TRADE IN FINAL GOODS AND MEASUREMENT OF THE IMPACT OF INNOVATION[1]

By

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Extended Abstract:

This study is concerned with conceptualising and measuring the impact of innovation in open economies and especially innovation embodied in imported and exported final products. In the UK for example, much innovation is embodied in new products imported from overseas such as mobile phones, plasma televisions, CD players, videos, personal computers. Such innovation, on the basis of casual empiricism, has made a significant impact upon our lives. However, the most commonly used indicators of the extent of, or the impact of, innovation, i.e. total (or multi) factor productivity, TFP, or its growth rate GTFP, do not reflect such

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innovation. Imported innovation in raw materials and intermediate inputs is allowed for in standard calculations of TFP via changes in the prices of such inputs (see for example Battisti and Stoneman, 2007). Overseas innovation, usually measured by overseas R&D embodied in new imported capital goods has also over the last decade been included as an innovation factor in TFP studies (see for instance Añón Higón, 2007). But overseas innovation embodied in imported final consumer products is not reflected in TFP[2], despite the huge literature that considers its measurement (Hulten, 2001). This is not surprising for, as TFP is a production orientated measure that takes no account of the impact of imported innovation on consumption, and instead essentially indicates how domestic output per unit of input and cost per unit of output (for given factor prices) change over time as a result of innovation.

In order to reflect the impact of innovation imported in final products it is necessary to approach the issue from the consumption rather than production side. We propose a novel approach by specifying an aggregate utility function. The main purposes of this study are then to: (i) argue how innovation embodied in imported final goods impacts upon the economy; (ii) to measure the impact of such innovation upon utility growth; (iii) to compare the relative importance of such innovation relative to other types of innovation impacting on utility growth; and (iv) to compare the estimates of the impact of all innovations upon utility growth with the usual GTFP measure. This is done for both a sample of OECD economies and for individual industrial sectors in the UK.

This study suggests a new measure of the impact of innovation based upon the impact on an indicator of aggregate utility, which shows how domestic innovation and imported innovation

[2] Skytesvall and Hagen (2006) seem to be heading in this direction when they say that "If a country's export is dominated by products and services that are produced by industries with high TFP growth sold on very competitive markets, it will have to sell them at decreasing prices and thus give away a large part of the rapid TFP increase to customers in other countries"

contribute to changes therein. This new indicator reflects that the domestic economy only benefits (directly) from innovation at home to the extent that its production is consumed domestically but that it also benefits from innovation overseas embodied in imported final products.

Applications of the approach at the aggregate level to a sample of OECD countries show that although the overall estimates of the new measure of the impact of innovation do not differ considerably from the GTFP estimates, the new measures suggest that in some countries (especially the UK and Canada) much of the benefit from innovation arises from imported sources rather than domestic sources. At the market/industry level, for the UK it is shown that in many industries there are considerable differences between the GTFP measure and the new measure and that in some industries imported innovation makes by far the dominant contribution to utility growth from innovation. The results generated fall within the area known as growth accounting. They are not intended therefore to approach causality. However some knowledge of the relative importance of domestic and imported sources of innovation should guide future analysis of causality.

Given that in the limit the benefit of innovation will be measured by utility gains rather than productivity gains these findings suggest that analysis and policy should take a more open economy view of innovative activity. A concentration upon GTFP ignores that the final purpose of economic activity is consumption and not production. Moreover no one economy is the source of all innovations. The more widely are innovations sourced the less reliable GTFP will be as a measure of the impact of innovation on domestic aggregate utility.