Abstract for "The Industry and Country Origins of Aggregate Productivity Growth in Canada's Production of Final Goods and Services"

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The production of goods and services in Canada is highly integrated with the United States and other countries. Canadian industries purchase a large share of intermediate inputs from the United States (Baldwin and Gu, 2008, Baldwin et al., 2013). As a result of such integration, technological progress in the U.S. and access to the imports from the U.S. contribute to the productivity and competitiveness of the Canadian production activities.

The objective of this paper is to trace the productivity gains in Canada's production of final goods and services to country origins and industry origins. We will focus on the production of three main categories of final goods and services: investment, consumption and exports. We ask too questions. First, to what extent do productivity gains in Canada's production of final goods and services come from productivity gains in the United States and other countries? Second, to what extent do those productivity gains come from various industries?

To answer those two questions, we make use of inter-industry multifactor productivity index that Statistics Canada produced at various times in the past (Statistics Canada, 1994, Durand, 1996). The inter-industry multifactor productivity (MFP) index measures the productivity gains in the production of final goods and services, and it captures technical process taking place in both final goods-producing industries and upstream industries. This is in contrast to the conventional MFP index which measures productivity gains at the industry level and captures technical progress for the individual industries (Diewert, 1976, Jorgenson, Gollop and Fraumeni, 1987). Based on the inter-industry MFP index, Statistics Canada (1994) reported that productivity growth in the production of private investment was highest among the final demand categories over the period 1961 to 1992, followed by the production of exports, government expenditures, and personal expenditures.

The inter-industry MFP index was proposed by Rymes (1971, 1972), Cas and Rymes (1991) and Hulten (1978). Hulten (1978) called it the effective rate of productivity growth. The growth in inter-industry MFP in the production of final goods and services is estimated as the difference between the growth in the output of final goods and services and the growth in combined capital and labour inputs that are used directly and indirectly in the final goods-producing industries and the upstream industries.

The inter-industry MFP index can be decomposed into the contribution of domestic industries and foreign industries that supply intermediate inputs. Such decomposition was developed in Domar (1961) in a simple case of industry integration in a closed economy. Hulten (1978) also proposed a decomposition of the effective rate of productivity growth into industry contributions in a general equilibrium framework. The decomposition in an open economy and more general case of industry integration has been developed by Cas and Rymes (1991) and Durand (1996).

The paper is related to two recent literatures. First, a number of recent international initiatives are being undertaken to understand the nature of global production by examining the country origins of value-added, jobs and income in the world production (Timmer et al. 2012; OECD, 2012). Our paper extends those studies to account for the country origins of production gains in the integrated world production process. Second, a number of recent studies have traced the aggregate productivity gains in the United States to the gains in production of final goods and services. Oliner et al. (2007) focused on the importance of productivity gains in the production of final nonfarm business output related to ICT goods (computer hardware, software, and communication equipment). Basu et al (2012) and Fernald (2012) focused on the difference in productivity growth in the production of consumption and investment goods. Those studies except Basu et al. (2012) make a simplifying assumption that the production function is the same for the production of various types of final goods and services. Our paper presents a method for constructing an MFP index for the production of final goods and services without making that simplifying assumption.

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