

Dynamic Stochastic General Equilibrium Models

Dr. Andrea Beccarini Willi Mutschler

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New Keynesian Microfoundations

There is agreement that a satisfactory macroeconomic model should allow for wage rigidities, should be based on optimizing behaviour by microagents and that individual behaviour should satisfy rational expectations.

- imperfectly flexible wages and prices associated with imperfections in labour and/or product markets;
- rational intertemporal optimizing behaviour of all agents;
- rational expectations;

General Theory (Keynes, 1936)

- recognises the aggregate demand as the key factor in the short and medium runs in driving output and employment away from equilibrium.
- does not recognise that persistent involuntary unemployment is a supply side phenomenon determined by structural characteristics of products and labour markets.
- does not rely on adequate microfoundation (with imperfections such as imperfect competition and information, externalities,... price and wage rigidities).

On the contrary, it is widely accepted that if there are:

General Theory (Keynes, 1936) - continued

- perfectly competitive labour and product markets with price flexibility,
- complete information,
- rational expectations,
output and employment will never deviate from equilibrium

One refers to this as the neoclassical benchmark model (NCBM)

Stylized facts

- output and employment deviate from their equilibriums for considerable periods of time:
 - the initial impact of an increase in aggregate demand is on output and employment not on prices and wages (as in the competitive markets);
 - an initial demand shock may be amplified (through the multiplier) by subsequent changes in consumption and investment as income changes;
 - inflation only responds slowly (with inertia) to disequilibrium situations;

Stylized facts - continued

- Supply-side features of the economy determine equilibrium unemployment (however, see Hysteresis):
 - some part of equilibrium unemployment is involuntary;
 - there may be multiple equilibrium output and employment rates.

Stylized facts - continued

- The central bank is forward looking and guides the economy back to equilibrium by using a reaction function to change the interest rates in response to inflation, aggregate demand and supply shocks.
 - Business Cycles (BCs) are considered as fluctuations about the equilibrium and are therefore modelled as disequilibrium phenomena.
 - In contrast, Real Business Cycles (RBC) Models assume that the economy is affected by technology shocks; agents are always able to reoptimize their labour supply decisions and BCs are driven by their behaviour.
 - RBC economists have developed the method of theoretical and empirical investigations known as Dynamic Stochastic General Equilibrium modelling (DSGE).

The general features of the NCBM

- Walrasian economy
 - the IS curve is horizontal at the stabilizing interest rate;
 - the Phillips curve is vertical at the unique equilibrium unemployment;
 - the monetary rule (MR) curve is horizontal at the target inflation;

the NCBM is not able to explain the stylized facts above.

The general features of the NKM

- monopoly producers (maximizing profits) and a monopoly unions (maximizing utility of its members) in the several sectors of the economy;
- each sector produces a differentiated good; the union chooses the wage and the firm sets the price, which in turn affects employment.

NKM 's explanations of the above stylized facts

- Output deviates from equilibrium
 - imperfect competition implies that a change in demand (holding prices and wages fixed) causes a change in output (this is not the case in the perfect competition);
 - aggregate demand shocks are amplified through the multiplier; the optimal consumption smoothing is prevented from inability to borrow.
 - the inertia inflation allows disequilibrium of output: this is modelled by the New Keynesian Phillips Curve (NKPC) including forward-looking behaviour and central bank's credibility:
 - this is derived from the Calvo model where it is assumed that a random percentage of firms adjust their prices in each period;
 - knowing this, firms take into account of expected future changes in the output gap since these would alter their desired price;
 - the derived NKPC specifies inflation as a function of the current output gap and expected future inflation.

NKM 's explanations of the above stylized facts

- Supply side features of the economy determine equilibrium unemployment:
 - Involuntary unemployment in equilibrium: imperfect competitions imply a price setting curve below the marginal product of labour curve and a wage setting curve above the labour supply curve. Hence equilibrium employment appears in equilibrium and is lower than in the NCBM.
 - wage-push factors that shift the wage setting curve such as institutional variables (unemployment benefits, union coverage) training programmes, wage accords and so on;
 - price-push factors that shift the price setting curve such as tax wedge, mark-up, productivity.
 - when a negative aggregate demand shock occurs and employment falls, human capital deteriorates, equilibrium employment declines and will not respond to a reversal of the demand shock (Hysteresis).

The Smets-Wouters model

- This is an elaborate New Keynesian model, based on Christiano, Eichenbaum and Evans (JPE, 2005).
- The economy is closed.
- There is a continuum of households, who supply household-specific labor in monopolistic competition (Labour is differentiated). They set wages.
- Wages are Calvo-sticky.
- Households derive utility consumption relative to their habits and disutility from work. Households save and convert part of their savings to capital by a household technology, which has adjustment costs.
- They rent out their capital to the intermediate-good sector. They also choose total amount of savings or investment and variable capital utilization rate.
- The other part of savings goes for lending/borrowing, i.e., bond holding.

The Smets-Wouters model

- There is a continuum of intermediate goods produced by firms in monopolistic competition. Various kinds of labor are used to produce these differentiated intermediate goods. Its production requires labor and (homogeneous) capital.
- Firms set prices. Prices are Calvo-sticky.
- Final goods use intermediate goods and are produced in perfect competition.
- There are many sources of shocks, two preference shocks, labor substitutability shock, intermediate-goods substitutability shock and aggregate productivity shock, goods mark-up or cost push shock, shocks to investment cost, monetary policy rule shock (as in Christiano-Eichenbaum and Evans), fiscal policy etc.
- The monetary authority follows a Taylor-type rule. No emphasis on optimal policy, but there is a monetary policy rule.
- Final good is consumed by households and government. Thus fiscal policy is allowed.