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Equilibrium Models of Macroeconomic Science: What to Look For in (DSGE) Models?

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22. February 2014

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ABSTRACT

Models in macroeconomic sciences are designed with the aim of understanding and then simulating the real world economic and monetary policy making. There has been a considerable debate over how to model the real world economic phenomena, and how correctly those models allow explanations of general equilibrium; that is, whether the models with their assumed parameters are able to expound on critical aspects of monetary policy making. Some models are structured to provide naïve explanations of the monetary policy process, while others are higher order complex models that attempt to elucidate the dynamicity of economic equilibrium. Dynamic Stochastic General Equilibrium (DSGE) model is one of such a complex model which has found the flavour of the time following its rapid adoption by Central Banks around the world. But strong contentions rebate the usefulness and question its effectiveness over other standard tools of macroeconomic and monetary policymaking process. Many scholars debate that DSGE models are far from perfect, to render it efficient in public policy making, although its adoption has been one such phenomenal. This paper aims to discuss in some detail about such debates relating to the contentious issues which arose on account of the failure of DSGE models to effectively detect the recent financial crisis the subprime of 2008. Hence, the present study revolves around a formal analysis of the epistemology of econometric modeling involving complex dynamic systems in real world policy making, and discusses whether if new models like DSGE could in fact help explain general equilibrium, or if they fail, then what to look for in their failure.

1. Introduction

Dynamic General Stochastic Equilibrium (DGSE) simulations succeeded other applied general equilibrium models as an instituted model during its inception in the 1990's. It was developed as a policy making tool with an eye toward efficient decision-making by the Central Banks who readily endorsed the model during the late 1990's. Similar in structure with respect to the first generation RBC models which was a fusion between growth and business cycle theory (See Kydland & Prescott 1982), and which incorporated shocks and frictions (Galí & Rabanal 2005), DSGE models are not entirely

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different, and yet they have definite microeconomic foundations. DSGE models rose into prominence following their adoption by the European Central Bank, and by many other central banks around the world having developed their own versions of these models (Tovar 2008). Stochastic models of general equilibrium those related strictly to the DSGE framework although does not rigorously constitute the core forecasting approaches adopted by the central banks as yet, nevertheless, they are applied for formal policy analysis and tools for forecasting and predicting the impact of policy changes. Most macroeconomic models are designed with the aim to stabilize the real economy (price stability), and keep inflation under control. Models are systematic representations of reality, or rather, instruments to simulate and understand the nature of real world workings. Although the debate about which models to adopt and whether to adopt any policymaking instruments if at all to influence the economy, is though an old question, the new question as if at present which is still unresolved is, perhaps, whether if there is a general positive consensus about the use of monetary policy instruments to stabilize the economy (following the resurgence of New Keynesianism). The distinction in thoughts regarding the role of monetary policy in economic stability is a long-run problem itself, with division of opinions among the "monetarists" and the "Keynesians". Monetarists did not see price control or other means of non-monetary interventions to tackle inflation as a viable model to stabilize the markets[2], whilst, the Keynesians believed that public policies (fiscal) do modulate aggregate demand and have bearings on inflation and output. During the 1950's-60's, the problem seemed twofold–should money supply be moderated? Should money demand be modulated? These old debates have now been replaced by new thoughts following the adoption of rational expectations theory and then the Real Business Cycles. The role of monetary policy in fact does matter, as the theory of monetary neutrality was disputed by Romer & Romer (1989) and which furthermore established the role played by Federal Reserve Bank in setting monetary policy goals or responding to declining output and employment (Mankiw 2012). Nevertheless, short-run non-neutrality of money has been established by several studies which yet again confirmed the validation of classic studies on monetary policies by Friedman & Schwartz (1963). It appears though that following past several ones while facing up to the present financial crisis, there is little if any doubt about such an accord. As Milton Friedman (1968) expounded on the issues about the wider agreements which existed regarding the major roles that economic policies or rather monetary policy should play, Friedman wrote—

> "There is wide agreement about the major goals of economic policy: high employment, stable prices, and rapid growth.........There is least agreement about the role that various instruments of policy can and should play in achieving the several goals."

<div align="right">--- Friedman (1968)</div>

How true in fact, how much realistic it is that there is little if any disagreement about the role which economic policies are supposed to play in the economy; i.e., to sustain high employment, fuel growth and maintain price stability[3]. But what Friedman had perhaps meant by his latter statement, can be reduced so as to mean that— there exists

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[2] http://www.econlib.org/library/Enc/MonetaryPolicy.html
[3] See for instance, the core objectives of the ECB at
http://www.ecb.europa.eu/mopo/strategy/pricestab/
html/index.en.html

divergence of opinion and discord about the role of policy instruments which are adopted by policy makers toward achieving those goals. In effect, the above statements do confirm the implicit interrelationships between at least the three macroeconomic variables; (a) employment, (b) price (inflation) and (c) growth. And then, the extrapolative one− that is, how monetary policy can in fact contribute toward such stability in order to achieve the major goals in economics (as enumerated above), and in what way should it be conducted in order to render it beneficial. Undeniably, it is now evident that *stability* is the most fundamental goal of all economic policies and to realize these objectives, policy makers require efficient tools and frameworks to achieve "stability" in price. Most central banks conduct their monetary policy toward stabilizing the economy, or forecast and extrapolate any future "instabilities". However, unlike other central banks, the modern European Central Bank (ECB) do not have a strict inflation targeting guideline to follow, but they have a flexible inflation targeting framework in practice wherein the primary objective of the bank is to oversee price stability in a monetary union(Weber 2012). This is relevant with respect to the Central Banks' adopting stochastic dynamic models to understand general equilibrium(or stability), and that the rationality behind the ECB having adopted the DSGE framework for their core policy analysis is, for the reason− to forecast unexpected shocks and to understand the evolving behaviour of the economy as a whole. Hence, DSGE approaches refer to holistic approaches in dealing with economic instability. But, there in fact, are some mounting issues and challenges surrounding the use of these models by the central banks (Tovar 2008). There also persist problematic matters related to the fact that how correctly DSGE models can allow explanations of the general equilibrium? As there still remain lack of consensus regarding the use and applicability of DSGE models for macroeconomic policy making, this paper attempts to underline the raucous debate over use and adoption of unorthodox models deemed to be *imperfect* for macro-policy analysis (Faust 2012). Before one should attempt to address the core issues and problems entangling the global economy, one must be able to, in such regard as it is hence when pertinent, to address issues and challenges concerning how to approach such problems entangling equilibrium matters in macroeconomic dynamics; what specific models, tools and techniques should be adopted to deal with such problems? Equilibrium models of business cycle have been one of the primary issues of considerable debate among scholars and policy makers. The explanations sought by them to explain the unexplainable causes of fluctuations in real output not attributable to the available factors of production (Lucas 1975) have led experts to seek for causes which they assumed must be those involving random shocks to the economy. Hence, the current discussion revolves much around the *rationalization* of models which would enable our understanding of economic (business) fluctuations (instabilities) to the fullest extent.

  This paper henceforth, seeks to discern the real equilibrium conditions of the economy for instance; what is the foundation of economic equilibrium which demands such models? Following this, the paper moves on to the discussion about the legitimate conditions for a model that is likely aimed to deal with such equilibrium issues in monetary policy making employing dynamic models which are stochastic in nature. Stochastic models are employed to study and analyze economic fluctuations in discrete time series. Finally, the analysis attempts to shed some light on the aspects of modeling innovative models and what to look for in such models when they fail. In essence, what does models generally tells us? And then, how to interpret the results derived from such? In the following sections, the discussion begins with a short discourse about agent expectations and behaviour and how they could affect market price. Following this, the

paper attempts to address the core issues of this analysis which are— dealing with complex data, the concerns regarding model design, their usefulness and their implications. Thus, the debate revolves around the general theme of this paper which is related to such contentious issues regarding the validation of adoption of DSGE models as means of tools for policy analysis and practice.

2. Rational Expectations & Price Theory

The assumption of rationality in economics is itself by far the most speculative theory in practice since it is hard to assume that all agents are always rational. Although some assumptions about agent behavior are necessary in order to construct a dynamic stochastic model, ultimately, the goal is to draw concrete conclusions from the data analyzed and then compare how reasonable the model is with respect to the real economic system. The material theme for argument regarding Classical models and Keynesian models originate from the old debate about the nature and behaviour of prices, and so forth, from the behaviour and expectations of real agents. Classical macroeconomic theorists consider that prices were flexible, whilst Keynesian theory centers on the concept that prices are sticky, non-flexible and agents require to intervene to equilibrate prices. What the agents might expect in the long run is that– how much they are informed about the future (the power of prediction and forecasting), since, expectations are nothing but informed predictions of future events (Muth 1961). A little more precisely, the point is to determine how far they are rational, which means; how much their predictions about the future outcome can go right or wrong. Herein, the point of contention lies between the subjective probability distribution of outcomes and objective probability distribution of outcomes; the subjective being referred to as– 'expectations' while the objective is about the predictive power from reasoning and analysis, or say, of models (technical competence of a model). In similar import, these models attempt to study the nature of adaptive expectations (Nerlove 1958) of agents who hold expectations about the future value of their labor, capital and assets, while at the same time they tend to adapt according to the available information and the environment; in effect, they are assumed to be rational. Agents tend to maximize their expected utility, while at the same time; they assume some degree of uncertainty associated with the outcomes of their decision-making process when such decisions are made under risky or tentative situations. Most assumptions can be modeled on risk-neutral or risk-seeking individuals who assume variable degrees of risk, and base their expectations on increasing marginal utility, but what about those risk-averse individuals who generally assume intertemporal constant utility? How to model individual choice, preferences and future actions of individuals who are (mostly) risk-averse? Which is easier to model? Naturally, a generalization of all economic agents' utility maximization effort is necessary with the view that on average, most individuals are rational and would make rational decisions (which in practice is not so). Generalizations about how people's expectations about the future might determine or influence business cycle hence is the primary goal of DSGE models which also takes into account the rational expectations theory. They also have future expectations of outcomes that nevertheless aim to maximize their own expected future utility. Equally factual it is that, those expectations about the future scenarios do motivate present behaviour and actions (Gertchev 2007). In some respect, DSGE models attempt to simulate how expectations may evolve over time. But in practice, do they really? Forecasting involves modeling of future expectations. There is a definite relationship between formation of prices and formation of expectations. Expectations have an effect on the formation of prices although expectations may be random and there is variable degree of uncertainty associated with

human expectations. When assumptions about the future expectations in "price" development appear to be unreasonably founded, agents tend to adapt on account of errors in expectations (Gertchev 2007); they try to be more *rational*. Agents adapt; and they *learn* to be rational. However, if they repeat their mistakes time and again, they are *irrational agents*. Therefore, it is unlikely that one would simply discount errors in future if one suffered from such in the past. Errors in judgment, choices and decision-making help agents to learn from those and adapt as they might be. This nevertheless, is also the fundamental basis of the theory of rational expectations. The theory of *rational expectations* therefore has become the standard model in orthodox economics. However, this hypothesis–the formation of expectations is criticized by Gertchev (2007) who contend that expectations fail to exert influence upon economic phenomena. This is partly a mistaken assumption to which I lend my slender disagreement. Expectations do affect economic phenomena; i.e., firms use information about volume expectations to adjust to production schedules (Hill & Jones 2004). Recall that Muth (1961) has also called expectations 'rational', and rational they are in that sense—that they are on average precise, but may go wrong. The probability that they might go wrong is the one of the foundational basis of rational expectations theory. In public policy management, policy makers aim to formulate novel models to simulate and forecast future (evolving) agent behaviour, actions and expectations based on their present assumptions about future expectations. That is, how expectations might change, and what could bring about those changes in agents' future expectations? Expected changes in price movements although may be to a certain extent non-deterministic, but informed forecasting may make a difference. Insofar, forecasting models deals with uncertainty, expectations formation and (price) prediction. Central banks employ forecasting tools which help them to model future trends in inflation, demand and consumption. Most central banks respond to inflation to stabilize the economy, whereas in response to inflation, they target price (CPI based targeting policies). The models they adopt for their monetary policy process are generally grounded on the principles of welfare function through policy interventions. They employ traditional models for short-term forecasting which do not include assumptions about agent preferences. Central Banks in their business of inflation targeting (Bernanke & Mishkin 1997) to stabilize the economy tend to keep an eye on the unemployment level as well. Monetary policy intervention, or more so, the demand-side intervention even in free market economies should not be taken up as lightly as any lack of it which might worsen any prevailing unemployment levels. Sitting back and doing nothing except watch away the economy plunge into doldrums is contemptible than to undertake some sort of policy interventions to contain a crisis. This reminds us of about the Great Depression when the US economy was in acute crisis characterized by unusually high unemployment rate and highly depressed income levels (Mankiw 2006). Government interventions guided by Keynesian macroeconomic policies helped revive the economy and saved capitalism from collapse. When we faced another similar economic crisis during the summer of 2008, in magnitude not less than that of the previous one, for the economists, is was even a bigger challenge, for since, the present economy is highly leveraged and financial markets are weakly regulated (Solow 2010). And it was again New Keynesian macroeconomics which was called for action to help stabilize the economy. In lieu of Keynesian economics, *public policy* hence is the cornerstone of effective governance; aka management of national resources, inflation and output.

The Realms of Macroeconomic Models

Taylor Rule   Productivity

Inflation   Output

Shocks

Frictions

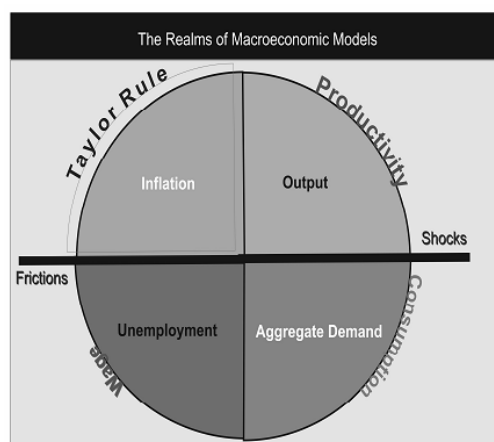Unemployment   Aggregate Demand

Wage   Consumption

Fig. 1 Macroeconomic Variables

However, the growing interest in new Keynesian macroeconomics following the financial crisis of 2008 has led to opposing views on the renewed interest in government policy interventions following Federal Reserve's active monetary policy mediations to contain the subprime crisis. Some authors criticize that this renewed interests in New Keynesian macroeconomics is extraneous; the New Keynesian models do not fit enough to be useful for policy analysis (Chari, Kehoe & McGrattan 2000). Nevertheless, Policy makers are in search for effective tools and policy models which invariably emphasize the importance of equilibrium in the economy, as well as, to forecast accurately, any stochastic deviations from it (disequilibrium).

In the realms of macroeconomic domain, thus, models play an important role in monetary policy advice and outcomes. Models help forecast output growth, inflation trends and fluctuations in aggregate demand. In effect, central banks' inflation target follows Taylor type rules to set interest (policy) rates in the long run. The upshot is that, the New Keynesian macroeconomics favour government policy interventions to oversee stability and manage unemployment rate to boost aggregate demand when there occur shocks to the economy. New Keynesian DSGE models herein find favour since they employ nominal frictions to mark-up wage and price stickiness, and among other variables, the model applies unexpected shocks which drive movements in output, investment, consumption, hours worked, wages, and unemployment to examine the impact of sudden monetary shocks to the economy. The interactions between real output, aggregate demand, real wage and price (inflation-indexed to Consumer Prices) is of prime importance since, changes in inflation horizon and output growth would be reflected on the costs faced by firms and also on the households which adjusts to the new settings. This also pertains to the Phillips curve which signifies the relationship between inflation and unemployment—decrease in unemployment rate increases inflation; which simply means that, deflation is bad for the economy. However, Phillips curve failed to explain for the persistence of high inflation and concurrent prevalence of high unemployment rate, a phenomenon called stagflation. In similar tune, following the Subprime crisis, there prevailed a more dreadful environment characterized by a persistent low inflation and high unemployment rate in the US, which actually corroborates Phillips curve yet again.
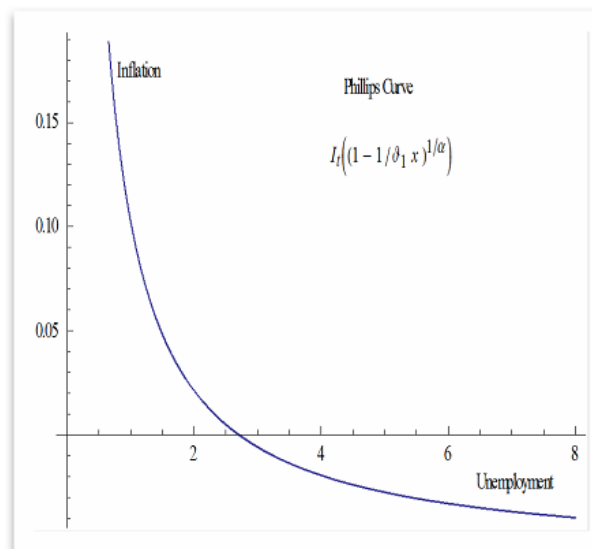
Inflation

Phillips Curve

$$I_t\left(1 - 1/\delta_1\, x\right)^{1/\alpha}$$

Unemployment

Fig. 2 The Phillips Curve

If we search for a derivative from the Phillips curve, we may assume the wage "fixed" as a continuous parameter since, any expected increase in real wages may reduce further employment and job creation wherein firms may suspend hiring enough if wage increase is *above* optimal. In essence, there is no limit on the question of how much a firm should profit, whilst, there is a definite cap on the price of labour; hence, there will never be a perfect equilibrium in the market economies and therefore, every unique equilibrium point is considered as a new equilibrium in itself. This is a paradox, and which perhaps induces wage stickiness. And this is also imaginably the principal involuntary "gap" in so called the market economies (rather a drawback) wherein, a concurrent appreciation in value of goods and services is frivolously recompensed by a measured change in real exchange by a concurrent increase in real wages. This effect nevertheless, depresses future consumption and the dampening effect is rarely acknowledged. However, the adjustments do indeed occur after a fixed interval in a forward looking manner (Plosser, 2012); still, there arise stickiness in adjustments, which means that− real wages and price adjustments become rigid(Lawrence, Eichebaum & Evans, 2005) even though a new equilibrium is attained (See nominal rigidities and the effects of dynamic shocks).

3. How much Complex a model should be?

Why a model needs to be complex? A simple answer to this question is likely, to model complexity. It is important to draw attention regarding the nature of complexity that a model is expected to deal with. Modern economic systems are compositely dynamic, and in a market economy, agents make decisions with differential preferences. Hence, it is relevant that those agents get an environment which is balanced, whereby is it assumed that agents make rational decisions. This was the foundational basis of rational expectations theory, conceived during the 1960's. Decisions are generally microfounded on the assumptions of human rationality (Tversky & Kahneman 1981), since business organizations make rational decisions (Simon 1978) which are based on rational assumptions about the economy and such assumptions mandate that rational choices

should be consistent and coherent. Although agents might have limited choices for policy actions in decision-making, even then, not all agents make similar choices under every given conditions. Some agents do make *irrational* decisions. Nevertheless, agents— in order to maximize their rewards, often assume variable degrees of risk. The assumption of risk is an important concept in economics and finance where agents seek superior rewards as an outcome of their decision-making process based on choices. Decision problems involve choices and options. Prediction of people's choices in an uncertain environment is a difficult task which is a complex decision problem (Tversky & Kahneman 1981). The complexity of the choice process, as investigated by Schilirò (2011) who likewise, contends that agents who are not perfectly rational and neither have perfect information may chose suboptimal options (wrong choice) which is also an example of the models of preferences wherein agents may commit mistakes while choosing. I reverberate on similar grounds that models of preferences with imperfect information about the future may perform poorly given that it is rather difficult to model "exactly" how agents' preferences would change over time. Actions of agents based on choices and given options may differ, which might lead to different kinds of reward functions (Chatterjee, 2011) and discrete equilibriums (optimal or suboptimal equilibriums). The difference between optimal and suboptimal equilibrium is a *deviation* which help determine the discordances of individual preferences. Models which include these measurable aspects of human preferences, intertemporal choice, and decision-making beyond the given data on which to draw conclusions are invariably complex since it must be assumed that preferences change or adjust with time. Traditionally, this means that decision-making is a dynamic issue, and for all this, we need dynamic models which would likely take into account the changing preferences of agents over time. Preferences change as much as expectations which do change as well. Expectations are based on prospects; i.e., how much informed is one's viewpoint about the future which is uncertain? How much is the deviation in agent's viewpoint from others' about the future prospect of a similar event? And it is here where the importance of the formation of expectations is realized. Traditional macroeconomic models attempt to predict deviations from equilibrium points in near future given some immediate and past information about correlation between macro-variables about what is actually produced, in order to forecast future production, consumption and demand. Hence, economic activities are path dependent process which is a property of complex dynamical systems (David (2000), Chatterjee (2011)). Initially, the Classical Libertarian models did not include explicit agent preferences in their modelling which is an important aspect of advanced macroeconomic agent-based models. However, the Classical (Austrian) School of Economics those championed by Carl Menger (1871) and Walrus (See Walrassian Equilibrium)during the late nineteenth century did actually define and took into consideration the individual subjective preferences since they considered it essential to include analysis of human economic actions on the basis of choices[4]. Since information about the future is *imperfect*, and to model uncertainty in production, demand and consumption processes, traditional models incorporate some degree of probability. However, it is not enough! Construction of accurate models requires incorporating the expected future changes in agents' preferences. This is still not enough as well!! Since, consumer preferences are unpredictable to certain degrees—they change over time. To keep in mind, it is very unlikely that one would be able to foresee all possible outcomes using general equilibrium modelling, or any modelling to speak. Hence, it is easy to invalidate predictions based on just past observations, but difficult to forecast future *path* of "unique" equilibrium points, or deviations from them. Modern economies are

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[4] http://www.econlib.org/library/Enc/AustrianSchoolofEconomics.html

complex dynamical systems, owing to the growing nature of complexity of its agents—and so are complex their preferences, choices, behaviour and tastes. To include all these aspects in a model, it would invariably make the model a highly complex surrogate of the real economy. But how much naïve or complex a model has to be in order to explain real world economic events (Krugman, 2000)? What should be the nature of complexity of a model to explain real world monetary policymaking? In other sense, there should be clear specifications regarding the nature of models which could reasonably be employed in macroeconomic analysis (Woodford 2008). Taking on Mankiw's (2006) criticism about the failure of macroeconomists in designing models which could have been meaningful for central banks to conduct their monetary policies effectively, Woodford (2008) argues that such modelling efforts are evolutionary in nature. Meaning that— they were employed on trial and error basis but the results were not as favourable as one might have expected to be. Insofar, macroeconomic models are complex simulations of the real world economic events. Macroeconomic models may be complex yet they might not serve the purpose, while they may be simple enough to render them useful in monetary policymaking process. In essence, the aims and scopes of macroeconomic models are not just restricted to public policy making, but beyond this, they are usually designed as essential tools to help explain general equilibrium, or lack of it (disequilibrium dynamics). Fundamentally, dynamic and general equilibrium issues make matters worse for the monetary policymakers. Yet, the solitary objectives of the central banks are tangible, however, to draw practical conclusions from studies on general equilibrium for welfare analysis. Central bankers rely on tools and techniques to frame monetary policies to contain inflation. To be precise, hence, it is not that much important whether if a model is a *complex* or a *simple* one, as regard to its actual efficiency to help explain the real world events (Krugman 2000). But it is imperative to render such models useful to study and explain delicate processes which characterize the actual workings of an economic system.

4. Short-term vis-à-vis Long Term Forecasting Models

Models in macroeconomic sciences spans across a wide array of functionalities based on diverse requirements that are meant to serve wide-ranging functionalities— i.e., for forecasting macroeconomic trends, business cycle fluctuations, predicting variability in output and understanding dynamic behaviour of economic systems in the short run and in the long run. It is important to posit that models which are exclusively developed for monetary and public policy making may not be equally effective in dealing with forecasting short-term or long term "market trends"; for which, a simple reduced form forecasting model or Ordinary Least Squares (OLS) based-technique, or other quantitative non-linear dynamics and analytical techniques may render more beneficial. The choice of equations to define a function also depends on the nature of data to be analyzed; how models can best fit into the data? For instance, a first order polynomial is a straight line as simple as a regression line, while, more complex quadratic second order or third order cubic equations are employed to fit in more complex data.

Macroeconomic models are meant to forecast overall fluctuations in aggregate demand and output, to model expected real inflation and frictions in business cycle. Besides, macromodels are used to explain long term trends in economic growth. This however, does not exclude the fact that they ignore the financial markets, since, stochastic dynamic models may be equally effective in forecasting financial market trends, and the only difference which differentiates such approaches is about the adoption of specific variables and parameters explicit for market analysis. In the above example in equation

1, if we include several market variables and parameters and then fit the model into the data, we get a curve fitting around the dispersed data. Financial market models generally include technical market data as (dependent and independent) variables i.e., the stock or index quotes; for instance, open, low, high, and close (all these actually constitute the "price signals"); and then, volume, market cap, book value etc., whereas macro models more often concentrate on macrodata or macro-variables (i.e., real GDP, inflation, unemployment rate, Federal Funds Rate etc.).

5. In Search of Equilibrium: Aggregate Demand & Aggregate Supply

Equilibrium Models: From Classical, through Keynesian, over New Classical into DSGE toward New Keynesian models

In market economies, agents have preferences—what they *want*. This modulates the technological preferences in turn—what can they *produce*? In simple terms, the interaction between (wants) aggregate demand and (production) aggregate supply determine the behaviour of "prices" and modulate actual levels of output. Output is the national income—while the balance between aggregate demand and aggregate supply which imply equilibrium level. Like demand and supply, prices of goods vary over time—meaning that, they are *dynamic*. The problem is to determine the *price* which constitutes equilibrium, since assuming transactions do not occur at disequilibrium prices where goods do not clear the markets (Zeimer & White 1982), market forces then attempts to eliminate most of the inefficiencies which characterize such disequilibrium. Disequilibrium is a state when the economy is not in equilibrium—where market prices have not adjusted fully. The proof of the existence of equilibrium denotes that at some point of time, the economy is at some *unique* point on account of adjustments in production, demand and consumption. This again means that, at market price, goods clear the markets more efficiently than they would have cleared away under disequilibrium states, since buyers and sellers are reluctant to trade at disequilibrium prices. These "unique" points may be captured from historical analysis of all the possible variables which makes up a real economy dynamic. The two variables—inflation and unemployment, constitutes among the most important economic factors which also pose as complex problem to every economy. The tricky part is not just to identify such *unique equilibrium* (Morris & Shin 2001) points but also to establish the fact that equilibrium *exists* in general where, aggregate demand equals short run aggregate supply (SRAS), with optimum inflation horizon, optimum unemployment rate (full employment) and price stability. This seems to be a simple enough representation of an economy in equilibrium but when considered through the lens of new classical economics as opposed to Keynesian, new classical economists claim that the economy will move towards its long run equilibrium extemporaneously; and without any intervention given an increase in demand which would affect the price only, but not output. Which means that in the short run, when demand increases, the cost of production (cost of factor input) increases as well which raise price to a new level, but since the economy is at full employment, firms compete for scarce resources and hence cut back production that brings down output to the previous level, while the price remains unchanged at a higher price level (price do not fall with respect to fall in output). This once more implies that, new (price) equilibrium has been reached. At this point, the economy is at the level of output which is more than the full employment level. This comparison between the new equilibrium position and the old equilibrium position is termed as comparative static. So, at each and every new instance of the above phenomenon, different but new price equilibrium is reached. A similar but analogous situation occurs when the aggregate demand falls.

While in the Keynesian view, aggregate demand can increase up to a certain level with an increase in output, but without any *increase* in "price" level. For any increase in aggregate demand above that level, the effect would be purely inflationary.

Now, what should be the real purpose of a macroeconomic model—forecasting or for policy making? From classical macroeconomic thoughts to the recent New Keynesian paradigm, the shift has been one such resounding. For any inquisitive learner of economics, I would need to ask myself—what economics has taught me—and how such 'transitional' knowledge could be best transformed into understanding about how the economy functionally evolves, and then, to apply them into a functional model to forecast and assume how economic policies are modulated, to what extent, and in what manners to suit the needs of the times. And to understand this "shift" in paradigm, one would require understanding what changes were effective during the transition from the classical to the neoclassical synthesis—those corresponding to adoption, criticism and then abandonment of the old philosophies to adopt new theories in macroeconomic policy modelling. Macromodels which evolved during the last few decades (1950-2000) have implied more roles for government policy interventions, stressed on the availability of household-level and firm-level data (Kocherlakota 2007). New models came into existence during the 1980's which were capable of fitting into enormous amounts of data generated from the industry, household and governments. These were microfounded macroeconomic models of Neoclassical synthesis and New-Keynesian Real Business Cycle theories which were followed by general equilibrium stochastic dynamics models (SDGE). These models were supposed to explain fluctuations in output cycles which are affected by technological shocks, shocks to productivity and consumption and demand shocks.

6.   Modelling Models: Dealing with Complexity

Economic systems are complex for the very reason that human behaviour is complex, and as a system, we are imperfectly understood by ourselves. Complexity arises out of interaction between multiple agents, agents who are themselves complex. True it is that our brain is an amazing machine of reasoning and deduction, but the reality seems to point to the fact that there are data and information which are a lot too complex for an average functional brain to handle or deduce just by the power of observation and analysis alone—data *too big to handle* for the brain. For the reason that we have found "ways" to develop "means" in order to handle and analyse such complex data which are often too big, and we have every reason to develop tools and "systems" that are capable of handling as well, examine data to seek patterns hitherto beyond our given natural powers of observation. In simple sense, models are "systems" modelled to solve specific problems. We may call such a problem solving system a "representative—agent" of the actual world— which makes it possible to build theories in order to explain what the data might tell us, where the data might lead us to, or, how to find solutions in order to resolve inherent and evolving problems of the economic systems. Computational models are composed of systems of algorithms which are designed for specific purposes. A model may consist in its kernel algorithms which contain prompts, conditions and effects that may be looped according to the requirements of the model, with a goal to obtain the final effect. The conditions may be formulas, methods and procedures which attribute towards the overall behaviour of the model. A predictive model relies on data gathered from observations of natural phenomena—say, data about consumption trends and income levels of a population. Factual it is that any "prediction" is based on post-habits and may be non-reflexive; hence, historical data and present information are

required to forecast the future. Representative models designed to mimic human agents would require formulations of equations that would exactly define the behaviour of the target agents, and the art of designing formulas and algorithms constitute the functional aspects of a model—which constitute as a prerequisite, to build functions to enable it to *behave* as required. This is the most difficult part of modeling. Nonetheless, Howitt et., al.,(2008) argue that it is time to go beyond such representative agent models, including DSGE's, while they advocate that the science of macro should focus more on

DSGE

DSGE or Dynamic Stochastic General Equilibrium Models are macroeconomic models used in monetary policy making and for studying imposed frictions and shocks applied to the economy. DSGE models succeeded RBC models as probabilistic rational models which are used to simulate and model the real world monetary and public policy. It is adopted by several Central Banks around the world (ECB) and was developed by the ECB.
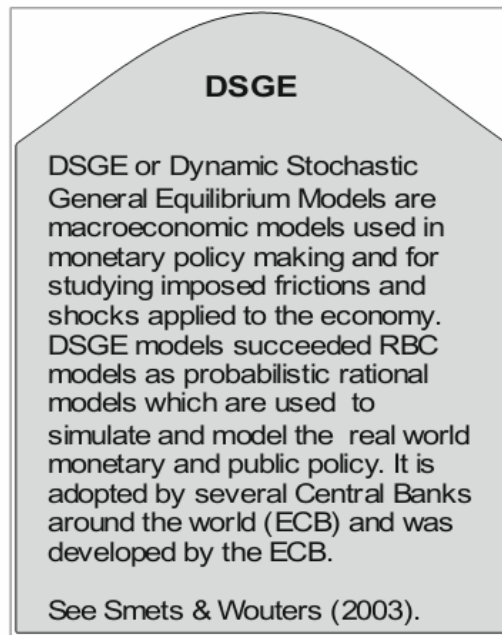
See Smets & Wouters (2003).

Fig. 3 Revival of DSGE (SDGE) Models

heterogeneous agent macro models which takes into account preferences, interactions and endogenous learning diligently. This means that, models should have the capacity to learn how expectations "emerge" and change with time, how agents interact among themselves, and whether if such interactions leads to optimal reward functions. In such parlance, De Grauwe (2010) previously stressed the need for the model to take into account the limited cognitive abilities of agents. This relates to fitting in ad-hoc assumptions about agents' cognitive abilities for which the model can introduce "rationality" through trial-and error based learning. Incorporating a learning component within the structure of DSGE models would go far way to model how preferences and expectations might change over time. The architecture of such structural models hence should be "goal oriented"—meaning that, they should be able to predict the changes in agents' choices' over time. They should tell more stories and provide "clues" about the future path of those agents' actions and preferences. But this is nevertheless, a difficult task for model builders. In any case, our expectations about the practical usefulness of models grow as the economy evolves. However, every well-designed model tells some stories. Actually, it is the *data* which have stories to tell since it contains all the vital and essential matters of importance, while different models may tell different stories from the same data. A simple model with fewer variables might fail to identify essential hidden patterns. Therefore, selection of variables depends on identification issues. And this is what the DSGE models face; identification issues (Canova & Sala 2005).

To all intents and purposes, models serve as an artificial vision to a human observer, since they help enhance the capacity to detect what natural observations might have overlooked. Human beings have a limited capacity for perception, observation and analysis; it is practically impossible for a human mind to analyze all the information which they perceive all at the same time since. Human agents are rationally bounded (Simon 2000) and have cognitive limitations; hence, there is a limit as to how much information agents can actually process. Mechanistic models generally amplify the capacity to deal with enormous amounts of data generated by economic processes. The science of pushing the threshold of model simulation to their extreme limits have its own limitations as well, but that threshold is increasing by time in order to detect what other models overlook which is also the reason behind design and development of innovative and analytic tools. New models give substitute older ones, and have different structural aspects which deal with new parameters. The models and analytical tools of experimental macroeconomics having definite microfoundations are developed with an aim to aid in public policy making, understanding human choice and decision-making. While those instruments employed by Central Banks in their monetary policy process deals with both cardinal and terminal information to examine aggregate quantities. But as critics would say, or impose "impractical demands" which are often beyond the scope of average models to effectively deal with the real world scenario, I would like to ask, are most macroeconomic models far from being perfect? Which is "the most perfect" model that could sufficiently capture the time-series properties of macrodata? According to Gurkaynak, Kisacikoglu & Rossi (2013), the authors state that most of the existing methods are not the finest and the best; that is, it is difficult to single out the most "optimal" forecasting model since their relative accuracies evolve over time. To capture real dynamicity, a model should be dynamic enough to include all the changes in discrete time series. Viewed from another angle, the goodness of a predictive model can be judged by how accurately it is able to forecast future trends which are dynamic. Models are by far abstract approximations of the reality; they include certain degree of abstraction in order to render them efficient. But this problem is rather non-trivial; is it possible to elaborate and capture all the real world events within a single model? If one would consider this to be the case, then every macroeconomic model, irrespective of its popularity, would fall prey to Lucas Critique at some point of time or other. However, with the exception that forecasting models, if designed with ingenuity with an eye that such models are immutable from structural changes due to policy shifts, systematic errors in forecasting could be avoided. Since it was Lucas (1976) who raised this issue and according to his critique, reduced form models may be useful for forecasting while at the same time, may perform poorly in econometric policy analysis and evaluation. Whereas, models specifically designed for policy advice may not perform commendably in forecasting trends. Citing Lucas (1976) from his seminal paper who argued that—

> "…the features which lead to success in the short-term forecasting are unrelated to quantitative policy evaluation, that the major econometric models are (well) designed to perform the former task only, and that simulations using these models can, in principle, provide no useful information as to the actual consequences of alternative economic policies."

---- Lucas (1976)

This particular issue has been the topic of major debate (See Lubik & Surico 2006) regarding the validation of forecasting models wherein scholars agree to the point that short-term forecasting models may not prove useful in long run policy making. That

is—short-term forecasting models can hardly be beneficial to be effective to correctly predict the long-term outcomes of alternative government policy changes, since, policy changes are no "one time" actions (Plosser 2012). The reason for this is that—agents tend to readjust their behaviour in response to policy changes. Agents can, in fact, alter their behaviour <u>without</u> any expectations for policy changes as well. They are in essence—unpredictable, but need not they be irrational. Policy regime changes, in some respects, are impulsive as well. Models should take into account alternative government policies to simulate any expected changes in policy implementations. In simple standing, models should include—*what if* scenarios. The reasons are simple enough. Human agents have behavioural heterogeneity; they assume the differential policy choices for their own consumption patterns and investments which may often be far from optimal—they could go either way—optimal, "suboptimal", or, they can be "super-optimal"—which means, they can turn out to be highly efficient. Consumption and investment decisions fluctuate over time though it is certain that humans *must* consume in order to survive. The question is, how much could be the fluctuations in real demand? Empirical validity of such models which include such agent heterogeneity and future welfare functions within their horizon may provide some stability to the models. In fact, parameter instability is often the cause of model failure (discussed in more detail in the ensuing section). Indubitably, this reasoning is valid, and this was the very reason for the Lucas Critique to have become an objective test for model validation.

Modeling shocks to Aggregate Quantities:

 Aggregate quantities are price, employment, wages, goods, income and investment. Whilst DSGE models, besides including the historical GDP data, structurally model different types of real and nominal frictions to the economy; sticky nominal price and wage setting, habit formation in consumption, fixed costs in production and variable cost in capital utilization. To be noted, frictions slow down the adjustments and makes macroeconomic variables sticky—in essence, they appear to be constraints. Besides these frictions, the model also incorporates structured shocks to the economy which include; productivity shocks, demand shocks, mark-up shocks and monetary policy shocks (See Smets & Wouters 2003). The model assumes that these four categories of shocks are cyclical in nature and their recurrence or relapse would likely explain intertemporal booms and recessions. Although the reason for inclusion of these structural shocks may be a valid one, but to assume that the economy would be subjected to similar kinds of shocks on every instance is somewhat like saying we get a *similar* story each time when there is a recession. Nevertheless, these models tell some stories, which Faust (2012) however, puts it in his own way—

> "At central banks, if you ask why one needs a structural model as opposed to simply needing a reduced-form forecasting model, one often gets the practical response that structural models are needed to help "tell a story" about what is going on."

Faust then goes on to say that—

> "Thus, when I apply Solow's smell test, I conclude that I am beginning to smell a rat. And it smells pretty good—at least relative to that fruit fly odor we had been living with. "

 While Faust reverberates about Solow's Smell test in a different manner, he considers that the smell of rat is "good". By this, perhaps he means that he smells something

"suspicious". Does it mean that he actually agrees with Solow? What this could mean is perhaps, he calls for a further review of the DSGE models to seek if there might be something worthwhile in it after all. The author draws an analogy with toxicologists to explain how macroeconomic models should adopt wet-lab practice (at least for peer assessments). While a thorough approximation of the procedures which are adopted by wet-lab toxicologists when they perform toxicity testing on animals to assess the minimum-maximum levels of human exposures to toxins could bring matters into light, toxicologists apply human-equivalent model—rat models per se, since rats' and humans exhibit remarkable analogy (Faust 2012). The reason for this is that—rats and humans share many biological characteristics. In this respect, I would offer to draw examples of standard protocols of how pharmacologists adopt dose-response and toxicity-efficacy analysis to evaluate a potential novel candidate drug. Before human trials, most of the effects of medications are evaluated on surrogate models of human–which are rats. In such a way that, a rat might be thought of as a proxy (substitute) for humans (though rats lack gall bladder), and, with some approximations, (See Faust (2012) for a more detailed account of his critic) just as DSGE models might likely serve as a substitute model for analysis of the real world policies, with some constraints, some limitations.

Coming back to the point, indeed, resulting interpretation of the data might "tell us stories"—for instance, that there are inefficiencies in the production process of a firm or wasteful operation and execution of decisions. But to keep in mind that there may be other microeconomic sources of inefficiencies in the economy, and the reason that these new theories which claim they have microeconomic foundations do find favour over the more archetypical ones which the critics of classical macroeconomics consider logical. Consider that "stickiness" of prices is one of such. So for a central bank, what should be their object of price stability efforts? Or, should central banks intervene in the foreign exchange markets, then why they should intervene and how? If economics is considered a scientific discipline, and since science is for reasoning, it is for the best of economists to seek their answers by ways and means of finest tools available for reasoning and deduction. Real world data are dynamic, and to develop models which would capture that dynamicity, the essential requirements are those subtle methods of entangling and disentangling such a system consisting of vast number variables and parameters that define real world events, and then to include by reasoning the most cogent ones which could help define a synthetic model of realism. It is not possible to include all the variables or parameters which makes up the real world events; neither is it feasible given the limited powers of observation and analysis of even the smartest of specialists. Rather, a coarse approximation calls for many such omissions of variables that are considered non-essential, and by inclusion of those conditions which are considered necessary but may not be "sufficient". On this regard, I beg to differ a bit from Faust on the cogency of adoption of DSGE models as a tool for monetary policy process. And finally, what to account for and how to detect inefficiencies in these models when they go wrong?

7. DSGE Models: What to look for about omissions in it?

Dynamic stochastic General Equilibrium (DSGE)[5] is one such micro-founded model developed by Smets and Wouters (2003) which was specifically designed to seek policy advice and explain the nature and complexity of general equilibrium in an economy. The model includes in its kernel, the capacity to exploit data and deduce information by balancing the matters of complexity—it uses limited number of variables and data while

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[5] See a general discussion about DSGE models at Wikipedia:
http://en.wikipedia.org/wiki/Dynamic_stochastic_general_equilibrium

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incorporating structural shocks to the economy which the model considers necessary for econometric forecasting. In design and development, therefore, DSGE models differ from classical models which lacked micro-foundations, and yet they differ from reduced form forecasting models. Hence viewed as an alternative to traditional models of forecasting (Chari 2010), DSGE models aims to serve similar purpose, but with a different approach—to explain what the traditional models of macroeconomics were incapable of. Contentious issues have arisen thereof regarding the usefulness and applicability of this unconventional model, while several critics of DSGE models claim that it fails to capture real world economics efficiently (Mankiw 2006). Critics' furthermore emphasize that DSGE models are flawed and far from being perfect (Solow 2010); i.e., they are incapable to answer questions related to monetary policy issues for the reason that they are not capable to explain microeconomic behavior accurately(Solow(2010), Mankiw(2006), Buiter(2009)), while the failure of the model to detect and forecast the Financial crisis of 2007-08 (Kocherlakota 2010) also led to assumptions about the model's power to effectively draw practical conclusions from historical data. Noah smith (2014)[6] assumes that DSGE models failed the "market test" and remarked that they have if any useful purpose in macroeconomic predictions. Does it mean that all these experts put DSGE models to RIP? This is not true. What is true in fact is that, people criticize yet find usefulness of the DSGE models. Why every macroeconomic policy models should require "market test" even if they are rarely used by financial modellers? Financial market specialists generally employ statistical models which use market variables, and seldom model shocks and frictions for predictions. Assuming that shocks drive business cycle fluctuations, and which may infer valuable information about "troughs" and "peaks" in a trend, there is no way that these fluctuations could accurately mirror market trends which include different variables altogether. Nevertheless, such findings could be used as 'signals' or *triggers* by financial market specialists to screen out potential hunch. This issue however remains highly contentious. Since its inception, DSGE models have gone under severe criticism to pass through so called Solow's "Smell-tests" with experts pointing toward optimization and reformulation of these models (See Kocherlakota (2010), Chari (2010) & Galí (2011a,b)) to fit 'new data' which they considered as necessary. Furthermore, issues have cropped up regarding variable omissions and parameter approximations—the first generation stochastic dynamic equilibrium models did not include few essential variables and parameters which were later added on to the system. Thus came along the reformulation of the Smets-Wouters (2007) framework with the addition of unemployment rate as an additional observable variable (Galí, Smets & Wouters 2012). This was mandated for efficient forecasting of output gap and furthermore, to elucidate the fluctuations in unemployment cycles. Anyway, stochastic dynamic models are rarely adopted by financial modelers who find very little usage for their purpose to benefit from superior market returns (Smith 2014). In fact, stochastic models like these might have very little to contribute toward market forecasting; they may better be left to deal with macroeconomic data and variables. It is not the goal of a modeler to make her model "look" more attractive but to render it more efficient. In fact, models can be important without being interesting, or seem attractive without having any utility at all. Models help seek out evidence which has been overlooked by natural observation, or facts which appears to be imperceptible. This is the reason why one should search for particulars; for instance, our subtle *powers of reasoning* can bring forth more facts than from mere generalizations. Indeed, inclusion of a large number of variables and parameters might make a model complex, if the complexity and enormity of the data demands so, but that

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[6] http://noahpinionblog.blogspot.in/2014/01/the-most-damning-critique-of-dsge.html

does not signify that the model is *perfect*. It is important to gauge how a model exploits data and deduce conclusions, since models without a good theory and "sufficient" data are worthless, as Pesaran and Smith (1995) conclude that models which do not represent data or theory lacks the executive powers of reasoning, and are ineffective for any practical purposes—including forecasting and policymaking. Indeed, DSGE models incorporate far lesser number of macro variables—about seven of them(See Smets & Wouters 2007); and to compensate for such non-inclusions, they include frictions and structural shocks to the economy to reveal probable physical insights (policy advice). In essence, these models are advanced but unconventional; or rather say, Avant-garde. Estimation of structural shocks modelled in dynamic models (DSGE models) of macroeconomic policymaking reveal several interesting insights regarding the historical data. However, the methods they employ are generally procedures which are nonetheless concepts and schemas developed systematically in order to render the model fit the data, and then to validate whether if the data suits the model to enable it to explain what is required. So, one might ask—does DSGE models fit the data? Contrariwise, is the amount of data which this model employs sufficient enough to draw tangible conclusions? Or, whether if the conception (priors) in the methods employed are infallible and if the schemas developed are flawless. Some authors even debate to the extent even if a model fits the data perfectly, it may produce worst results to policy problems than an imperfectly fitting model (Kocherlakota, 2006). It is here where the disagreements regarding the suitability of the (DSGE) models arise. Part of the problem is that—some authors have attempted to optimize the models farther past beyond with unrealistic assumptions to see if the model's predictive power could be amplified. When a model is too close to be highly efficient in predicting the future correctly, it is likely to contain more parameters and variables for "optimization" purpose. This increases the nature of complexity of the model until the model becomes too much complex to handle and fails miserably.

What makes a model complex is also the inclusion of abstract assumptions about agents' future actions and behaviors. While variations in assumptions may affect conclusions but such assumptions and conclusions should be realistic enough to be able to model future scenarios rationally. Traditional macroeconomic models generally employ a large amount of data and macro variables, and it is the art and science of modeling models which are assumed to be perfect not just to "deal" with such enormous amount of data, but essentially, to give some sense to, or extract meaning from data—even if such data appears to be disordered or random. Beyond this, models are based on theories which propose several assumptions as hypothesis to draw some conclusion, and the function of the model is to "prove" whether if such assumptions are true or false. The model does that by means of intrinsic analysis of the data, structured on core design of the model for the purpose— by proving or disproving hypotheses which are constructed in a form of a theory. Hence, it is relevant to assume what a model might tell us, and then validate how correctly it does so. For the same purpose it is essential to comprehend first what an economic equilibrium is, how economic systems exhibit equilibrium, and what if, if there are any problems inherent with dynamic general equilibrium issues itself. It would be logical then to assume what kind of a model would likely be able to represent the dynamicity of economic systems with an aim to simulate the equilibrium conditions of the real economy. Without stability in the model itself, it is rather fool heartening to seek for equilibrium analysis of the real economy that is so complex enough to weaken the very foundations of a model which might have been designed without ingenuity and imagination.

8. What to look for in Models when they fail?

Models do fail and become useless when the purpose for which they were designed is not fulfilled. Models which are usefully employed for forecasting purposes may fail to predict future trends, or shifts in trends due to sudden imposed shocks and frictions. When they fail, the first and foremost thing to inspect is to seek out any flaws in assuming the correct parameter specifications. Repeated back testing with historical data to check the empirical power of prediction of the model is essential for smooth extrapolation. Inclusion of wrong variables might also contribute toward poor forecasting, or parameter instability might contribute toward wrong policy advice, as is in the case of DSGE models. Lucas (1976) specified that models which perform well in forecasting may not be that much useful for econometric policy evaluation (See Hurtado (2013) while at the same time, DSGE models which in some respect include assumptions about policy regime changes with subsequent changes in agents' preferences, they still fail to account for agent heterogeneity. When agents' preferences change, it could result in parameter instability–which simply put, the model fails to account for response to policy shocks and hence the policy advice derived from the analysis may be inaccurate (Hurtado 2013). By disentangling DSGE models, it may be possible to trace how shocks are structured with what parameters, and whether there is a drift in parameters when sudden shocks are imposed on the model. It is also relevant to scrutinize what variables are included and how the coefficients are coupled with those variables. The estimated values should be closely observed for any drift in parameters employed in the model; which of these structural parameters shows *instability* when subjected to inspection –stickiness, discount factor, habit formation, elasticity, share of capital in production, fixed cost, Taylor rule inertia, response to inflation and output gaps, trends in growth in GDP and inflation, hours worked and various mark-up shocks and imposed frictions (stickiness) as included within a DSGE model (for more details, consult Smets & Wouters (2003), Hurtado(2013)). Following this, one might round up to find out about the causes behind parameter drifts. Some deep parameters may nevertheless, remain fixed (constant). Now, what is meant by parameter instability and drift? Why should parameter instability matter at all? Answers to these questions would likely emerge from the interaction of the model with the real world; while the real world is evolving, is the model capturing such evolving trends? And if so, then how such aspects should be reflected by the model? If those evolving aspects are not being captured by the model then that might lead to wrong interpretations or outright failure in forecasting trends. Recall that Woodford (2008) argued by saying that modeling aspects are evolutionary in nature. Thus, adding a "learning" component to the model would likely enable the system to capture, learn and train itself in order to effectively help in forecasting. This would also help to account for any evolving change in household preferences, consumption patterns or demand, policy changes, regime shifts, production cycle, technological innovations, environmental factors, or any other aspects which might induce real shocks to the economy. The constructive philosophy of models is based on the structural edifices which characterize the architecture of a functional model; whether they are reduced-form models or stochastic equilibrium models. Moreover, it is equally important to include all those factors as parameters estimates to build a robust dynamic fit of the real world economics. For just as the knowledge of the human body in healthy state is essential to compare the same in a state of disease, knowledge of the real economy being modeled by a model is a pre-requisite to compare and understand the robustness of the economy and its lack in crises. Very few new models are capable to include all the essential parameters to render a model highly efficient, and very few models indeed match the complexity of the DSGE models which nevertheless, amplify the nature of

complexity the model has to deal with. Dynamic stochastic general equilibrium models do include all these real parameters of the economy and yet, they failed to signal an impending market crisis. One may wonder, 'What a Model' it is then!

  New models are always subjected to criticism and validation of results derived from reasoning and deduction often shows that there might be inherent limitations or flaws in their structural designs and execution. For instance, the failure of DSGE models to forecast the financial crisis has been ascribed to parameter instability subjected to the models' failure to account for unanticipated and unexpected shocks to the economy, for which it was actually designed. During the 1970's, policy makers relied on reduced form Phillips curve and structural VAR models to forecast inflation and output trends. This idea was central to the notion of "fixing" interest rate in response to inflation—going by so called the "Taylor rule". Forecasting of inflation and output trends was then the norm to chart out the policy paths of future interest rate changes, and to "optimize" the economy in response to output and inflation. But soon, such models were subjected to Lucas criticism which questioned about the stability and efficiency of those models when they failed to account for unexpected shifts in policy implications in response to structural shocks to the new economy. The criteria for criticism have been rather simple; but the remedial measures seemed to be too farfetched.

9. Conclusion

Prediction of anything which is uncertain is difficult since forecasting deals with uncertainty, while *stochastic* equilibrium models are dynamic because decision-making is a dynamic path dependent process. Equilibrium herein refers to the stability and balance in the economy dominated by the forces of supply and demand. In this paper, I have taken the pleasure to explain what dynamic stochastic models are, and what they aim in reality. The real pain with any stochastic model is to gauge its accuracy–how far accurately they can predict future trends? The present analysis have drawn in the DSGE models which are *on the line of fire* and criticism about which I have discussed in some detail, and about the real need for such policy making instruments to oversee issues of stability and instability in a economy. To model fluctuations, a model must be flexible. The point is how far DSGE models are successful in successfully predicting real fluctuations in business cycles. To this end, this research highlights current debates about the usefulness and expediency of fancy models whose vanity is often the cause of its own meekness. We do not need fancy models which fail to perform what they are designed for, but we may certainly look for reasons of failure if the model achieves some degree of success and if there are any related known issues for their malfunction which might be resolved to make it more robust. This paper–the first one of a series of three papers which I have endeavored to address critical issues regarding econometric model design, wherein I hope that I shall be able to present in subsequent papers; and in a more lucid manner, the core issues revolving DSGE models, and the soft and hard debates gyrating around such issues related to its failure or overall success.

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