

Submission to the House of Representatives Standing Committee on Economics Inquiry into Raising the Level of Productivity Growth in the Australian Economy

by

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Productivity Growth is Vital for Welfare Improvement

It is clear that world economic resources, as traditionally understood, are finite and that as issues of resource scarcity and sustainability become increasingly important the crucial way to enhance economic well-being will be through productivity growth. Productivity growth in this broad sense can be thought of as achieving more with a given quantity of resources, or equivalently achieving constant results with a lower resource footprint. Whichever way it is looked at, productivity growth is vital to future improvements in economic welfare. Yet even in our recent period of relatively high productivity growth by historical standards (the period 1996-2006) average annual productivity growth in Australia was barely more than half that achieved in the United States (1.5% compared to 2.8%). This submission will focus on problems of measurement, the inadequacies of theory, and resulting implications for policy.

Some Dimensions of the Modern Measurement Problem

Over the past century, changes in the nature of economies have made it increasingly difficult to measure productivity growth by traditional methods. These changes have also made it harder to measure the relative contributions of specific factors. This is especially true as economies have become more sophisticated, with an increasing dominance of services for which the distinction between inputs and outputs is difficult to resolve, where outputs may not be physical products and hence may be difficult to measure, and where complex interrelationships in the production of goods and services mean that the contribution of individuals is increasingly an unobservable *task* and not a specifically measurable component.

A Previously Important but Increasingly Irrelevant Distinction

Although there has been a lengthy debate about the relative contribution of microeconomic reform versus technological change to the recent productivity growth spurt, even this distinction is now difficult to maintain. One reason for this difficulty is that microeconomic reform is concerned with the modification of the environment in which economic relationships are transacted with the aim of producing greater efficiency in these relationships. However, in an increasingly sophisticated world, technological change at its heart is also concerned with modifying the way tasks are combined. Ultimately the recognition of a technological improvement also requires observing greater efficiency in production. It might be thought that the first of these is concerned with *process* while the

second is concerned with *product*, but in a world in which most transactions now involve the contribution of tasks in the production of a more complex result, the difference between process and product has become blurred. Furthermore, improvements of either type—if the distinction can be maintained—ultimately rest on *knowledge*. The increasing importance of the knowledge economy means that the real generators of productivity growth in the future are going to be smart ideas, regardless of whether they can be characterized as applying to process or to product and regardless of whether they arise from private sector or public sector input.

Previous Sources of Productivity Growth may have been ‘One Off’ – Where to from here?

Perhaps previous microeconomic reform, as well as well-known elements of the ICT revolution (such as improvements in microchip technology), made significant contributions to productivity growth in the past. But where do we go from here? While we may now have a standard of living that is higher than it has been in the past we cannot raise the average standard of living without further productivity growth. Obviously further microeconomic reform is possible, but there are probably severely diminishing returns here. New technological advances will also undoubtedly occur, but how can their effects be measured, and where are they to be found?

Prior to the IT revolution, who would have predicted it? Even now, we still do not have a clear idea of how the benefits of the IT revolution flowed through to the rest of the economy. So what will the next revolution be, and how prepared are we to be actively involved in the sectors from which those technological advances emanate? We should be considering *now* how to facilitate the *future* adoption of these changes to processes and techniques in downstream industries to maximize the flow-on benefits.

Current thinking on the economics of technological progress can probably be fairly described as still in its infancy, yet some things do seem clear. First, there is a link between technological advances and the R&D of private firms from the sector in which the advance emanates. If one wanted to predict the sector in which the next major advance might occur (IT again? bio-technology? nanotechnology? some other scientifically sophisticated sector?), and the country in which the discovery might first occur, a key determinant would be the extent and type of private sector R&D in the economy. Comparing Australia with some key OECD economies (USA, France Germany Japan, UK), in 2007 our R&D as a proportion of GDP was 1.8%, the lowest of this group, which averaged 2.2%. Furthermore, the contribution from private firms was 53% of Australia’s total private and public sector R&D expenditure, compared to a 61% group average.

What might be behind the relatively low R&D expenditure by private firms in Australia? Studies point to the *fertility* of the R&D process and the *appropriability* of the results of R&D as determining factors. Fertility depends on successful interaction between basic research and applied research and development. The success of this interaction depends critically on having available a well-educated workforce. This in turn, especially with the growth of the knowledge economy, requires strong basic education followed by substantial opportunities for deep specialization, clearly in scientific areas but also in innovative and creative thinking. Appropriability depends on the legal environment, with increasing emphasis on the need to protect intellectual property rights in the knowledge economy. Development of a suitable

framework for a changing environment itself requires the services of educated, innovative and creative human capital.

Key Needs for the Future

The Need for Better Evidence

With increased reliance on technologically sophisticated products and new types of services that both deliver and utilise these products, we need to find better ways of measuring outputs in this modern, service-oriented economy so that actual productivity growth can be properly measured. In a modern service-oriented economy—where trading in tasks is increasingly dominant—the lack of an up-to-date categorization of what exactly it is that an economy does, and our inability to adequately measure service outputs, may mean that we are failing to measure the flow-on effects of technological advances, a failure that could easily lead to poor policy prescriptions.

The Need for Improved Theoretical Approaches to Evaluating Evidence

In the past, economic modeling has contributed substantially to the development of evidence-based policy, aimed at advancing Australia's productivity and its standard of living. *Dynamic macroeconomic modeling* has contributed to policies aimed at encouraging steady growth and reducing the effects of distortions that manifest in business cycles. *Multi-sectoral (computable general equilibrium) modeling* has played a key part in developing the evidence base for innovations in trade policy. However, modern developments suggest new issues that must be faced to better utilize both these forms of evidence gathering in today's globalised economy.

First, the links between the real and financial sectors have not been well enough developed in dynamic macroeconomic models to enable us to utilize them as good predictors of the recent global financial crisis, and as sharp tools for policy input to deal with the effects. Even though Australia has weathered this crisis relatively well by world standards, there have been heavy costs for sections of the community, and the consensus is that there remain dangers ahead. Though productivity growth shocks are well established in modern dynamic macroeconomic models, they are generally treated as exogenous processes. However we need to understand better the links between productivity growth, production and the financial sector over the business cycle. Our dynamic macroeconomic models are limited in their ability to explore the implications of innovations because the modern economy consists of many specialised tasks that are typically not differentiated in these models.

Second, multi-sectoral models are currently limited in their abilities to explain the economics of innovation, yet this is going to be crucial to understanding productivity growth in the knowledge economy. Some tasks lend themselves to utilizing technological productivity improvements much more than others, so that the flow-on effects from a specific technological advance are likely to be uneven across the economy.

Improved and convergent modeling of the two types needs to be encouraged, so that Australian policy-makers can better understand how to design policies to enhance our future productivity growth.

The Need for Greater Skills and Flexibility

With the growth of the knowledge economy that will be vital in developing our task capabilities, we need to recognize the importance of *education* and flexibility in vocational choices and in lifetime education choices. The importance of education cannot be over-emphasized in this context. First, the fertility of R&D from a firm's perspective depends upon the quality of its research personnel. At its core, this suggests the need for a well-educated population from which a pool of future specialist researchers can be drawn. Second, a comprehensive education is also the key to a flexible attitude to life and its contingencies. Good education and training will allow individuals with specific skills to continue to make meaningful contributions in the presence of technological advances for which required skill sets are likely to change considerably within working lifetimes.

Recommendations

The key needs listed above are not unrelated. For example, with sophisticated developments in the service-oriented economy, it may take creative ideas in economic modeling to infer the presence of quality improvements, say by observing changes in individuals' economic preferences. Making up for missing output measurements in the modern economy may not simply be a matter of taking additional direct measurements (in fact, this may be impossible) but it may require careful attention to indirect evidence that can only be gleaned by tracing out the complex interrelationships in the economy. Good economic theory is vital for solving this problem.

At the level of the public sector, there is a need for a more substantial dedication of resources in several areas:

- (1) There needs to be a greater dedication of resources to statistical measurement agencies to enable the complex modern economy to be better measured and monitored.*

Elaboration: This submission has emphasized the importance and the difficulties of measuring outputs in an increasingly service-oriented economy. The 'attributes' methodology is a long-standing and valuable approach that could be beneficially extended to handle the measurement of specialized tasks. It is likely that new attributes will need to be invented to describe the full nature of innovation related to sophisticated products and services. Approaches to indirect measurement of changes in the quality of attributes also need to be developed and these would require sophisticated economic modeling. For example, it may be possible to examine changes in individuals' economic behaviour to infer improvement in quality of attributes where switches in purchasing occur that are incompatible with the implications of price movements. However, changes in tastes might be an alternative explanation for this type of behaviour and careful and creative modeling may be necessary to discern the difference. In summary, there is an increased need for integration of data measurement and economic modeling tasks in the future economy, and this suggests an even more critical and sophisticated role for official statistical agencies, in particular the ABS.

- (2) There needs to be a greater dedication of resources to provide the public sector infrastructure that will complement private sector inputs and encourage the innovation needed to achieve productivity growth.*

Elaboration: This submission has tended to concentrate on specific needs for productivity measurement in the 'new' economy, but there remain substantial bottlenecks to productivity growth in the 'old' economy that should not be overlooked. Some of these bottlenecks relate to a long-term run down in public infrastructure. At the same time, there needs to be creative thought put towards the types of public infrastructure that will be most useful to complement developments in the 'new' economy. National broadband infrastructure is an obvious example that is now being addressed, but the nation could benefit from a more proactive and forward looking approach to public sector infrastructure provision. For example, especially in the context of public sector commitment to long-term projects, in its procurement and contracting policies government could give even more special regard to potential contractors and providers that are actively engaged in their own internal R&D. Such a policy would recognize the potential for firms at the cutting edge of research to provide results that go beyond the minimum contractual requirements and would provide, in some part, incentives for private sector R&D that ultimately should produce benefits for the wider economy.

- (3) There needs to be a greater dedication of resources to education for people of all ages to increase the creativity of individuals, to enable them to re-position themselves as required, and to produce a larger pool of technologically literate contributors to the smart economy of the future.*

Elaboration: This submission has attempted to underscore the need for new approaches to productivity measurement in an increasingly sophisticated knowledge-oriented economy. Complementary to the difficulties of measurement of productivity gains in this new environment, we need to ensure that the economically active population is ready to participate fully in, and gain the benefits from, productivity improvements that are linked to the use of sophisticated skills and new tasks that may not have even been envisaged during an individual's formative education years. High quality basic education coupled with flexible re-education opportunities is a key to developing a smart society that can benefit from and contribute to productivity improvements in the knowledge economy.