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Stories about productivity

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Stories about productivity

When asked about their methodological practices, most economists claim to practise some form of instrumentalist positivism, as advocated by Friedman (1953) or appeal to Popper's (1963) notions of falsification, implemented by the hypothesis-testing procedures of classical inference. More philosophically sophisticated members of the profession might, following Blaug (1980), refer to Lakatos' (1970) methodology of scientific research programs.

In practice, however, particularly in debates over economic policy, economists rely heavily on a 'story-telling' approach. What matters in this approach is not the formulation of decisive tests of statistical significance, but the application of economic reasoning to the relevant 'stylised facts' to produce a convincing narrative account. Although most prescriptive methodologists regard such story-telling as relying on inappropriate appeals to implicit presumptions and collective authority, this approach has been strongly defended by McCloskey (1983).

Beginning in the late 1990s, a narrative developed around the idea of a 'new' or 'miracle' economy in Australia. Although strong macroeconomic performance, particularly during the Asian economic crisis, contributed to the appeal of this narrative, the crucial element of the story was derived from estimates of multifactor productivity (MFP) developed by the Australian Bureau of Statistics (various years), first published by the in the late 1990s, and presented by the Productivity Commission (Parham 1999, 2000) as evidence of the success of microeconomic reform.

The ABS estimates showed a surge in productivity beginning around 1993-94, and were interpreted as showing the benefits of the micro-economic reforms undertaken by the Hawke-Keating government. Although the improvement in estimated MFP growth rate was not sustained beyond 1998-99, the story of a productivity surge driven by reform continues to be told.

The statistical basis for the 'new economy' story has been disputed by critics. Quiggin (2001) argued that the observed upsurge in estimated rates of

MFP growth could be explained, in large measure, by recovery from recession and by an unsustainable increase in work intensity.¹ Quiggin (2005) claimed that the slowdown in MFP after 1998-99 supported this view. A more fundamental criticism was offered by Hancock (2005), who fitted simple linear and quadratic models to the data and found that the null hypothesis of a constant rate of MFP growth could not be rejected. In response, Parham (2005a) argued that an appropriate analysis of data, using smoothing, error-correction and appropriate timing of cyclical breaks supported claims of a productivity ‘surge’ in the 1990s.

In this paper, it will be argued that, given its relatively short duration and high year-to-year variability, the MFP data set does not contain enough information to allow clear statistical discrimination between competing hypotheses. As a result of this lack of information, combined with the human predilection for observing patterns, a range of alternative stories, each of which may be supported by an appropriate interpretation of the data, has been produced.

Three such stories are described here. The first is the ‘New Economy’ story put forward by Parham and others. The second story agrees with the first regarding the 1990s, but interprets the subsequent decline in productivity growth as the result of a failure to pursue microeconomic reform with sufficient vigour. The third story rejects the idea of a productivity miracle in the 1990s and argues instead that productivity growth rates experienced a sharp decline at the end of the postwar ‘Golden Age’ around 1970, and that this decline has been sustained, although with fluctuations around the trend.

¹ For reasons that are not clear, Parham (2005a) summarises this paper as follows: ‘A self-professed sceptic, Quiggin (2001) has come to accept that there was a productivity surge, though his is at the low end of estimates’. The conclusion of Quiggin (2001) was: ‘The claim that economic performance in the 1990s was comparable with that of the golden age of the 1960s is inconsistent with the empirical evidence. On the basis of the available data, it is not even possible to conclude with confidence that the underlying rate of productivity growth was higher in the 1990s than in the 1980s.’ This conclusion does not support Parham’s interpretation.

Background

Beginning in the late 1990s, the Australian Bureau of Statistics began producing estimates of MFP for the market sector, going back to 1963-64. The crucial requirement for the development of these estimates was the construction of estimates of the capital stock, thereby permitting the derivation of estimates of MFP in place of partial labour productivity measures.

The ABS statistics were organised using the concept of productivity cycles, typically of about six years, which were inferred from the properties of the annual MFP series. Although productivity cycles typically corresponded fairly closely to expansion and contraction phases of macroeconomic cycles, no exogenous information was used in dating cycles.

From a statistical viewpoint, the central question is whether the data set contains enough information to make reliable claims about average levels and trends in productivity growth and about the occurrence or absence of a structural break in those trends in the early 1990s.

It is important to observe that the ability to derive robust inferences from a data set typically declines each time the data is differenced. Thus, the data contains more evidence on the level of MFP than on the rate of growth of MFP, and more evidence on the rate of growth of MFP than on trends in the rate of growth of MFP. Attempts to detect a structural break in the trend rate of growth of MFP are therefore likely to be fraught with difficulty.

The data set allows a decisive rejection of the obvious null hypothesis relating to the rate of growth of MFP, namely that the rate is zero. On the other hand, as Hancock (2005) shows, using Ordinary Least Squares to estimate a simple linear trend of the form

$$\text{MFP}(t) = a + bt,$$

the null hypothesis $b = 0$ cannot be rejected at standard levels of significance. Similar results are obtained using a quadratic functional form

$$\text{MFP}(t) = a + bt + ct^2.$$

Parham (2005a) criticises Hancock’s analysis arguing that the failure to find statistically significant results reflects short-term noise in the data, and that it is better to focus on smoothed data. If the ABS analysis of productivity cycles is accepted, it seems most natural to focus on a data set consisting of such cycles, as is done in most of the informal discussion of the topic. This data set is presented in Table 1.

Table 1: Multifactor productivity growth since 1964-65

Cycle	Multifactor productivity growth rate ^a	First difference in MFP ^b
1964-65 to 68-69	1.3	
1968-69 to 1973-74	1.6	0.3
1973-74 to 1981-82	1.1	-0.5
1981-82 to 1984-85	0.9	-0.2
1984-85 to 1988-89	0.6	-0.3
1988-89 to 1993-94	0.7	0.1
1993-94 to 1998-99	2.0	1.3
1998-99 to 2003-04	1.0	-1.0

a: Percentage points, annual average

b Percentage points

Notes

1. Source: Australian Bureau of Statistics

2. The long-term average rate from 1964-65 to 2004-05 is 1.2 per cent

3. Excluded observation for 2004-05, -1.7 per cent

The obvious problem for statistical analysis is that there are only eight data points. This would be enough to detect a trend if the series declined or increased steadily. There are seven differences in the series, so the probability that they are all of the same sign (either positive or negative), under the null hypothesis of stationarity, is 2^{-n+1} or 1.5 per cent for $n=7$, which is sufficiently small to reject the null hypothesis. However, no such monotone trend is present in the data set.

Any more complex pattern is impossible to confirm or reject with such a limited data set, using standard classical inference testing. Parham (2005a) claims that visual inspection of the smoothed data set supports the hypothesis of

a productivity surge in the 1990s. However, the ability of the human eye to detect apparent patterns in random data is notorious. It is not difficult to find interpretations consistent with prior beliefs, but it seems clear from the course of the debate so far that a wide range of prior beliefs can be supported by visual inspection of the data.

Neither the raw annual data, nor the cyclical arrangement preferred by the ABS justifies rejection of the null hypothesis of random variation about a constant mean. There are a range of intermediate options, involving either the use of smoothed versions of the data set or the application of error-correction models to the raw data.

Parham (2005b) reports that statistical modelling using error correction methods yielded support for the hypothesis of a structural break in 1990-91. However, since there are a great many possible models incorporating structural breaks at different points in the data series, it is hard to assess the power of statistical tests. Given nearly 40 possible choices for a break point, it would be not be surprising to find the null hypothesis of a constant trend rejected for at least one of these points using standard statistical tests.

It seems unlikely that such results, mostly estimated over the period up to 1998-99, would prove robust if the same model were fitted to the out-of-sample data that has subsequently been observed. McKenzie (2005) using data for the period up to 2002-03 finds no evidence that the ‘spike’ in productivity during the mid-1990s was sustained.

Alternative stories

In the absence of any clear statistical resolution of disputes over the correct interpretation of the productivity data, it may be useful to consider an analysis of the debate based on a rhetorical or ‘storytelling’ approach to descriptive methodology. In this approach, rather than considering a description of research in terms of the formulation and testing of hypotheses, we consider various alternative stories that can be told about the data, and the factors that might lead to these stories being accepted or rejected in a given community.

The 'New Economy' story

According to the 'New Economy' the program of microeconomic reform that began with the floating of the Australian dollar in 1983 has, after some initial disruption, produced a new, more flexible and more productive Australian economy. Thus, the pain of structural adjustment has been more than offset by the gains from sustained high economic growth.

The 'New Economy' story was developed with a focus on estimates of MFP for the 1990s, and particularly the cycle from 1993-94 to 1998-99. After declining fairly steadily from the 'Golden Age' of the 1960s to the early 1990s, estimated rates of MFP growth showed a sharp upturn for the cycle beginning in 1993-94, matching or exceeding those of the 'Golden Age'. The final estimates for the cycle from 1993-94 to 1998-99 show a productivity growth rate of 2.0 per cent, the highest of any period in the ABS data set.

Advocates of the New Economy story, most notably Parham (2005b), have explained the relatively weak MFP growth estimated for the period since 1998-99 as the product of a variety of temporary factors, including a 'short-term blip' in 2000-01, possibly associated with the introduction of the GST, drought in 2002-03 and 2003-04, the Olympic Games in 2004, and, more recently, bottlenecks constraining growth in mineral exports.

Given underlying strong MFP growth, however, each of these temporary shocks should have been followed by above-normal MFP growth, as productivity returned to its long-term growth path. The idea of a 'productivity cycle' incorporates the notion that short-term effects like those discussed above should wash out over the course of a cycle.

This point is developed further by Dolman et al. (2006) who conclude that
'in an historical context, the productivity surge of the late 1990s, rather than the most recent productivity cycle, appears to be the more unusual experience.'

Dolman et al. consider a variety of explanations of the surge in measured productivity during the 1990s, including microeconomic reform, but find that none of them are consistent with the slowdown observed after 1999.

The 'New Economy' story gains more support from macroeconomic than from microeconomic outcomes. The current expansion, which has already lasted fifteen years since the trough of the 1990-91 recession, is one of the longest on record in Australia, and one of the longest for any OECD country in recent decades. It was continued growth during the Asian economic crisis of 1997 and 1998 that led to Krugman (1998) describing Australia's as a 'miracle economy'.

There is, however, no clear reason to link microeconomic reform to macroeconomic stability. Supporters of the 'New Economy' thesis argue that market-oriented microeconomic reform has increased the flexibility of the economy. However, observation of the global business cycle over the past two centuries gives little support for this view. Even though economic intervention was very limited in the 19th century, severe recessions and depressions occurred regularly. Similarly, government intervention, regulation and unionisation were very limited in the United States in the 1920s, but that did not prevent the occurrence of the Great Depression.

Despite these objections, the rhetorical appeal of the New Economy story is obvious. The narrative is one of virtue rewarded, always a popular theme. The rapid growth in wealth observed over the past few years is attributed, not to macroeconomic good fortune and a global decline in interest rates, but to the hard work and sacrifice of the 1980s and early 1990s.

'The light that failed'

An alternative story, also popular with some advocates of microeconomic reform agrees with the New Economy story in presenting rapid growth during the cycle from 1993-94 to 1998-99 as representing the benefits of microeconomic reform. However, the period from 1999-00 onwards is viewed more pessimistically. The slowdown in productivity growth is regarded as real, and the result of a slowdown in the pace of microeconomic reform.

The major difficulty for this story is one of timing. While the Howard government has taken a less consistent approach to reform than its Labor predecessors, it introduced a number of major reforms in its first few years in

office. Many of these were measures that had long been demanded by advocates of radical reform but resisted by the Labor government because of political sensitivities. These included the *Workplace Relations Act* 1996 (Cwlth), the partial privatisation of Telstra in 1998 and 1999, waterfront reform in 1998, and, most notably, the Goods and Services Tax, introduced in 2000.

Moreover, many reforms introduced by the Hawke–Keating government did not begin to take effect until after 1998. The most notably of these is National Competition Policy. Most states did not even complete their legislative reviews or set up their general regulatory bodies until 1998, and the National Competition Policy process, with associated payments to the states was still not completed by 2003-04.

If such an array of reforms is not sufficient to maintain even an average rate of productivity growth, the whole rationale of microeconomic reform is called into question. Far from generating sustained growth, the ‘light that failed’ story suggests that the decade or more of microeconomic reform that began with the floating of the dollar in 1983, produced only five years of above average productivity growth before requiring a renewed burst of reform merely to sustain past gains.

In view of the substantial adjustment costs associated with microeconomic reform, the ‘light that failed’ story implies that, in many cases, the net present value of microeconomic reform must be negative. It is generally conceded, for example, that the short-term consequences of financial deregulation included a relaxation of lending standards that contributed to the severity of the 1990-91 recession. If the benefits of this reform were only temporary, being exhausted by 1998-99, the present value, viewed from an *ex ante* perspective, was almost certainly negative.

The most convincing argument for the ‘light that failed’ story is based on the idea that international competition is becoming steadily more intense, necessitating ever more radical reform. But this idea is obviously inconsistent with the claim that microeconomic reform is associated with increasing welfare and economic productivity. The whole point of economic progress is that the

choice set available to society should expand, not contract.

Again, however, the ‘light that failed’ story has a strong rhetorical appeal. Surprisingly, perhaps, calls for sacrifice are always popular, and the view that it is never time to rest on your oars can always count on a hearing. The ‘light that failed’ story combines this rhetorical appeal with adherence to the claim that Australia did indeed experience a productivity miracle.

The ‘blip’ story

The central point of the ‘blip’ story (Hancock 2005, McKenzie 2005, Quiggin 2005) is that the productivity ‘surge’ of the 1990s was a statistical illusion. The central theme of the story is that the notion of a ‘productivity cycle’ is misleading, since the correct basis for comparison is derived from the business cycle rather than from internal properties of the series of productivity estimates. Dividing business cycles into two or more productivity cycles is likely to produce alternating periods of weak (contraction phases) and strong (expansion phases) productivity growth. This point is observed by Dolman et al. (2006) who note (p. 42) ‘A period of strong multi-factor productivity growth is not typically followed by another similar period.’

In addition to the general pattern of alternating expansion and contraction phases, Quiggin (2001) points to a number of temporary factors that led to an overestimation of MFP growth for the mid-1990s cycle. The most important was an increase in work intensity, correlated with an increase in reported and unreported working hours, and supported by widespread anecdotal evidence. Reported working hours for full-time workers peaked around 2000, as did popular discussion of increased work intensity. Thus, it seems likely that gains in measured productivity from this source during the 1990s were, at least partially, reversed after 2000.

Consideration of the MFP data supports this view. For the entire period since 1993-94, including the most recent observation for 2004-05, the average rate of MFP growth is 1.2 per cent, exactly the same as for the entire data period. For the current incomplete macroeconomic cycle, beginning at the last

cyclical peak in 1988-89, the rate of MFP growth is below the long term average

Thus, the 'blip' story is parsimonious as an explanation, and fits the data well. On the other hand, a negative finding lacks rhetorical appeal. The publication bias against such findings is well-known (Scargle 2000).

To the extent that the 'blip' story has rhetorical appeal, it does so by enhancing the contrast between the 'Golden Age' from World War II to the early 1970s and the long period of poor economic performance that began with the breakdown of the Bretton Woods system in the early 1970s. Although the ABS MFP data only goes back to the early 1960s, and begins with an anomalous decline in MFP from 1964-65 to 1965-66, it seems likely that MFP growth was strong throughout the Golden Age, which was also characterised by full employment and steady reductions in the inequality of income distribution. By contrast, the period since the early 1970s has been disappointing in all these respects.

An analysis showing higher productivity growth for the period before 1970 compared to the subsequent period is appealing for those who prefer the policies of the Golden Age, including Keynesian macroeconomic stabilisation, and an expanding welfare state, to the less interventionist policies associated with the program of microeconomic reform.

Concluding comments

Considered in Popperian or Lakatosian terms, the 'New Economy' claim that Australia experienced a productivity surge in the 1990s, driven by microeconomic reform in the preceding decade must be regarded as a refuted hypothesis. In the Popperian approach, the crucial test of a hypothesis is prediction and potential falsification.

The natural prediction of the New Economy hypothesis, put forward at the time the hypothesis was formulated was that the further reforms of the 1990s would generate continued strong growth in measured multifactor productivity. This prediction was refuted by the observed outcome. Subsequent attempts either to explain away contradictory evidence or to 'save the

phenomena' by advancing the modified 'light that failed' hypothesis may be seen as evidence, in the terminology of Lakatos, of a degenerating scientific research program.

Considered in the rhetorical terms proposed by McCloskey (1983), however, the 'New Economy' story and its variants remain highly successful. The view that Australia's long-running economic expansion, and the associated growth in household wealth is the product of tough decisions in the past, rather than a combination of asset inflation and adroit macroeconomic management has obvious appeal.

This appeal may be found both in the optimistic 'New Economy' version which projects a renewal of strong productivity growth as a result of reforms already undertaken, and in the more pessimistic 'light that failed' story in which we are in danger of losing the gains of the 1990s. Notably, while giving directly opposed interpretations of the data for the most recent productivity cycle, advocates of the two stories derive the same policy conclusion: more reform is needed.

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