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**“Policy Implications of  
Alternative Economic  
Paradigms: Some  
surprises from  
endogenous  
technological changes”**

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**POLICY IMPLICATIONS OF ALTERNATIVE ECONOMIC  
PARADIGMS:  
Some Surprises from Endogenous Technological Change**

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## **ABSTRACT**

One of the most neglected issues in modern economics concerns the consequences of technological change that is ubiquitous and endogenous. To address these we need to model technology as more than a scalar value in an aggregate production function, dealing with technological change in its messy micro economic details. This paper illustrates these points by considering the policy implications of some alternative economic theories that treat technology differently. The first section contrasts the policy implications of neoclassical and evolutionary economics with respect to the evaluation of the efficiency of the price system, policies with respect to 'distortions,' policies to discourage monopolies, to encourage economic growth in general, and infant industries and specific technological advances in particular. The second section contrasts New Classical and various versions of Keynesian economics with respect to micro behavioural underpinnings of macro relations, the place of technology as a driving force of economic change, and aggregate demand as both a source of fluctuations and a variable to be manipulated by policy makers.

**Key Words:** Technological change, Keynesian Economics, New Classical Economics, infant industries, picking winners, aggregate demand, microeconomic underpinnings.

**JEL Classification:** B50, H1, O.

# POLICY IMPLICATIONS OF ALTERNATIVE ECONOMIC PARADIGMS:

## Some Surprises from Endogenous Technological Change<sup>1</sup>

### INTRODUCTORY COMMENTS

#### Background

In the early 1990s when I began researching long term economic growth I came to understand that technological change, seen at the micro economic level – the kind of material that Nathan Rosenberg analyses in his great book *Inside the Black Box* – was the key to understanding long term growth and studying policies meant to influence it.

Interestingly, students who take courses in economic growth will typically study models in which the driving force is technological change but in which technology is modelled as a single scalar in an aggregate production function. An analogy might be to medical researchers studying diseases caused by some microbe and proposing to treat the microbe as a single dot without internal structure.

In *Economic Transformations: General Purpose Technologies and Long Term Economic Growth* (Lipsey, Carlaw and Bekar 2005) my co-authors and I study how, starting 30,000 years ago, about two dozen major technologies have transformed the entire economic, social and political structures of the societies of their time. In “Sustained Endogenous Growth Driven by Structured and Evolving General Purpose Technologies” (Carlaw and Lipsey 2011) Carlaw and I model such transforming technologies formally and in much more detail than as a single dot.

My main theme today is the importance of understanding endogenous technological change in all of its messy details and the consequences of ignoring these. In my first policy section I apply these ideas to some issues that I have studied in depth. For this I need only distinguish between neoclassical economics, which is found in most standard micro textbooks and evolutionary economics,

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<sup>1</sup> I am extremely pleased at have been invited to give this lecture in honour of my old friend and colleague, who we all knew at the LSE as “young Maurice” but you now know as the exalted Lord Peston– founder of the Queen Mary economics department and long-time advocate of educational reform, a subject dear to my own heart. Mine is but a small addition to the honours that Maurice so well deserves. I am also greatly indebted to Kenneth Carlaw and William Scarth for critical comments on earlier drafts of this lecture.

which has no canonical text book version but looks to Joseph Schumpeter as its grandfather.

## Two Types of Policy Implications

I distinguish two related types of policy. The first, which I call “theory based,” can be formally derived from a well specified theory; the second, which I call “intuition based”, is not formally derived but is in the spirit of the theory in question and seems reasonable to those who accept it.

## VIEWS OF THE ECONOMY

### Neoclassical economics

One of the founders of economics, Adam Smith, argued that competition would encourage "The Wealth Of Nations", by which he meant economic growth.<sup>2</sup> Another of the founders, David Ricardo, used as his technique of analysis the long term equilibrium of the economy, *the state of rest that would be achieved when all forces causing change had worked themselves out*. Alfred Marshal's *Principles* helped to solidify the Ricardian rather than Smithian approach in the English speaking world when he developed the theory of what we now call perfect competition. In it:

- firms maximise profits while consumers maximise their utility from consumption;
- there are so many firms and so many customers in each industry that no one of them can influence any market price, we say they are “price-takers”;
- these prices are set impersonally by market forces so as to produce an equilibrium in which the amount demanded is equal to the amount supplied.

When this theory was applied to the labour market, with workers as suppliers and firms as demanders, equilibrium occurred when there was no involuntary unemployment. If this were not so, wages would change, rising if there was an excess demand for workers and falling if there was an excess supply until equilibrium full employment was attained.

*It was a noble conception in which no one had any power over the market yet the market worked for the general good.*

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<sup>2</sup> For this slightly unorthodox but I think convincing interpretation of Smith, I rely on the cogent analysis of the late, great historian of economic thought, Mark Blaug (2007).

In its formal development, it was a theory of the behaviour of individual markets until, in the middle of the 20<sup>th</sup> century, Kenneth Arrow and Gerard Debreu proved the existence of an equilibrium for a model of an entire competitive economy.<sup>3</sup> The model's conditions were quite special and often unrealistic. Nonetheless, it was shown that a general equilibrium could exist in a model economy that did mirror at least some aspects of real economies.

Here we consider critically just three of the many key characteristics of this general equilibrium model.

#### *No Market Power*

In the time between Alfred Marshall and Arrow and Debreu, as a result of several new technologies, the era of the small price taking firm gave way to the era of the large corporation with substantial market power. It went from what Adam Smith called the "invisible hand" to what the great business historian Joseph Chandler called the "visible hand".

#### *Static view*

Neoclassical theory is a theory of an end state that would occur if all change-causing forces were allowed to work themselves out. No consideration is given to an economy that is continually changing as a result of the introduction of new technologies and other persistent forces.

#### *Given preferences and technology*

Equilibrium analysis requires the absence of forces causing change, so consumption preferences and production technology are assumed to be exogenous, i.e., not determined from within the theory.

#### *Evaluation of the price system*

That market economies are efficient relative to the alternative of running them according to the commands of bureaucrats was settled beyond doubt in the 20th century by the great failed experiment with Soviet-style planning. But how efficient they are relative to how efficient they might be under different conditions is still much debated.

Arrow and Debreu's perfectly competitive idealisation of the market economy has an equilibrium in which it is impossible to make anyone better off without simultaneously making someone else worse off. Today some economists, including some writers of advanced micro theory textbooks hold that the Arrow-Debreu model helps us to understand the virtues of real market economies. Others hold the opposite view. For example, Mark Blaug (2007) refers to economists'

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<sup>3</sup> Of course, many earlier economists, such as Pareto and Pigou in their analyses of welfare economics, had assumed the existence of a general equilibrium for the whole economy, but Walrus seems to have been the only one to attempt to prove this formally.

schizophrenia in arguing that although the assumptions required by this model bear virtually no relation to reality, the model nevertheless is in some way useful in helping us to understand reality.

In the Arrow-Debreu economy, any interference into the free working of markets by governments, large firms or trade unions is a distortion that reduces market efficiency. The theory-based policy of non-interference refers to this imaginary economy; the intuition-based policy makes the jump of assuming that what is welfare-reducing in that imaginary economy will be welfare-reducing in our real economy.

### **Evolutionary Economics**

In evolutionary economics, competition is viewed as a process rather than the as an equilibrium end-state. A major tool in such competition is the introduction of new technologies, such as the computer that replaced the mechanical desk calculator; new processes, such as the modern robotised factory that replaced the Fordist assembly line; and new forms of organisation, such as the replacement of the old pyramidal form of business organisation by the looser more lateral form that is more common today. All of this implies that technology is in fact an endogenous variable that is being continually changed by firms searching for temporary advantages over their competitors. These changes occur not randomly but in a path dependent trajectory where what happens today depends critically on what happened yesterday.<sup>4</sup>

This technological change is the main driver of long term economic growth. Notice importantly that such growth does not just produce more of the same. We have ten times as much real income as our Victorian ancestors, but we do not spend it on more horse drawn carriages and steam train rides to the local sea shore. Instead, we spend it on new products produced with new more efficient means. Most of the products that we take for granted today would have seemed like miracles to our grandparents and inconceivable to theirs.

Although most economists would agree today that technological change is endogenous to the system, much economic analysis takes place in, and much policy advice is derived from, microeconomic theories in which technology is unchanging.

#### ***A Digression on Risk and Uncertainty***

Assume we are unsure whether or not some event will happen. It is risky if we can calculate the odds on it happening, but it is *uncertain* if we cannot calculate

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<sup>4</sup> The path dependent nature of technological change has been noted by many students of technology. See for example Nelson & Winter (1982) and Lipsey, Bekar and Carlaw (2005).

these odds. It is a characteristic of risky situations that two equally well-informed maximising agents, possessed of the same knowledge will make the same choice – the one that maximises the expected value of the agents’ objective function. It is a characteristic of uncertain situations that the same two agents may make different choices and there is no way, until the results of both choices are known, of deciding who made the better choice.

Research into technological change shows that one cannot even enumerate the possible outcomes of various lines of R&D devoted to some new technology. Large sums are sometimes spent with no positive results, while trivial expenditures sometimes produce results of great value. Furthermore, the search for one objective often produces results for different objectives.

Uncertainty is involved in more than just making some technological breakthrough. There is uncertainty with respect to the range of applications that some new technology may have. The steam engine, electricity, the laser, the electronic computer, the internet and fibre optics are examples of technologies that were initially thought to have very limited potential. Commercialization is another important part of the innovative process that involves uncertainty. Many marvellous technological advances were commercial flops.

The fact that those who seek to invent and innovate make R&D choices under uncertainty has important implications

- There is no unique line of behaviour that maximizes firms’ expected profits—if there were, all equally well-informed *competing* firms would be seeking the same breakthrough made in the same way. Firms do make decisions but these involve knowledge, guess, hunch and good judgment and cannot be solely based on scientific calculation.
- Hence there can be neither a static nor a dynamic unique Arrow-Debreu-style optimal allocation of resources.
- Hence, firms and households should be visualized as *groping into an uncertain future in a purposeful and profit seeking manner (instead of maximizing the expected value of future profits or utility).*

In neoclassical treatments, although the term uncertainty is often encountered, the models are almost all based on rational calculation to reach maximising positions – something that can be accomplished under conditions of risk but not uncertainty.

## SOME MICRO ECONOMIC POLICY ISSUES

Now let us consider some policy applications of these economic theories.

### **Anti monopoly policy**

#### *The Neo-Classical View*

In neoclassical economics market power creates "market failure" because in equilibrium the price is too high and the output is too low to be optimal, while in perfect competition price and output are optimal. Micro-economics text books invariably have a section entitled the "deadweight loss of monopoly" (which in the circumstances means any firm with market power). The theory-based policy is to make all firms in all such industries behave as if they were in perfect competition. The intuition-based policy is to reduce market power wherever and whenever possible.<sup>5</sup>

#### *Evolutionary View*

In fact, competition among firms with market power is commonplace. These firms compete to a great extent in technology using their profits to finance their R&D. For example, the agricultural innovations that allowed Western countries to move within a century from around 50 percent of the labour force on farms to less than 5 percent came from oligopolistic firms in the farm equipment industry not from price-taking farmers.

*The challenge of evolutionary economic policy is to accept the common existence of market power and to keep firms actively competing rather than coalescing into de facto monopolies.*

### **Growth in General**

According to the neoclassical view, governments should ensure that the economy functions well by having a good financial system and effective laws governing such things as the copyrights, the safety of property, and bankruptcy. After that, the miracle of the market can be left to do the job. Any direct intervention into how the market allocates resources is to be avoided as causing "distortions". This applies to R&D as well as everything else.

Evolutionary economists agree that providing these background arrangements is a necessary condition for ensuring sustained growth. But, as we observe below, they argue that doing so is by no means sufficient.

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<sup>5</sup> Operating from within neoclassical economics, the theory of second best (Lipsey and Lancaster (1956) and Lipsey (2007) rejects this piecemeal, intuition-based policy (and the theory-based policy is, of course, impossible to achieve in practice). But here I am interested in criticisms that come from evolutionary economics.

## **R&D and Growth**

Two questions arise when we consider growth-inducing Research and Development (R&D): Is the total amount optimal? and, Is that total allocated efficiently among the various possible lines of enquiry?

### *Neo Classical*

As regards the total, the position expounded long ago by Kenneth Arrow (1962) and agreed to by evolutionary economists, is that the amount that the free market would allocate to R&D is too small. Those who invent and innovate major new technologies do not reap anything like the full value of the social benefits. For example, major new technologies enable the profitable development of myriad derivative technologies by many firms that were not involved in developing the original technology. So there is a case for using subsidies and tax relief on R&D expenditures to encourage more than the unaided market would provide.

As regards the allocation of total R&D expenditure among alternative lines of enquiry, the two sides diverge. In most neoclassical treatments, R&D is subject only to risk so that the probability of success in each particular line of enquiry can be calculated. This allows profit-oriented private firms to allocate R&D money so as to maximise the expected value of the total. Any state interference to alter this allocation is a distortion that will lower the expected value of the total effort.

### *Evolutionary*

Evolutionary economists offer two objections. First, because the development of new technologies is subject to major uncertainties, there is no unique discernible maximising allocation of R&D, departures from which are 'distortions'. Second, the degree to which agents can appropriate the value of new inventions varies greatly. For example, the profit incentive is weak at the pre-commercial stage of the development of major new technologies, while it is much stronger at later stages. So a generalised form of R&D support is neither efficient nor neutral, since it encourages those who do not need it as much as those who do.

## **Picking winners**

### *Neoclassical*

By and large neoclassical economists have been hostile to the picking of products, firms or industries for public support on the theory-based grounds that any non-general support for R&D is a distortion. The intuitive-based argument is that even if it were desirable in principle, governments are particularly bad at it and will mostly make mistakes in directing their support. "Governments cannot pick winners" is a commonly heard argument against selective support.

### *Evolutionary*

Evolutionary economists argue that neoclassical theory is too abstracted from the details of technology to come to grips with the issues involved in this debate.

Detailed microeconomic research suggests that purely private incentives are insufficient to get many radically new technologies past their early stages of development. Consider some American examples. Early on, the US aircraft industry received substantial assistance from a government body that among other things pioneered the development of large wind tunnels, and demonstrated the superiority of the retractable landing gear. The airframe for the Boeing 707 and the engines for the 747 were both developed in publicly funded military versions before being transferred to successful civilian aircraft. Electronic computers and atomic energy were largely created in response to military needs and military funding. Early support for the US semiconductor industry came mainly from military procurement whose rigid standards and quality controls helped to standardise practices and to diffuse technical knowledge. The US government's heavy involvement in the early stages of the US software industry produced two major spin-offs to the commercial sector. One was an infrastructure of academic experts, built largely with government funding; the other was the establishment of high and uniform industry standards. The space industry with its myriad industrial spinoffs, that is currently just beginning to be taken over by private firms, was fully created by public funds, in particular those associated with the race to the moon in the 1960s.<sup>6</sup>

Since most of these support activities did not take the form of direct subsidies listed in the government accounts, Americans are free to believe the myth that the miracle of the unaided market accounts of their 20th century industrial predominance when in fact it was a judicious combination of public support and private initiative in both the 19<sup>th</sup> and 20<sup>th</sup> centuries. Sadly for Americans, all too many of today's US Republicans, bent on minimizing government, do not understand that this public-private cooperation was what lay behind so much of their past successes.

A similar list can be compiled for many other countries. I hasten to add, however, that although governments clearly can and do pick winners, it is also clear that they have picked a large number of massive failures. So the real policy issue is to establish the conditions under which government interventions to encourage particular technological developments are likely to succeed or fail. This Lipsey and Carlaw have attempted using case studies of both successes and

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<sup>6</sup> Most of these examples are drawn from Lipsey & Carlaw (1996).

failures to extract several dozen lessons of what to do and what to avoid doing in order to increase the chances of success.<sup>7</sup>

## **Infant Industries**

### *Neo Classical*

The standard infant industry argument for tariff protection found in the text books is to assist a new industry in a developing country that is subject to substantial economies of large scale when such industries are already established elsewhere. According to the argument, because capital markets are imperfect, the industry needs assistance to grow large enough to move to the bottom of an extended, negatively-sloped, long-run cost curve (i.e., to fully exploit existing major economies of scale).

### *Evolutionary*

Once it is recognized that technology is subject to continuous endogenously generated change, infant industry protection is not seen as merely a matter of moving along a static long run cost curve, but of establishing a dynamic industry that can hold its own in fierce international competition where technological change is one of the main weapons.

The 19<sup>th</sup> century Scottish born Canadian economist John Rae (1905) argued that since technology is endogenous, the policy advice of building on one's current comparative advantages, which is an argument for staying with the status quo, is no longer obviously the best advice. A country's competitive advantages can be changed by public policy.

The dramatic vindication of Rae's arguments came not long after the end of the Second World War. Three poor, undeveloped countries, South Korea, Taiwan and Singapore, created the basis for the Asian growth miracle by setting out to create their own comparative advantages in manufacturing industries in which they had no obvious current advantage.

Their firms, having no initial experience in foreign markets, had to climb steep learning curves concerning such things as product quality, reliable delivery times, marketing techniques and after sales servicing. The public policies for helping them do this were complex but they amounted to creating new competitive advantages through subsidizing and rewarding success but penalising failure in creating viable export-oriented industries. The Taiwanese government, for example, virtually created its electronics industry in which it became a world leader. In a very few decades, the living standards of these once-poor countries

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<sup>7</sup> See, for example, Lipsey and Carlaw (1998a) and (1998b)

approached those of the established industrialised nations – a miracle of government-managed endogenous technological change.

## MACRO ISSUES

In this section, I look at some macro theories and ask if what we know about the microeconomics of technological change has any relevance in this context. Here I am on less familiar grounds than in the first section. I am an outsider. But as such I may still have a different perspective to offer – a perspective that asks macro economists to step outside of the box for just a bit.

Both New Classical economics and New Keynesian economics are changing rapidly so I must paint with a broad brush. My stress will be on demand versus supply side views of the economy and the implications of endogenous technological change. Because of the latter, I need also to consider the issue of micro underpinnings of macro relations.

### Old Fashioned Keynesianism

The prototype of old Keynesianism is the IS-LM model and one of its major novel aspects was to provide a theory of aggregate demand and its fluctuations. In it there was no market-clearing, full-employment equilibrium.

Later the model was closed with a Phillips curve, first simple and then expectations-augmented. Hardly noticed at the time, this Phillips curve closure had the paradigm changing consequence of introducing into the Keynesian model a full employment equilibrium with the price level altering to remove inflationary gaps (quickly) and deflationary gaps (slowly); in both cases propelling the economy back to its *assumed* unique, full-employment equilibrium,  $Y^*$ .

The OPEC oil shock of the early 1970s caused a stagflation with simultaneous increases in inflation and unemployment, a conjunction not seen before in modern times.

### New Classical Economics

About that time the New Classical economists attacked Keynesian economics on two grounds

1. They asserted that Keynesian economics was decisively refuted by stagflation. Lucas and Sargent (1979) spoke of “the spectacular failure of the Keynesian models in the 1970s” and asked what could be salvaged from the “wreckage”.
2. They accused it of having inadequate micro underpinnings.

But instead of accepting this “decisive refutation,” Keynesians responded to stagflation by extending their model to accommodate it. The IS-LM part was compressed into an aggregate demand curve and an upward-sloping, short-run aggregate supply curve was added.<sup>8</sup> Now exogenous increases in costs such as were caused by the OPEC oil shock, shifted the AS curve upwards, pushing the economy along its AD curve causing prices to rise while output fell. This extension of the model first entered elementary text books in Baumol and Blinder’s, 1980 edition followed by Lipsey and Steiner in 1981. It remains today in almost all first year books.

At the start of every new edition of our UK and Canadian texts, my co-authors and I ask teachers if they want something of the New Classical or New Keynesian macro models added but we are always told that the old Keynesian model is good enough for first years. *Surely it would seem strange to a scientist from another disciple that a theory that had been “decisively refuted” decades ago is still taught to beginners, many of whom will study no more economics.*

One of the most important consequences of the New Classical rejection of Keynesian economics was to remove aggregate demand from centre stage in the play of cyclical fluctuations.

The second New Classical criticism was that Keynesian economics had unsatisfactory micro underpinnings because, among other things, they were not based on full maximizing behaviour.

Keynesian aggregate economics did have an elaborate set of empirically based microeconomic underpinnings – underpinnings that had been worked out in the decades following the publication of *The General Theory*. Strong empirical evidence showed that the marginal costs of manufacturing firms are constant as output varies up to full capacity. It was also clear that modern markets were served mainly by large price-setting firms and empirical evidence showed that they typically added a mark up to their horizontal marginal cost curves, producing a price that did not fluctuate with every fluctuation in demand. This made quantities not prices the main short run source of adjustment when aggregate demand fluctuated. It was debated if this “full cost pricing”, which clearly existed, was consistent with profit maximization.<sup>9</sup>

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<sup>8</sup> See Lipsey (2010a).

<sup>9</sup> See Lipsey 2000 for elaboration of these issues. Note that much of the cost discussion here, and in most next books, concerns firms in the shrinking manufacturing industries and does not even consider the cost structures and short run cost curves of firms in the many modern service industries.

On the wages side, Keynesians took it as so obvious that wages were inflexible in the short run that they saw no reason to explain the behaviour theoretically. However, later generations of new Keynesian economists provided a number of plausible theoretical explanations such as were found in the theories of relational contracts, efficiency wages, signalling, internal labour markets, incentives to avoid violation of trust, tournaments, and the need to protect investment in non-firm-specific human capital .

*The pre-Phillips curve Keynesian macro relations, in particular that quantities rather than prices were what mainly adjusted over the demand driven business cycle, were consistent with these empirically based micro underpinnings and with firms operating in the uncertain world of continuous endogenously generated technological change, but not necessarily consistent with full long run inter-temporal maximisation.*

In the place of these Keynesian micro underpinnings, the New Classical economists focussed on a representative, infinitely lived consumer who maximized his/her lifetime utility and a representative producer who was a price taker operating in a perfectly competitive, flexible-price market and later a version of monopolistic competition that was mathematically tractable but which had been abandoned by Chamberlin himself after a long debate with Nicholas Kaldor.<sup>10</sup> Both producers and consumers had rational expectations about all future events. Cyclical fluctuations occurred around an equilibrium growth path and were caused by random fluctuations in preferences and technology.<sup>11</sup> Since all agents were maximizing under rational expectations, it followed that the behaviour of the cycling economy was optimal; policy intervention could only worsen it.

So the charge against Keynesian economics that would at least have been founded in fact was not that it had no micro underpinnings, nor that their underpinnings were empirically unrealistic, but that they were not always the result of maximizing behaviour.

Because Keynesian economics was assumed (albeit incorrectly) to have been decisively refuted by stagflation, a debate about the relation between micro and

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<sup>10</sup> The Dixit-Stiglitz version of monopolistic competition is almost universally used today because it is mathematically tractable. It is, however, based on Chamberlin's symmetry assumption that all differentiated versions of a generic product are equal substitutes for each other – e.g., small cars, medium sized cars and large luxury cars. Eaton and Lipsey (1989) show that monopolistically competitive markets behave very differently, when this assumption is replaced by the empirically relevant assumption that such goods stand in a chain of various degrees of substitutability.

<sup>11</sup> See Carlaw and Lipsey (2012 forthcoming) for an alternative model in which endogenous technological change drives the economy along a non-stationary growth path that display unpredictable fluctuations due to the many uncertainties faced by its agents.

macro variables never took place. Here are some of the issues that should have been openly debated at length:

1. Why is it necessary that all the micro behaviour that is assumed to underlay macro behaviour be based on dynamic optimization over the infinite time horizon when evolutionary theory backed by solid empirical evidence shows that such behaviour is impossible given the uncertainty under which most technological change continuously occurs?
2. Why is it acceptable to criticise old Keynesian economics for being based on ad hoc assumptions while basing the driving force of cyclical fluctuations in the new Classical economics on the ad hoc assumptions of random variations in (i) preferences and (ii) technology? There is no empirical evidence to support the former assumption and there is clear empirical evidence establishing the path dependent, non-random fluctuations in the latter.
3. Why is everything that is established in industrial economics about the behaviour of firms in small group competition deemed irrelevant to macro behaviour, which is the implicit assumption when a single representative firm stands for the production side of the New Classical economy?
4. Why is it acceptable to determine the price level by tacking on a quantity theory equation to an New Classical real model without any micro behavioural theory of how the action of agents causes the price level to change when the quantity equation is not satisfied.

Instead of those debates, we have the result recently stated in a review article: "In modern macroeconomics, no analysis is deemed to have pedigree if it is not based on explicit dynamic optimization."<sup>12</sup> Even the so-called new Keynesian economists who attempt to model some Keynesian characteristics obey this injunction that their agents should be inter-temporal optimizers.

### **Effects of the rise of New Classical Economics**

The replacement of the Keynesian by the New Classical as the prevailing macro economic theory had some interesting implications:

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<sup>12</sup> Lipsey & Scarth (2011: xxvii)

- to transfer emphasis from the demand to the supply side as providing explanations of cyclical fluctuations with the supply side producing equilibrium income at all times and aggregate demand side only determining the price level;
- to put freely fluctuating prices rather than fluctuating quantities as the main adjuster of the economy's short run behaviour;
- to replace the Keynesian prediction that the markets often contained unsatisfied firms, customers and workers with the assumption of continuous market clearing;
- to make obligatory the assumption of rational dynamic maximization by all agents.

### Hybrid Keynesian-Evolutionary Macro

Take an old fashioned Keynesian model, possibly updated by such things as the newer theories of why wages tend to be rigid over the cycle, add a creditable low inflation policy by the Central Bank, remove the expectations-augmented Philips curve and replace it with the evolutionary view of how the economy behaves. It fluctuates cyclically mainly because of variations in aggregate demand, variations that originate sometimes in investment booms and sometimes in monetary incidents; and it is subject to long waves that alternate between relative prosperity and harsh times as economic historians have observed and Freeman and Luca explain in Schumpeterian style in their great book *As Time Goes By* (2001). These waves are driven by major endogenously generated technological shocks that are anything but random but instead are highly auto correlated because they are associated with the major upheavals in the whole structure of the economy that are made necessary by new general purpose technologies that bring with them waves of new derivative technologies.

Such an economy has no stable long run equilibrium either in a static sense or the sense of a steady state growth path that is returned to if disturbed.<sup>13</sup> Instead, the constantly changing economy can exist, as shown in Figure 1, over a wide range of income, employment and unemployment values, without behaving as it would if its inflation rate were determined by a quantity theory equation or an expectations-augmented Phillips curve centered on unique general equilibrium values of  $Y$  and  $U$ . (Figures are at the end of the paper.) Instead of a NAIRU there is a non-inflationary band, a NIABU. At either extreme end of this band, there may be something like a Phillips curve with GDPs in excess of capacity being associated with accelerating inflations, and GPTs well below capacity, as in serious

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<sup>13</sup> For such a model see again Carlaw & Lipsey (2011)

and prolonged recessions, being associated with a falling price level. But between these two extremes, we have a NAIBU over which the economy can fluctuate around a creditable central bank inflation target without encountering any tendency the rate either to accelerate or decelerate.

Figures 2 and 3 show that, at least at first glance, this NAIBU picture seems to conform with the facts. The figures show the Canadian and UK inflation rates plotted against their corresponding rates of unemployment from 1981 to 2011. We see in both countries the high inflation rate of the 1980s slowly coming down until the rates come to cluster closely within a narrow band of about one percentage point on either side of an inflationary target of 2 percent. In the Canadian case, the rate only falls outside of the band in two years, both with a rate below one percent. In the UK there are three years in which the rate is slightly above that band and one in which it is slightly below. But in both cases, there is no tendency for the inflation rate to show systematic movements of either acceleration or deceleration, in spite of wide variations in the unemployment rate.<sup>14</sup>

## **DEMAND SIDE VS. SUPPLY SIDE EXPLANATIONS AND POLICIES**

As far as short run behaviour is concerned, the most important difference between the old fashioned and hybrid Keynesian on the one hand and the New Classical on the other is in the relative merits of demand-side and supply-side explanations. Although recently some New Classicals and some new Keynesians have begun to alter their models to introduce some demand-side effects, this distinction is historically valid and still is to a great extent today. In what follows I will consider demand and supply side explanations without attribution of any of these to particular theories or theorists.

### **The Housing Boom of the Mid 2000s in the US and Elsewhere**

In the demand-side interpretation, there was a boom in new housing construction financed by credit creation through mortgages and new derivatives. As housing prices rose, existing owners were able to re-mortgage their homes and spend the proceeds. High consumer spending combined with high incomes in the housing industry caused a high level of output and employment. It was partly sustained by the unrealistic expectations of home owners that their prices would go on rising indefinitely and the overly zealous and sometimes dishonest sales persons.

Many of the mortgages had low or non-existent payments for several initial years, followed by relatively high ones. Many were sold to persons who had little

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<sup>14</sup> The issues surrounding this paragraph are investigated in much more detail in Lipsey & Scarth (2011) and Carlaw and Lipsey (2012, forthcoming).

possibility of servicing them once the initial low payment period was over. By then the sellers had repackaged the mortgages and, with the aid of rating agencies, classified them as low risk and sold them both domestically and internationally.

When the higher interest payments kicked in, defaults rose dramatically and the building boom came to an abrupt halt. Many lost their homes while others with mortgages that they could still just sustain found themselves forced to cut their discretionary spending on other goods and services. The fall in spending by consumers and home builders caused a major recession.

It is hard to see how any supply-side explanation can support the view that this recession was caused by random fluctuations in a preferences and technology. It would need to explain among other things:

1. How the collapse of the housing bubble could have been caused from the supply side.
2. The rise in unemployment appears to have been caused by a fall in demand for labour services? Can it be explained by a rise in frictional and structural unemployment, i.e., something else emanating from the supply side?
3. Did those who lost their homes and those who had increased their mortgages to sustain consumption spending have rational expectations about the future housing prices and about their ability to handle the mortgage payments when the higher rates kicked in?
4. Was the market for subprime mortgages and the resulting derivatives an efficient market? Did not fraud and ignorance play an important role?

## **Recovery**

In the demand-side view, the banks and firms who are currently sitting on historically large amounts of liquidity are worried about customers' ability to repay and so are unwilling to grant sufficient credit to both existing and start up firms that would have gotten credit in more normal times. The eventual recovery will be driven mainly from the demand side by a recovery of consumer spending and business investment. (As I was writing this, I heard the news reporting the encouraging sign that US consumer spending is beginning to rise.) Firms will use their own and borrowed funds to finance increases in their outputs as soon as the demand is there. A rise in sales will eventually alter banks' expectations and they will begin to grant loans more freely thus feeding the recovery.

In the theory-based supply side view we are only seeing a low equilibrium level of income and employment. So the recovery must come from the supply side by an increase in equilibrium national income. How will that occur over the next couple of years? In the theory-based view does this come from a shock from technology that lowers firms' costs and leads them to produce more? What else? In the intuitive-based policy view as expounded by Republicans in the US, the low output is caused by the repression of firms by excessive regulation and uncertainty about forthcoming policy changes. Since there was no sudden increase in regulations and taxes at the onset of the recession, it is hard to see this as source of the recovery since it was clearly not a cause of the recession. Nonetheless, this is the view.

### **Can Fiscal Policy Help?**

The demand side answer is "Yes" Current fiscal policy at all levels of government is hurting because policy makers are doing what they did in the 1930s to subsequent universal condemnation: cutting expenditures in an effort to remove their deficits while the recession is still serious. They could help by at least holding expenditures constant or by engaging now, rather than after full employment is achieved, in the kinds of infra-structure repair and replacement that is long overdue. Re-time more of it to the present and help to restore demand, rather than undertaking it at a time of full employment and possibly creating inflationary pressures. Even if the multiplier is low, it is better to have a positive injection of expenditure than a negative one.

In the hybrid view there is no worry about anything like crowding out because there is no unique equilibrium value of national income that would force reductions of other types of expenditure to offset an increase caused by expansionary fiscal policy; instead its main effect would be to move the economy within the NAIBU towards full employment.

The supply side answer to the question in the heading is "No". Increased government expenditure with no change in the real side of the economy would raise neither national income nor expenditure. According to the Ricardian equivalence doctrine, agents perceive the future obligations imposed by new deficit-financed government expenditures and adjust their savings to offset it fully. In reply, evolutionary economists argue that technological change is inevitably full of unforeseeable surprises. For example, no one in the late 1960s foresaw that the new ICTs and falling transport costs would combine to kill many relatively low-skilled but high-paying manufacturing jobs in the developed nations and so alter the life-time earnings of assembly line workers. Nor did most of the middle class persons – teachers, firefighters and police officers – who have been unemployed

for over a year in the latest US recession ever anticipate such an event. So to predict consumer behaviour on the basis of an hypothesis of life-time maximisation under rational expectations is likely to be misleading. Indeed, to a demand sider it seems odd to believe that the unemployed, desperate to pay the food and medical bills would decide to save the new injection of unemployment insurance because their heirs will have to service the debt that this deficit financed expenditure imposes.

### **How Can the EU Countries Get Out of Their Present Difficulties?**

As far as Greece is concerned, I am reminded that when Yogi Berra was asked how to get to a particular place he replied: "If I was going there I wouldn't start from here" Starting from Greece's present position, it is hard to see a clear way back to normalcy. The common European currency is the modern version of the gold standard. Demand siders observe that the relative downward inflexibility of wages and prices implies, as it did in the late 1920, that the deflation needed to restore a country's competitive position when it is seriously out of line is a long, slow and painful process.

Other EU countries are not in quite so precarious a position but those that have major deficits, including the UK, are all adopting similar supply side policies of major cuts in public expenditures. With recession and heavy unemployment, this policy does not appeal to demand siders who argue that imposing austerity in an already depressed economy risks exposing it to many more years of suffering. They point, for example, to the social problems that may result from prolonged heavy youth unemployment, anything from 20% to 50% depending on which country you consider. As the Arab Spring has shown, large numbers of unemployed youth can provide a potent force for social unrest. Also, as economic research has shown, prolonged periods of unemployment early in one's adult life can have lasting effects on the employability and productivity of those persons throughout the rest of their lives.

Many supply siders see the only route out of the present mess as austerity to remove large government budget deficits. This may be the only way out, but the route already seems much longer and more painful than many had anticipated. As one of the most vocal of the American demand siders, Paul Krugman, recently argued "Two years ago, as many policy makers and pundits began calling for a pivot from stimulus to austerity, they promised big gains in return for the pain. He then goes on to quote the then president of the European Central Bank, speaking in June 2010. "The idea that austerity measures could trigger stagnation is incorrect. Fiscal discipline will inspire confidence, and this will lead to economic growth'." The same arguments can be heard from Republicans in the US. The demand siders

argue that the austerity will depress incomes and employment and hence government tax revenue, making recovery even more difficult and prolonged.

But what can be done according to demand siders? There is little that the countries of the monetary union can do acting individually short of default, which Greece has already done quite a bit of, or leaving the common currency and then devaluing. It is doubtful if every one of the countries in present difficulties would have signed on to the common currency if they could go back to the design time knowing what they do now. But once in, leaving it is quite another matter; the tiger is truly being held by its tail.

The UK does not have this constraint and demand siders would have the government ease off on the present austerity, advocate a creditable policy for adjusting any structural deficit, through future changes in tax rates and expenditures, so that the budget would be more or less balanced at full employment in the longer term, and then stimulate the economy in the shorter term. If one is worried about the Ricardo effect or the increasing burden of interest payments, the government has the option of resorting temporarily to the printing press (i.e., selling its bonds to the Bank of England in return for new deposit money). Some demand siders suggest that putting up with a prolonged recession and heavy unemployment is an unreasonable price to pay for avoiding some temporary increase in the rate of inflation that would be imposed by a few more years of such stimulus. To go further, we would need to quantify: how much inflation would be involved and for how long; and how much gain the stimulus would provide.

So I must leave it there. Supply siders argue there is no real alternative to austerity. Demand siders argue that such a policy risks a prolonged recession with all of the accompanying social and economic costs; instead they advocate further stimulus, or at least avoiding further cutting, as probably the best choice from among a set of mutually unattractive alternatives.

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