reach with large sample and multiple testing. It does not require judgment nor tacit knowledge as a criterion for publishing a research paper (Wasserstein and Lazar (2016)). Colander's (2009) argument of "social replication" explanation for the success of DSGE models is not so obvious. It is only in central bank research departments and academia that both DSGE models and VAR models are used. In private banking sector research, new-Keynesian DSGE models are not used, whereas VAR are used for forecasting.

Probably half of the data-first published papers are related to a "simple" theory, seeking the statistical significance of the parameter between two variables or of impulses responses of vector auto-regressive models. CVAR is not a macroeconomic theory. It is a statistical method to test existing alternative macroeconomic theories against each other. There remains a need for CVAR "*to bridge the gap between theory and data by developing structural models beyond the ones associated with data-induced restrictions*" (Spanos (2009), p.11). Inventing these theories may be grounded on cost-benefit analysis (microeconomic foundations), on rule based behavior (agent-based models) or any other criteria different than only fitting CVAR. CVAR did not eradicated DSGE models nor conversely. But it added pressure on new-Keynesian DSGE modelers to find ways to claim their new-Keynesian DSGE models were as good at forecasting as CVAR.

3.4 Gresham's law of the theory of positive macroeconomics

An extravagant demand pushed toward normative theory to be identical to positive theory, not only in order to estimate the relations between macroeconomic variables as functions of structural parameters, but also in order that normative theory appears as a top-performing tool for short run forecasting. This put great stress upon data sets. Under such a pressure for quick and dirty empirical justification of new-Keynesian DSGE macroeconomic theory, an alternative empirical approach spread. It bargains between normative and positive economics, on the behalf of the requirement that the data and the world should normatively behave according to the theory but reach statistical significance for t-tests. The normative theory turns out to be positive economics, with a loose connection with the data, exploiting the pitfalls of the lack of identification, of weak identification and the numerous weaknesses of statistical data, methods and tests.

The most famous kick-off of this approach has been Kydland and Prescott's (1982) "Real Business Cycles". Calibration was invented because it was expected that econometric tests would reject the model. Calibration was another way to "adjust" with data and use statistics without econometrics. Their approach neatly avoided identifying and testing its structural parameters.

It is not necessary to follow such a radical approach against econometrics. The advantage of lack of identification or weak identification is that a researcher does not receive a signal from a statistical software when there is a parameter identification problem while the statistical significance of the parameters (using the t-test) may be obtained. A weakly and/or not identified theory is likely to be successful, because one is more likely to find statistical significance for the desired values of parameters (any value may actually be estimated in some cases). One find allies for a new theory if many others can find seemingly successful statistical significance tests using variations of your theory. This leads to Gresham's law for preferring non-identified and weakly identified theories.

Treating openly identification issues leads to modest and disappointing results. It may lead to the empirical rejection of new-Keynesian DSGE theory. It is *rewarding* for the scientific careers of theory-first macroeconomists *to escape* a detailed treatment of identification issues. While pretending empirical evidence, this strategy maintains theory-first tradition alive, doing *business as usual*, despite the growing crowd of applied economists, with these features:

(1) Claim the empirical evidence of some of the propositions derived from the axioms. The evidence is grounded on a biased use of the information in the data.

(2) Weight on deductive theory instead of inductive.

(3) Weight on normative *as if* positive.

(4) Coordinate on the axioms of the deductive theory colluding with a network of allies and involve a network of stakeholders, such as central bank research departments.

(5) Defend the axioms of the deductive theory using arguments of authority and hierarchy, ideology, political police rhetorics, in order to force dissenters out of the field of mainstream macroeconomics (Romer (2016)).

3.5 Opacity and "mathiness"

This normative-positive empirical approach may go hand in hand with Romer's (2015) "*mathiness*" blurring the interpretation and the understanding of the economic theory. We may define mathiness as ambiguous literary discourse, analogies and interpretation of formal mathematical models, with a narrative which describes something else or the opposite of the working of the formal mathematical model, to get it published, to sell the paper in broadening its contribution and its empirical evidence, to convince and to find new allies.

"*Mathiness*" in new-Keynesian DSGE modelling is related to technological progress: the development of the Dynare software in the 2000s. While easing access to DSGE simulations and Bayesian econometrics to new PhD students, many of this DSGE-born generation of macroeconomists did not learn the expertise and the modelling skills of small scale *consistent* macroeconomic models and the understanding of their mathematical solutions. This widened the gap between their literary fairy-tale narrative on the mechanisms underlying the impulse response functions of their DSGE models and their effective, obscure and messy mechanisms. These mechanism are related to several distortions with respect to perfect competition equilibrium, while omitting from time to time stock-flow accounting equations, assuming variables such as the capital stock are not observable. "*It is often extremely hard to understand what a particular distortion does on its own and then how it interacts with other distortions in the model.*" (Blanchard (2016), p.3).

3.6 Drivers of destruction

Will the future of the new-Keynesian DSGE theory in twenty years be different from theories of the 80s? Exogenous and endogenous factors may drive creative destruction.

(1) The demand for empirical validation and replication is likely to rise with more and more big data access. The combination of the core five compulsory assumptions of New-Keynesian DSGE theory is too fragile to meet this demand. The monetary policy transmission mechanism based on the quantitative theory with a constant velocity of

money was found to be a fragile theory with respect to data. Positive-feedback Taylor rules and the monetary policy transmission mechanism based on the new-Keynesian Phillips curve and the intertemporal substitution effect of the interest rate is *at least as fragile as monetarism* with respect to data. More and more of the weaknesses of its empirical validations will be detailed and repeated in referee reports.

(2) The *boredom* of repeating variations of useless and opaque results, with more and more knowledge on their empirical weakness hurts new generations. New generations prefer to explore new theories with not yet known empirical weaknesses with even more opaque identification issues, which is promising for agent-based models.

(3) Structural change in modern economies will lead to new questions. The answers of more and more opaque DSGE simulations adding more and more equations will be more and more expected to be disappointing. It is already the case with macro-prudential DSGE models.

(4) The increases of computational power of computers and big data access will allow to invent and use new statistical and simulations tools.

(5) The strength of authority and clique arguments supporting new-Keynesian DSGE theory weakens due to aging, retirements, decreasing returns to scale, decreasing returns to scope, decreasing support in academia and Central Banks. Political police rhetorical arguments enforcing *threats* that there is no job offer in academia or in central banks for alternative macroeconomic theory will no longer be credible. Recurrent dissenting papers by authorities in the field of mainstream macroeconomics (the latest ones by Blanchard (2016) and by Romer (2016)) will take over. Nobel-prize-awards will be a signal that it is time to nail the coffin of this fragile macroeconomic theory, after it provided work and careers to many researchers.

Political police rhetorics denying controversies, claiming forced consensus, dismissing dissenters to push them out of macroeconomic theory signals the lack of robust empirical validations of macroeconomic theory. These political police rhetorics lack credibility, because the ones claiming now a forced consensus will jump on to the next train of the future mainstream new way of writing macroeconomic theory.

A new type of dynamic stochastic macroeconomic model, with or without equilibrium, will emerge. At the beginning, it has to be rhetorically presented as a new consensus, upgrading new-Keynesian DSGE theory, in order to find allies during the transition. But *it will not be based on the combination of the five core new-Keynesian DSGE assumptions.* Thousands of new-Keynesian DSGE papers will belong to the history of dead economic theories. There is no guarantee, however, that the new theory will fit data and facts better.

4 Macroeconomic Theories with Too Many Structural Parameters.

4.1 A useful normative theory can be a useless positive theory

This first example of observational equivalence and an identification problem is obtained when the prediction of the theory implies a linear relation between two variables (y_t, x_t) with a number of reduced-form parameters β (in this case, equal to one) lower than the number of structural parameters of this theory. In the example below, the theory predicts that the sum of two structural parameters denoted (a, b) is equal to β:

$$y_t = \beta x_t + \varepsilon_{t+1} \text{ where } \beta = a + b \text{ and } \varepsilon_t \text{ is i.i.d. } N\left(0, \sigma_\varepsilon^2\right).$$

For a Marshallian *normative* theory point of view, this theory is *useful*, because one can explain comparative statics to undergraduate students in the economics tripos in Cambridge. A change of parameter *a ceteris paribus* (with b unchanged) and conversely has a different effect of y on x. The theory may satisfy *useful* criteria and principles from a *normative* point of view, such as microeconomic foundations or rational expectations.

From a Koopmans or Cowles Commission *positive* economics point of view, this theory is *useless*, because it is impossible to distinguish *using data* the effect of a (ceteris paribus) from the effect of b. It is also impossible to distinguish this theory from *an infinite set of alternative "observationally equivalent" theories* where the reduced-form parameter β is any function of any finite or infinite number of structural parameters. This is such an obvious case of an *useless* under-identified model with too many structural parameters with respect to the number of reduced form parameters, that it is *never mentioned* in econometrics textbooks.

There is observational equivalence for the reduced-form parameter function of two structural parameters when *at least* two distinct sets of values of structural parameters (a, b) provide the same prediction:

$$\widehat{\beta} = 1 \Rightarrow a = \widehat{\beta} - b = 1 - b.$$

For an estimated value of the reduced-form parameter $\widehat{\beta} = 1$, there are at least two sets of values, for example $b = 0$ and $a = 1$ or $b = 1$ and $a = 0$. In this particular case, there is an infinity of pairs of structural parameters (a, b) such that $a + b = \widehat{\beta}$ that predicts the same observations. To estimate one of the two structural parameters (a, b), the researcher needs *an additional theory justifying an additional identification restriction*, such as $b = 2$. Then, he can estimate the other parameter: $\widehat{a} = \widehat{\beta} - 2$.

A criterion to select among positive theories mentioned in Aristotle's physics, twenty five centuries ago, later mentioned by Aquinas in 13th century and then by Ockham in 14th century (Ockham's razor) is as follows: among all theories with exactly the same predictions, the simplest theory with the lowest number of parameters has to be chosen. *A useful normative theory can be a useless positive theory with too many parameters.*

The divergence between normative versus positive knowledge facing Ockham's razor is an old issue, much broader than macroeconomic theory. For "positive" science, God is an unnecessary hypothesis *for* the theory of celestial mechanics, according to Laplace's answer to Napoleon and *for* Darwin's theory of evolution. Aquinas (1920, part 1, Q.2) second objection on the existence of God is : "*Further, it is superfluous to suppose that what can be accounted for by a few principles has been produced by many. But it seems that everything we see in the world can be accounted for by other principles, supposing God did not exist.*". But this does not imply that God does not exist. God is a necessary assumption for "normative" or teleological theology (van Inwagen (2005), Glass (2016)).

To have a chance for this normative theory to be *empirically useful* as a positive theory, one needs to provide additional theory in order to know when identification restrictions are valid on available observations. In this example, an *additional* theory and information helps us to find some observations of an *available* data set where a structural parameter a is held constant while another structural parameter b is not constant (this subset of observations allows to estimate $\widehat{b}$) and conversely (the alternative subset of observations allows to estimate $\widehat{a}$).

The design of a positive theory has to go hand in hand with the precise design of the identification of its parameters in its empirical test, taking into account the availability of data. But academia may reward the quick and dirty "imprecise" positive validation of a fascinating normative theory.

4.2 Testing optimal growth and convergence

Testing the Ramsey-Cass-Koopmans optimal-growth model has been done in cross-country convergence regressions in the 1990s. The growth of gross domestic product (GDP) per capita is regressed on an initial level of GDP/head. A meta-analysis found the estimated parameter on average around $\widehat{\beta} = 2\%$ for the period 1960-2000 (Abreu *et al.* (2005)).

For the closed-economy model with a constant savings rate (Solow-Swan), the reduced-form convergence parameter β depends on four structural parameters: the elasticity of capital in the production function α, the growth rate of labour n, the growth rate of labour-augmenting technical change x, and the depreciation rate of capital δ (Barro and Sala-I-Martin (2004), p.112)):

$$\beta(\alpha, x, n, \delta) = (1-\alpha)(n+x+\delta) \text{ constant savings rate (Solow model).} \quad (1)$$

For the optimal-growth closed-economy model (Ramsey-Cass-Koopmans), the reduced-form convergence parameter β depends on six structural parameters: the same four technological parameters as in the Solow-Swan model and two utility parameters of the representative generations of consumers. Utility and preferences of generations of the representative consumer include the discount rate over generations ρ and the relative fluctuation aversion parameter θ (Barro and Sala-I-Martin (2004), p.111):

$$\begin{aligned} &\beta((\alpha, x, n, \delta), (\rho, \theta)) \\ &= \frac{1}{2}\left\{\zeta^2 + 4(1-\alpha)\left(\frac{\rho+\delta+\theta x}{\theta}\right)\left[\left(\frac{\rho+\delta+\theta x}{\alpha}\right) - (n+x+\delta)\right]\right\} - \frac{\zeta}{2} \quad (2) \\ &\zeta = \rho - n - (1-\theta)x > 0. \end{aligned}$$

In the case when $\frac{\rho+\delta+\theta x}{\theta} = \alpha(n+x+\delta)$, the optimal-growth convergence parameter is identical to the constant savings-rate convergence parameter (Barro and Sala-I-Martin p.109).

The discount rate over generations of consumers (ρ), can be set to zero. This identification restriction is assumed by Ramsey (1928) who argues against discounting future generations on an ethical principle of equality among generations. The growth rate of the population n can be easily computed. The growth rate of labour-augmenting technical change x could be measured estimating a production function, although the measure of the stock of any type of capital (physical, human, and so on) depends on uncertain judgments on the depreciation of the variety of capital goods δ.

Two structural parameters measure the curvature of the production function α and the curvature of the utility function θ. They measure the degree of concavity or the extent to which the production and utility function differ from a linear function. The first one (α) is the return to scale of any kind of capital that can be accumulated without instant depreciation. When the returns to scale tend to one, convergence is extremely slow. The second one (θ) is the relative aversion of fluctuations of consumption (the inverse of the

intertemporal elasticity of substitution). When the relative aversion to fluctuations tends to infinity, convergence is extremely slow.

The design of the convergence test does not allow to distinguish utility curvature θ from production curvature α. There is observational equivalence for a given convergence parameter $\widehat{\beta} = 2\%$: it may correspond to large returns to capital α with a low relative fluctuation aversion θ and conversely. Because of under-identification with *too many* structural parameters, the convergence hypothesis test *cannot* test the exogenous savings rate (Solow growth model) *versus* endogenous savings (Ramsey, Cass, Koopmans optimal growth model).

The key achievement of *normative* optimal growth theory (utility characteristics matter) is forgotten in the *positive* convergence hypothesis empirical literature, which is nonetheless described in textbook to be the closest empirical test of neoclassical growth theory (Barro and Sala-I-Martin (2004), p.466). The contribution of Ramsey-Cass-Koopmans-Malinvaud optimal growth theory is to state that utility matters due to preferences for smoothing consumption over time and generations. *Utility matters in normative theory but not in the positive convergence hypothesis test nor in growth accounting.*

4.3 Keynesian VAR versus new-Keynesian DSGE theory of inflation persistence

The structural or cointegrated VAR data-first approach (Juselius (2010), Spanos (2013), Colander (2009)) has been perceived as a challenge to proponents of the new-Keynesian DSGE theory. We present the simplest way to understand how new-Keynesian DSGE theory seemingly answered successfully to this challenge. New-Keynesian DSGE theory is able to claim that the accuracy of its forecasts can be at least equivalent to the one of VAR (Smets and Wouters (2007), Smets, Wouters and Linder (2016)).

We demonstrate that a Keynesian VAR and new-Keynesian theories of inflation-persistence are *observationally equivalent*. But the new-Keynesian theory includes at least *one more structural parameter which cannot be identified* than Keynesian VAR theory. As there is observational equivalence between these two theories, Ockham's razor selects the Keynesian VAR theory *which has the lowest number of parameters*.

Including forcing variables that are *serially correlated and non-observable* leads to a parameter identification problem. This identification issue helps to understand more precisely Romer's (2016) critique on dynamic stochastic general equilibrium (DSGE) models.

The Keynesian VAR theory of inflation persistence assumes backward-looking adaptive expectations so that inflation π_t is an auto-regressive process of order 1 (AR(1)) with an auto-correlation parameter λ and with a disturbance ε_t which is not auto-correlated over time ($\rho = 0$):

$$\begin{aligned} &\pi_{t+1} = \lambda\pi_t + \varepsilon_{t+1} \text{ where } 0 < \lambda < 1, \text{ where } \varepsilon_t \text{ is i.i.d. } N\left(0, \sigma^2\right), \pi_0 \text{ given} \\ &\quad \Rightarrow E_t\pi_{t+1} = \lambda\pi_t, \end{aligned}$$

where ε_t are zero-mean, normally, independently and identically distributed (i.i.d.) additive disturbances. An AR(1) is indeed a univariate VAR, where the vector is a scalar including only one time-series. The initial value of predetermined inflation π_0 is given. Inflation expectations are backward-looking adaptive: $E_t\pi_{t+1} = \lambda\pi_t$.

The new-Keynesian theory of inflation persistence is given by the new-Keynesian Phillips curve (Gali (2015)). For simplicity, assume that the output gap does not deviate from zero, and assume the identification restriction that the Taylor policy rule parameter measuring the response of the policy instrument (interest rate or the output gap) to the deviation of the policy target (inflation) is zero. Inflation is assumed to be forward-looking, without an initial condition for inflation, with potentially exploding dynamics with a growth factor $\frac{1}{\beta} > 1$ driven by inflation expectations $E_t\pi_{t+1}$. Inflation also depends on a backward-looking auto-regressive (ρ) "cost-push" forcing variable, with a given initial value u_0 :

$$E_t\pi_{t+1} = \frac{1}{\beta}\pi_t + u_t \text{ where } 0 < \beta < 1, \pi_0 \text{ unknown and endogenous}$$
$$u_{t+1} = \rho u_t + \varepsilon_{t+1} \text{ where } 0 < \rho < 1, \ u_0 \text{ given}$$

Blanchard and Kahn's (1980) unique solution for rational expectations models is such that inflation is anchored to be exactly collinear with the non-observable shock:

$$\pi_{t+1} = Nu_{t+1} = N\rho u_t + N\varepsilon_{t+1} = N\rho\pi_t/N + N\varepsilon_{t+1} = \rho\pi_t + N\varepsilon_{t+1}$$
$$\Rightarrow E_t\pi_{t+1} = \rho\pi_t, \text{ with } N = \frac{1}{\rho - \frac{1}{\beta}} < 0, \text{ where } \pi_0 = Nu_0$$

The proportional coefficient N is the slope of the eigenvectors of the stable eigenvalue (ρ) of the saddle-point equilibrium of inflation and the cost-push shock. The regression $\pi_t = Nu_t$ is predicted to be exact, with a coefficient of determination equal to 1 and with a negative slope ($N < 0$). Economic agents anchor the initial value of inflation on the initial value of the cost-push shock only if they can observe the cost-push shock.

But when testing the new-Keynesian theory, the cost-push forcing variable time-series is assumed not to be *measured (observable)* for the econometrician (e.g. Smets and Wouters (2007)). This is a *major* difference from the measured auto-regressive Solow residual of the aggregate production function used in real business cycles (Kydland and Prescott (1982)). Hence, the econometrician *cannot* run the simple regression of inflation on the cost-push shock ($\pi_t = Nu_t$). He cannot estimate N nor the explosive parameter $1/\beta$ created by inflation expectations. The econometrician cannot differentiate the Keynesian residuals ε_{t+1} from the new-Keynesian residuals multiplied by N: $N\varepsilon_{t+1}$ using the estimate of the standard error of the residuals of the regression of inflation on lagged inflation. He cannot use identification condition from the variance of residuals.

Inflation π_0 is given in the Keynesian theory. In the new-Keynesian theory, the observed initial value of inflation is obtained as an anchor on a cost-push variable $\pi_0 = Nu_0$ where the econometrician is unable to observe u_0. These two models for the initial value of inflation are observationally equivalent due to the lack of knowledge of the econometrician of u_0.

Table 1 sums up which variable is observed and which auto-correlation parameter can be estimated.

Table 1: The new-Keynesian Synthesis

	Observed	Not observed
Variable	Inflation	Cost-push forcing variable
Auto-regressive parameter	Cost-push shock: $0 < \rho < 1$	Inflation: $1/\beta > 1$

In the new-Keynesian theory, the unobserved auto-correlated shock is assumed in order to fit the observed auto-correlation of inflation time-series. Keynesian backward-looking inflation and new-Keynesian forward-looking inflation are then *observationally equivalent.* By assuming a non-observable exogenous serially correlated forcing variable, the new-Keynesian theory of inflation persistence achieves that it *cannot be tested* against the Keynesian VAR theory of inflation persistence.

$$\pi_{t+1} = \lambda\pi_t + \varepsilon_{t+1} \text{ observationally equivalent to } \pi_{t+1} = \rho\pi_t + N\varepsilon_{t+1},$$
where $0 < \lambda < 1$, $0 < \rho < 1$ and N cannot be estimated.

Using Hoover's (2015, p.3521) terminology on this case, the new-Keynesian theory assumes an "*ontologically*" independent serially correlated *latent* forcing variable. But if the Keynesian theory is an apt articulation of the causal structure, the auto-correlation ρ of the cost-push shock u_t is simply an *artifact* of the representation.

However, Hoover uses a distinct example where the number of identified parameters (equal to 3) is the same in the two representations which are observationally equivalent while being "ontologically" different. In sharp contrast with Hoover's example, the Keynesian theory has a *smaller number of parameters* than the new-Keynesian theory, which includes the explosive growth rate of inflation expectations $1/\beta$ that can never be estimated. Ockham's razor argument of parsimony is that the Keynesian theory with the lower number of parameters predicting exactly the same observations than the new-Keynesian theory should be selected. Adding an infinity of auto-regressive *latent* variables may be *useful for normative theory* and, at the same time, *useless for positive theory.*

The new-Keynesian DSGE theory of inflation persistence is *more complicated* than the Keynesian theory for another reason. The *negative* relationship between the slope of the stable eigenvector N determining inflation and the rate of growth of inflation fictitious expectations $1/\beta$ is the *opposite* of the economic intuition that inflation expectations dynamics are *positively* correlated with inflation dynamics. The larger the explosive growth rate of fictitious expectations (the larger $1/\beta$), the lower is inflation, because the slope of the eigenvectors N decreases. An infinitely explosive growth rate of inflation fictitious expectations process ($1/\beta$ tends to infinity) leads to zero inflation.

If ever the inflation expectations fictitious dynamics is not explosive: $0 < 1/\beta < 1$, the new-Keynesian theory predicts the indeterminacy of the initial condition of inflation. In the particular case where the inflation expectations are not explosive and exactly equal to the auto-correlation of the non-observable shock ($0 < 1/\beta = \rho < 1$), inflation tends to infinity, because the slope of the eigenvector N tends to infinity. By contrast, in this case $0 < 1/\beta = \rho < 1$, there is no longer the identification issue raised by Fève, Matheron, Poilly (2007) for the auto-regressive model with auto-regressive residuals and predetermined (backward-looking) inflation:

$$\pi_{t+1} = \lambda\pi_t + u_{t+1} \text{ where } 0 < \lambda < 1, \text{ and}$$
$$u_{t+1} = \rho u_t + \varepsilon_{t+1} \text{ where } \varepsilon_t \text{ is i.i.d. } Normal\left(0, \sigma^2\right), \pi_0 \text{ and } u_0 \text{ given.}$$

Smets and Wouters (2007) expand the above identification issue including six other time series besides inflation. These seven time-series are all related to seven auto-regressive exogenous forcing variables. Four exogenous auto-regressive parameters of

these forcing variables have auto-correlation coefficients estimated to be close to unit roots. This implies a very high goodness of fit of the estimation (a coefficient of determination R^2 close to one). The contribution of other parameters and other variables in the model is likely to explain a very small share of the remaining unexplained variance. They may over-fit the data while picking a few specific observations. One may wonder whether the empirical validation of their DSGE model is close to be *observationally equivalent* to the auto-correlation coefficients of seven macroeconomic time-series. This allows the authors to claim an overwhelming goodness of fit of their new-Keynesian DSGE model. Normative DSGE theory turns to be a top-performing theory for short run forecasting.

Once the cost-push shock is measured by an economic time-series, instead of being computed by the auto-correlation of residuals of the inflation equation, the identification issue vanishes. One can test the new-Keynesian theory versus the Keynesian theory of inflation persistence. Firstly, test that the regression $\pi_t = Nu_t$ should have a perfect fit $R^2 = 1$ and, if not, the econometrician tests that its residuals are not auto-correlated. Secondly, the econometrician performs tests of the statistical significance of the hypothesis of a negative sign of parameter $N < 0$ and the statistical significance of the test of the null hypothesis of an out-of-equilibrium exploding expectations parameter $1/\beta > 1$, having estimated the auto-correlation parameter of inflation ρ and its standard errors. These demanding tests are likely to reject the new-Keynesian theory of inflation persistence.

Under-identification is systematic in new-Keynesian DSGE models: *several structural* parameters are related to a *single reduced-form* parameter in a non-linear way in new-Keynesian DSGE theory. Consider that the output gap denoted x_t is no longer equal to zero in the new-Keynesian Phillips curve (Gali (2015)):

$$E_t\pi_{t+1} = \frac{1}{\beta}\pi_t - \frac{\kappa}{\beta}x_t + u_t, \text{ where } 0 < \beta < 1 \text{ and } \kappa > 0.$$

The estimated reduced-form parameter of the slope of the new-Keynesian Phillips curve which relates inflation to marginal cost or to the output gap (denoted κ) depends on four structural parameters: the representative household discount factor β, the household elasticity of substitution between each differentiated goods ε, the measure of decreasing returns to scale of labor in the production functions of the firms α, and the proportion of firms who do not reset their price each period θ (Gali (2015)):

$$\kappa(\beta, \varepsilon, \alpha, \theta) = \frac{(1-\theta)(1-\beta\theta)(1-\alpha)}{\theta(1-\alpha+\alpha\varepsilon)}.$$

The new-Keynesian Phillips curve estimates κ, but not $(\beta, \varepsilon, \alpha, \theta)$. DSGE modelers select values for $(\varepsilon, \alpha, \theta)$ identical to ones of the first DSGE paper which selected them. This does not matter. These values match the estimate $\widehat{\kappa}$ for calibration and simulations as well as an infinity of other values of these parameters provide exactly the same κ and the same impulse response functions. The discount factor β appears in other equations, so changing it may change the simulations. Finally, some researchers claim that the proportion of firms who do not reset their price each period is endogenous and depends on monetary policy rule parameters. The parameters θ and $\kappa(\theta)$ face the Lucas critique.

The instability of the velocity of money for the monetary policy transmission mechanism was the argument to abandon monetarism. Mavroeidis *et al.* (2014) surveys the instability of the estimates of κ, which is the key parameter of the monetary transmission mechanism of the new-Keynesian DSGE theory. Will the new-Keynesian DSGE theory of monetary policy avoid the fate of monetarism?

5 Conclusion

Our point is not to promote data-first against theory-first, but an *honest* balance between theory and data, as proposed by Spanos (2009). This leads to *modest* but *robust* empirical results, once identification and weak identification issues are taken into account. A theory which has not too many parameters has more chances to last than a theory based on specific micro-foundations involving several non-testable structural parameters and unexpected sign prediction, such as the new-Keynesian Phillips curve. Modest and robust results are not demanded by top academic journals. They are not rewarding for researchers.

As a consequence, testing between macroeconomic theories in order to settle controversies has made very little robust progress. For this reason, new-Keynesian DSGE theory is likely to face creative destruction as it happened to theories of the 80's.

A first cost of the new-Keynesian DSGE theory is related to a bias in the allocation of talent. A "*forced consensus*" emphasizes that there is no alternative on the job market for current PhD candidates in macroeconomic theory than writing new-Keynesian DSGE models. Skeptical PhD candidates with alternative ideas, in particular women, shift to microeconomics or econometrics.

A second cost of the new-Keynesian DSGE theory is that, by its recurrent attempts to force consensus while avoiding to consider identification issues in empirical tests, it maintains macroeconomic theory as a *science in the making*, fostering endless controversies. Macroeconomic theory does not accumulate at least a few modest and robust results into *ready-made science*, in order to complement, if possible, the resilient undergraduate IS-LM model.

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