

A Framework for Estimating the General Equilibrium Economic Effects of Foreign Direct Investment in the Host Country: A Canadian Perspective

Someshwar Rao

Abstract: This paper first discusses the channels through which inward FDI could impact the key drivers of aggregate labour productivity in the host country. Next, it reviews the available empirical evidence on FDI impacts in the host economy. It concludes that the available empirical evidence is not very useful for serious policy analysis because each of the available research papers looks at only one or two of the inward FDI economic impacts in isolation and do not provide a full picture, and they use different data sets and apply different econometric techniques. Finally, the paper proposes a system approach for estimating the general equilibrium economic impacts of inward FDI in the host country. Towards this goal, it outlines a small macro-econometric model of ten equations for key economic variables in the host country, to be estimated as a system, taking into account interdependencies between them.

Keywords: Inward FDI, product productivity, general equilibrium, economic policy

1. Introduction

Removal of tariff and non-tariff barriers to trade in goods and services, liberalization of foreign direct investment flows and financial markets, and a dramatic reduction in transportation and communication costs have all contributed to the increased economic integration and economic interdependence of the world economies, and resulted in increasingly fierce competition globally for markets and market shares, investment, R&D and skilled workers. Transnational corporations (TNCs) are increasingly playing a dominant role in global economic integration, investment, innovation, production, employment and value chains in both developed and developing economies.

According to UNCTAD's World Investment Report 2013, foreign affiliates of TNCs in 2012 employed over 70 million people worldwide, generating sales worth of US\$ 26 trillion, resulting in value added of US\$ 6.6 trillion and exports of US\$7.5 trillion. Global foreign direct investment (FDI) inflows and outflows increased a great deal over the last 20 years. As a result, global inward foreign direct investment stock increased from just about US\$ 2.1 trillion in 1990 to US\$ 22.8 trillion in 2012 (table 1). Another major development is the growing importance of developing and transitional economies, especially China and other BRIC countries, in global foreign direct investment flows and stocks. They have become a major destination and a major source of global FDI. As a result, the shares of non-OECD economies in global FDI stocks increased dramatically during this period. Their share of global inward FDI stock

increased from 24.8 % in 1990 to 41.5 % in 2012. Likewise, their share of global outward FDI stock increased from 6.9 % to over 20.9 % during this period (table 2).

The increased importance of TNCs in both developed and developing nations has contributed to the increased global economic integration and economic interdependence, and resulted in fierce competition among them for markets and market shares. TNCs are looking at ways and means to increase productivity and reduce costs. Towards this goal they are increasingly resorting to globalization of production and R&D, and international sourcing of investments in physical capital, and innovation and skilled workers. Because of the increased importance of global value chains (globalization of production), much of the global trade is intra-firm and intra-industry type. Consequently, trade and FDI have become increasingly strong complements. They go hand in hand. Mergers and acquisitions and reinvested earnings account for much of the global FDI activity in developed countries. On the other hand, Greenfield investment plays a major role in developing countries' inward FDI activity.

Canada too has actively participated in the globalization process. It has become a major source and destination for global FDI flows and stocks. Canada's inward FDI flows increased from US\$ 8.8 billion in 1990 to US\$ 43.0 billion in 2012. Consequently, its inward FDI stock increased from US\$ 113 billion to US\$ 637 billion during this period (table 3). Canada's outward FDI flows and stock have actually increased at a faster pace than its inward FDI flows and stock. For instance its outward FDI stock increased from just US\$ 85 billion in 1990 to US\$ 715 billion in 2012. In other words, Canada went from a major importer and net debtor prior to 1990 to a major exporter and a net creditor of FDI in the world over the past 20 years. The gap between Canada's outward FDI and inward FDI stocks increased from a deficit of US\$ 28 billion in 1990 to a surplus of over US\$ 78 billion in 2012 (table 3).

Despite the large increase in Canada's inward FDI stock over the last 25 years, Canada has been losing a significant ground in FDI to the U.S., Mexico, other major OECD economies, and emerging economies, because the inward FDI flows in Canada have increased at a much slower pace than in the other economies. Canada's share in OECD countries' inward FDI stock fell from 7.7% in 1990 to 4.4% in 2012. Similarly during this period, its share in global inward FDI stock declined from 5.4% to 2.8% (Table 4). Canada's share in North American inward FDI stock too dropped from 17.6% in 1990 to 15.5% in 2012. The fall in Canada's FDI shares could be a reflection of a much faster economic growth in other economies, especially emerging economies, as well as more barriers to inward FDI in general in Canada than in many other OECD countries, and in service industries in particular. .

These FDI trends raise a number of interesting policy research questions: What are the key factors responsible for a faster increase in Canada's outward FDI flows and outward FDI stock than the inward FDI flows and stocks? Is Canada becoming a less competitive and a less attractive location for investment in general? What are the major impacts of an increase in inward and outward FDI flows and stocks on the Canadian economy? How interdependent are economic growth, productivity growth and, the growth in inward FDI and outward FDI flows and stocks?

The main objective this paper, however, is confined to just providing a synthesis of the available theoretical and empirical literature on the economic impacts of *inward FDI in the host economy*, with a focus on Canada, and to suggest an approach for estimating empirically the macro-economic impacts of an

increase in inward FDI flows and stocks in Canada in a coherent, consistent and comprehensive manner, using a system approach. FDI could provide considerable benefits to the host economy through a number of channels (avenues): capital accumulation, trade expansion, international transfer of new knowledge and technologies, scale and scope economies, human capital development, increased innovation and innovation adoption, and improved resource allocation via intra- and inter-industry shifts in productive inputs (see Lipsey (2002), De Mello (1997 and 1999), Moura and Forte (2010), and Rao, Souare and Wang (2010)).

Nevertheless, the available empirical research to date in Canada and elsewhere, to the best of our knowledge, has examined only the economic impacts of inward FDI in a piecemeal manner. Various researchers have empirically examined one or two of the key channels of inward FDI in isolation, instead of estimating them as a system of equations, taking into account the interdependencies among the key economic variables. This paper hopes to address the following four key policy research questions:

- What are the main channels (avenues) through which inward FDI could impact the host economy, especially in an open economy such as Canada's?
- What does the existing empirical research say about the importance of these channels, mainly in the context of Canada's long-term experience with inward FDI?
- What are some of the limitations of the existing Canadian empirical research in this regard?
- How can one overcome the limitations of existing empirical research and go about empirically estimating the economic impacts of inward FDI in Canada, using a sound, comprehensive and coherent approach and data?

The paper is organized in the following way: Section 2 will outline recent trends in the industry distribution of Canada's inward FDI stock and its source country composition, and examine the shifts in the types (modes) of Canada's inward FDI stock. The next section (section 3), will discuss various avenues through which FDI could impact the host economy, with a special focus on Canada. A short synthesis of the existing empirical literature on the economic impacts of inward FDI in Canada will be provided in section 4. This section will also discuss some of the major shortcomings of the available empirical work. Section 5 will outline alternative empirical approaches towards estimating the economic impacts of inward FDI in Canada. The concluding section (section 6) will summarize the main findings of the paper and outline some the key steps towards estimating empirically the general equilibrium impacts of inward FDI on the Canadian economy.

2. Recent trends in Canada's inward FDI

Before proceeding to discuss various channels through which inward FDI could potentially impact the host economy and examine the empirical evidence for Canada and on other countries, this section briefly examines recent trends in key aspects of inward FDI in Canada.

Past theoretical and empirical research suggests that the impacts of inward FDI on the host economy depends on several dimensions of inward FDI: the mode of FDI (Greenfield vs. M&As); the source country for FDI; the sector in which FDI occurs; and the type of FDI (market seeking vs. efficiency

seeking), see Bosworth Collins (1999), Fortanier (2007), Ng and Souare (2009), Alfaro (2003), and Beugeldijk, Smeets and Zwinkels (2008).

During 2006-2012, inward FDI flows into Canada averaged \$66.2 billion per year, almost a three-fold increase from the annual average during the first half of the 2000s. Over the same period, the U.S. share of total FDI inflows into Canada declined from 73.5% to 34.5% (Table 5). In 2012, total FDI flows into Canada averaged \$43 billion; over 80% of those came from the U.S. (38.3%) and from the European Union (44.4%).

Modes of Canada's Inward FDI Flows:

The average share of M&As in total FDI flows into Canada increased from 40.0% in the first half of the 2000s to 48.2% during 2006-2012. On the other hand, the average contribution of reinvested earnings (expansions) by foreign affiliates in Canada fell from over 60% to 19%. The share of all other FDI inflows (mostly Greenfield investments) averaged 32.6% during 2006-2012, compared to a small negative contribution in the first half of the 2000s (table 5). The big surge in merger and acquisition activity in Canada between 2000 and 2007 was the main reason for the increase in the share of M&As in FDI flows into Canada in the 2000s.

Sources of Canada's Inward FDI Stock:

Total inward FDI stock in Canada increased from \$379.5 billion in 2004 to \$633.9 billion in 2012. During this period, U.S. share in Canada's inward FDI stock declined from 64.1 % to 51.5%. On the other hand, the shares of all other regions in Canada's inward FDI stock increased: the share of Asia/Oceania increased the most, by 6.3 percentage points, to 11.3%, Europe's share increased from 29.0% to 33.5%. South and Central America (by 2.0 percentage points) and Africa (by 0.5 percentage point) accounted for the rest of the increase (table 6). The growing role of transnational corporations from emerging economies in Asia and South and Central America in the global outward FDI flows, the growing investment linkages between Canada and the Western European countries, and the commodity and energy price boom all could explain the shifts in the geographic distribution of Canada's inward FDI stock in the last 10 years.

Distribution of Canada's Inward FDI Stock by Sector:

In 2012, just five sectors, manufacturing (28.6%), mining, and oil and gas extraction (19.0%), management of companies and enterprises (19.2%), finance and insurance (13.4%), and wholesale and retail trade (12.3%) accounted for over 90% of the total inward FDI stock in Canada (table 7). Between 2008 and 2012, the share of manufacturing sector fell by 7.3 percentage points, while the contribution from the mining, and oil and gas extraction sector increased by 4.8 percentage points. Similarly, the share of management of companies and enterprises increased by 8.2 percentage points, which implying that the combined share of the remaining sectors registered a significant decline (table 7). The slowdown in manufacturing output and the investment boom in the oil and gas sector could largely explain the changing roles of the two sectors in Canada's inward FDI stock.

3. Potential impacts of inward FDI

Past theoretical and empirical literature suggest that FDI could improve significantly the standard of living and the quality of life of citizens in the host countries in a number of ways (see Baldwin (1994), De Mello

(1997 and 1999), Lipsey (2002), Moura and Forte (2010), and Rao, Suare and Wang (2010). In this section, we will examine various channels through which FDI could impact productivity, living standards and quality of life in the host countries. In the next section, we will synthesize the available empirical evidence on the economic impacts of inward FDI in the host country.

Productivity is the best overall indicator of a nations underlying economic health. Over the long term, improvements in real wages and real incomes go hand in hand with increases in labor productivity. Labor productivity and quality of life also move together, because higher real incomes allow countries to invest more in education, health, environment, and physical, telecommunication and knowledge infrastructures and boost spending on social programs. Productivity research in Canada and other countries indicate that aggregate growth in productive efficiency, hence the trend labor productivity growth, are mainly determined by scale and scope economies, increases in physical and human capital, innovation and innovation adoption (including international knowledge and technology transfers), and improvements in resource allocation, due to favorable intra-firm and intra-and inter-industry shifts in productive inputs (see Rao (2011).

Using this framework, we will analyze the potential effects of inward FDI on the host economy. FDI could improve the host country's productivity and real incomes through all the following channels (see De Mello, 1997 and 1999; Lipsey, 2002; Moura and Forte, 2010; Rao, Souare and Wang, 2010).

Scale and Scope and Economies:

TNCs in general are significantly larger in size than domestically-oriented companies. For instance, in Canada, both foreign-controlled companies as well as Canadian TNCs operating in Canada are, on average, considerably bigger than domestically-oriented Canadian firms in terms of sales and employees (see Rao and Ahmad, 2002; Baldwin and Gu, 2005). Consequently, they would benefit significantly more from scale and scope economies than the others. Large firms also tend to invest more in physical and human capital and innovation, and tend to be more outward-oriented than small and medium-sized firms. Hence, an increase in FDI by TNCs in the host economy (including via mergers and acquisitions), all other things being equal, would increase the benefits from the scale and scope economies and raise the aggregate labour productivity and increase investments in physical and human capital, innovation and innovation adoption in the host country. Furthermore, an increase in FDI would result in trade expansion (both exports and imports) in the host country, because of increased intra-firm and intra-industry trade, resulting in increased specialization of tasks (see Baldwin, 2012). This too will raise the aggregate productivity of the host economy.

Human Capital:

Because of the size advantage as well as their superior managerial, and technological and knowledge know how, foreign affiliates are likely to employ more skilled people and invest more in skills development of their employees, because they are more likely to outsource/offshore the relatively low-skills and low-wage tasks and concentrate on relatively high-skills and high-wage tasks (see Lipsey, 2002; Baldwin, 2008; Souare, 2013). Nevertheless, the aggregate impact of FDI on skills in the host economy a priori is ambiguous. If an increase in FDI, on average, does not change the skill-mix of all the other companies in the host country, the aggregate impact of FDI on skills would be positive. In addition, if the increased competitive intensity and the positive technology and knowledge spillovers from foreign

affiliates to all the other firms in the host economy increase the skill mix of the other firms in the host economy, the aggregate positive impact of inward FDI on skills in the host economy would amplify. On the other hand, if an increase in FDI, on average, reduces the share of skilled workers in all the other companies, because they are forced to specialize more in low skills and low wage tasks, the aggregate impact on skills in the host country could be either positive or negative, depending on the size of the two opposing effects.

Physical Capital:

An increase in FDI, other things remaining the same, would increase investment in construction and machinery equipment in the host economy. However, the size of new investment would differ between the modes of FDI. The investment response is expected to be bigger for Greenfield FDI than FDI from mergers and acquisitions (see Bosworth and Collins, 1999; Hejazi and Pauley, 2002). The aggregate inward FDI impact on the aggregate investment in physical capital, like skills, would, nevertheless, depend on its impact on the investments by all other firms in the host economy. If FDI results in the crowding out of investment by all the other firms, the impact on the aggregate investment could be either positive or negative depending on the size of the two opposing effects. On the other hand, if the increased competitive intensity and the demonstration impacts (supplier and customer linkages with foreign affiliates) increase the investment of all the other firms, the aggregate investment in the host economy would increase.

Innovation and Innovation Adoption:

Development of new products and processes, and the adoption and diffusion of new and state of the art technologies, knowledge and managerial practices are the key drivers productive efficiency and real incomes. Because of the superior managerial practices and technological know-how of foreign affiliates, an increase in FDI, other things remaining constant, would raise the aggregate productivity in the host economy (see Rao, 2010). In addition, because of the increased competitive intensity and technology and knowledge spillovers from foreign affiliates, all other firms in the host economy could also increase their investments in innovation and in the adoption and diffusion of new and the state of the art technologies, leading to further increases in aggregate productivity of the host economy (Keller, 2004), and Acharya and Keller, 2007).

Intra- and Inter-Industry Shifts in Productive Resources:

Increases in competitive intensity, resulting from increased FDI and trade linkages with other countries, as well as increased specialization of tasks could improve the allocation of productive inputs within and between firms in a given industry, as well as between industries, resulting in the death/the decline of inefficient and low productive plants and firms, and the birth/expansion of efficient and high productive plants and firms, and increasing the share of high value added industries in the real output of the host economy. All these developments would raise the aggregate productivity of the host country (see, Baldwin and Gu, 2006, 2004, and 2010; Sharpe and Smith, 2005; Shape, 2010). In the short-term, an increase in FDI could also increase employment, contributing further to the rise of real incomes in the host country. But, over the long term, growth in the working-age population and increases in net immigration mostly determine the employment growth. In short, inward FDI could significantly improve the aggregate productivity and real incomes in the host country both in the short term and long term via a number of

channels. It is important to note, however, that all the channels are all highly interdependent and interact in complex ways.

4. Review of the available empirical evidence

In this section, using the analytical framework outlined in the previous section (section 3), we will briefly summarize the findings of existing empirical evidence on the economic effects of FDI in the host country, with a focus on Canada. There have been a number of very good and comprehensive surveys of the existing empirical literature on this subject (see De Mello, 1997; Lipsey, 2002; Moura and Forte, 2010; Rao, Souare and Wang, 2010; Hejazi and Trefler, 2013). Therefore, in this section, we will only focus on the Canadian empirical evidence. The available empirical evidence in general suggests that FDI would raise the aggregate labour productivity and real incomes in the host countries through all the above-mentioned channels. However, the direction and the size of the overall economic impacts would depend critically on the initial business conditions and the absorptive capacity in the host countries: institutional development, human capital, physical, knowledge and telecommunication infrastructures, competitive and open markets, efficient and competitive regulations and market framework policies, and political stability (see Lipsey, 2002; Moura and Forte, 2010; Rao, Souare and Wang, 2010; Hejazi and Trefler, 2013). In the rest of this section, we will summarize the available empirical evidence on the impact of inward FDI on a number of key economic variables in Canada.

Productivity Levels of Foreign-Controlled Firms:

As mentioned before, because of size advantage as well as their superior technical know-how and managerial practices, foreign-controlled firms on average tend to have higher productivity levels than domestic firms in the host countries. Higher productivity levels of foreign-controlled firms in Canada were reported in Globerman, Ries and Vertinsky (1994), Baldwin and Dhaliwal (2001), Rao and Tang (2005) and Baldwin and Gu (2005). For instance, Rao and Tang (2005) reported that after controlling for firm and Industry characteristics, foreign-controlled firms in Canada, on average, are about 20 percent more productive (in terms of multifactor productivity) than domestic firms. Nevertheless, recent research by Baldwin and Gu (2005) suggests that the average productivity levels of Canadian multinationals operating in Canada, (after controlling for size and industry) are not significantly different from the average productivity level of foreign affiliates in Canada. This in turn implies that the higher productivity levels of foreign-controlled firms mostly reflect the multinational advantage.

Research by Helpman, Melitz and Yeaple (2004) indicate that normally the most productive firms undertake FDI activity. In this context, a more recent paper by Hejazi and Trefler (2013) suggests that leveling down of Canadian FDI restrictions to the average OECD levels would raise the Canadian aggregate labour productivity by 0.79 %, and would also increase employment by 137,400. Foreign multinational corporations could also contribute disproportionately more to productivity growth. Between the 1980s and the 1990s, foreign affiliates accounted for almost two-thirds of the increase in labour productivity in the Canadian manufacturing sector, although their share of the manufacturing output is only about 50 percent (Baldwin and Gu (2005)).

Capital formation:

Inward FDI could impact economic growth in the host economy through its effects on capital formation and innovation and innovation adoption. However, the net overall impact of inward FDI depends on the size of the crowding-out of domestic investment and R&D. The impact of FDI on overall capital formation is expected to be considerably higher for Greenfield FDI and investments in expansions by foreign affiliates than FDI through M&As. As expected, the share of foreign investment (closely related to FDI) in Canada's total investment is substantially higher for M&E investment (a key driver of productivity growth) than construction investment. The foreign M&E investment share averaged 24.6% during 2009-2011, compared to its share of only 8.0% in construction investment (table 8). Using panel data on Canadian industries, Hejazi and Pauly (2002) indicate that, on average, one dollar increases in inward FDI raises domestic capital formation in Canada by about 45 cents in goods producing industries, but found no significant impact on domestic capital formation in service industries.

Innovation and Innovation Adoption:

Business R&D is a major driver of innovation and innovation adoption, hence the productivity performance. Foreign-controlled firms play a major role in business R&D in many host countries. Between 1998- and 2007, the share of inward BERD (BERD by foreign-controlled firms in the host country) in total BERD in the host country increased in almost all OECD countries. In Canada, it increased from 33.2% to 35.4%, in the U.S. it increased from 13.2 % to 15.2 %. The share of inward BERD is generally large in small open countries such as Ireland, Belgium and Israel (between 50 to 70%), and small in large countries such as the U.S. and Japan, between 5 and 15% (Table 9).

Foreign-controlled firms accounted for close to 60% of total R&D spending in motor vehicles, office, accounting and computing machinery, other transportation equipment, and chemical products industries in Canada in 2007. These four industries represented about 60% of total foreign R&D in the manufacturing sector in that year (Table 10). Baldwin and Gu (2005) reported that foreign-controlled firms are more likely to perform R&D on an ongoing basis, to introduce product and process innovation, and to adopt new advanced technologies than domestic firms in Canada.

Human Capital:

Foreign-controlled firms, because of their superior performance in innovation and innovation adoption, also likely to hire, on average, more high skill and high wage employees, and invest more in formal and informal training in worker skills (see Zang, 2000; Lounagani and Razin, 2001; Alfero et al. 2004; Moura and Forte, 2010), resulting in a vicious cycle of increased productivity, innovation and innovation adoption and human capital development. Using panel data on Canadian industries, a more recent research paper by Souare (2013) shows that FDI contributes significantly to skills upgrading (both in terms of high skilled employees and high paying jobs) in both service and non-service industries.

Knowledge and Technology Spillovers:

Increased competitive pressures from and stronger trade linkages with other countries from the increases in inward FDI could encourage domestic firms to adopt and use more advanced technologies and superior managerial practices used by foreign firms operating in Canada, resulting in intra-industry productivity spillovers. Recent research by Baldwin and Gu (2005) and Rao and Tang (2005) found that domestic firms in industries characterized by larger market shares of foreign producers or with higher FDI penetration

tend to have better productivity performance, suggesting productivity spillovers from FDI to domestic firms within the same industry. In addition, FDI could also result in inter-industry productivity spillovers from the supplier (upstream) and the user (downstream) linkages of foreign-controlled firms with domestic firms in other industries in Canada. Using panel data on Canadian manufacturing industries, Gu and Wang (2008) report strong and significant inter-industry productivity spillovers from FDI, via both the upstream and downstream production linkages.

Trade Expansion:

The impact of FDI on host country's overall trade (exports as well as imports) depends on the motivations for FDI. When trade costs (cost of trade barriers as well as transportation and communication costs) are high in the host country, transnational firms might choose FDI and foreign production as substitute for exports to the host country. On the other hand, efficiency- and resource –seeking FDI (vertical FDI), would results in a complimentary relationship between FDI and trade, leading to an increase in intermediate inputs, and a rise in exports of final goods and services in the host country. As in other countries, inward FDI and exports are found to be generally compliments than substitutes in Canada, because of increased intra- and inter-firm trade (see Hejazi and Safarian (1999), Cameron and Cross (1999), Baldwin, Beckstead and Caves (2001), and Baldwin, Caves and Gu (2005). In short, on balance, the available empirical evidence indicates that FDI provides significant net economic benefits to Canada. Nevertheless, empirical evidence on the impact of inward FDI on economic growth and intra-and inter-industry shifts in productive resources in Canada is either scarce or non-existent.

5. Alternative approaches

The review of existing empirical evidence in Canada in the previous section indicates a strong need for new initiatives for estimating empirically the overall economic benefits of inward FDI in the host country in a coherent, consistent and comprehensive way, using a system approach and an up to date panel data on Canadian industries.

Shortcomings of the Existing Empirical Research:

The existing empirical evidence is of limited value for undertaking any serious policy analysis and discussion on the costs and benefits of inward FDI to Canada, because of the following three major limitations of the available empirical research: First, The existing empirical research in Canada on the effects of inward FDI comes from different studies, they use different data sets and different approaches. Consequently, there is no coherence and consistency among the different studies. Second, they rely almost exclusively on a single equation approach, concentrating on examining empirically a specific impact of inward FDI on the Canadian economy. Consequently, they are not estimated as part of a complete system of structural equations. Therefore, the estimated equations do not take into account the interplay and interdependencies among the key channels through which inward FDI could impact the Canadian economy. Hence, the available empirical research can provide only partial and qualitative evidence, but does not give a quantitative assessment of the overall economic impact of inward FDI on labour productivity, real GDP and real incomes. Third, the existing empirical work also do not control for differences in source country and industry effects. They also do not take into account the differential impact of the three modes of inward FDI (Greenfields, M&As and reinvested earnings) on the key

economic variables. Moreover, in estimating the economic impacts of inward FDI, they also always do not control for the initial economic conditions (the absorptive capacity) and the business conditions variables.

Suggestions for Undertaking New Empirical Research:

New empirical research should address these shortcomings and limitations of the existing empirical work on the economic effects of inward FDI in Canada. Using long time-series data on detailed Canadian industries, grouped into three major sectors (primary, manufacturing and service sectors), we need to estimate the impact of FDI on key economic variables as a system of equations, (taking into account interactions and interdependencies between all the key economic variables). Using the framework in section 3 on the potential economic impacts of inward FDI in the host economy, we could estimate equations for the following eight key macroeconomic variables: real investment (if possible disaggregate it into two types: M&E and construction), real exports, real imports, R&D spending, share of skilled workers in total employment, labor productivity, real output, and employment.

These eight equations would constitute a small macro model. Of course we need to estimate them as a system of equations, taking into account potential interactions and interdependencies among them. As mentioned before, in estimating these equations, we should control for the initial conditions (absorptive capacity) and the business climate variables. In estimating the equations, we should also control for the major source regions of inward FDI in Canada (U.S., Europe, Central and Rest of the World), and for the different modes of FDI flows (mergers and acquisitions, expansions and all other types of flows). Using the estimated coefficients of inward FDI on the key economic variables, we could simulate the macro economic impacts of either a 10% or a \$ billion increase in inward FDI stock in the three major sectors of the Canadian economy (primary, manufacturing and services).

A Tentative Outline of the Specification of the Equations:

$$INV = F(Q, EX/Q, r, CAPU, FDI, SFDI.US, SFDI.EU, SMA)$$

Real investment is a function of real output, real interest rate, capacity utilization, inward FDI stock, shares of U.S., and Europe in Canada's inward FDI stock, and share of mergers and acquisitions in Canada's inward FDI flows.

$$EX = F(Q.U.S, Q.OTH, REX, FDI, SFDI.US, SFDI.EU, SMA)$$

Real exports are a function of real output in the U.S. and in the rest of the world, real exchange rate, inward FDI stock, shares of U.S. and Europe in Canada's inward FDI stock, and share of mergers and acquisitions in Canada's inward FDI flows.

$$IM = F(Q, REX, FDI, SFDI.US, SFDI.EU, SMA)$$

Real imports are a function of real output, real exchange rate, inward FDI stock, shares of U.S. and Europe in Canada's inward FDI stock, and share of mergers and acquisitions in Canada's inward FDI flows.

$$R\&D = F(Q, EX/Q, CT, TCR, HC, FDI, SFDI.US, SFDI.EU, SMA)$$

R&D spending is a function of real output, share of exports in real output, corporate tax rate, R&D tax credits, human capital, inward FDI stock, shares of U.S. and Europe in Canada's inward FDI stock, and share of mergers and acquisitions in inward FDI flows,

$$HC = F(RW, M\&E/INV, R\&D, FDI, SFDI.US, SFDI.EU, SMA)$$

Human capital is a function of real wage, share of M&E in total investment, R&D spending, inward FDI stock, shares of U.S. and Europe in Canada's inward FDI stock, and share of mergers and acquisitions in Canada's inward FDI flows.

$$Q/N = F(CAPU, FDI, FDI.U, FDI.S, HC, R\&D/Q, INV/Q, M\&E/INV, EX/Q, IM/Q, SFDI.US, SFDI.EU, SMA)$$

Labor productivity is a function of capacity utilization, inward FDI stock, inward FDI in user industries, FDI in supplier industries, human capital, Ratio of R&d spending to real output, share M&E in total investment, shares of exports and imports in real output, shares of U.S. and Europe in Canada's inward FDI stock, and share of mergers and acquisitions in Canada's inward FDI flows.

$$N = F(Q, CAPU, FDI, RW, SFDI.US, SFDI.EU, SMA)$$

Employment is a function of real output, real wage, capacity utilization, inward FDI stock, shares of U.S. and Europe in Canada's inward FDI stock, and share of mergers and acquisitions in Canada's inward FDI flows.

$$Q = Q/N * N$$

Real output can be derived as an identity.

Where,

INV = Real investment by industry, could estimate separate equations for M&E and construction

EX = Real exports, disaggregated by industry,

IM = Real imports, disaggregated by industry,

R&D = R&D spending, disaggregated by industry

HC = Share of employees with university education, disaggregated by industry

Q/N = Labour Productivity, disaggregated by industry

Q = Real Output, disaggregated by industry

N = Number of people employed, disaggregated by industry

CAPU = Capacity utilization, disaggregated by industry

r = Real interest rate

FDI = Inward FDI stock, disaggregated by industry

SFDI.US, SFDI. EU, are the shares of US, and Europe in Canada's inward FDI stock, disaggregated by industry

SMA = Share of mergers and acquisitions in Canada's inward FDI flows, disaggregated by industry

Q.U.S = Real output in the US, disaggregated by industry

Q.OTH, Real output in other countries, disaggregated by industry

REX = Real exchange rate

CT = Corporate tax rate, disaggregated by industry

TCR = R&D tax credit, disaggregated by industry

M&E = Machinery and equipment investment, disaggregated by industry

RW = Skilled labour wage rate relative to the total wage rate, disaggregated by industry

FDI.U = A weighted sum of inward FDI in the buying (user) industries, disaggregated by industry

FDI.S = A weighted sum of FDI in supplier industries, disaggregated by industry

W = Real wage rate, disaggregated by industry

These eight equations need to be estimated as a system, using time-series (at least 10 to 15 years of annual data) on detailed Canadian industries, grouped into three major sectors: primary, manufacturing, and services.

Other Suggestions:

Another possibility is to input the estimated coefficients (elasticities) on inward FDI into one of the existing Canadian CGE models, and simulate the general equilibrium impacts of a 10% increase in Canada's inward FDI stock on the Canadian economy. Using time-series data on firms and highly disaggregated industries from Statistics Canada, one could also estimate the impact of inward FDI on average firm size, and on intra-and inter-industry shifts in capital and labour inputs in Canada, the other important drivers of aggregate labour productivity and real incomes.

6. Conclusions

This paper discussed the potential impacts of inward FDI on the Canadian economy, provided a brief review of the available empirical evidence, focusing on Canada, and outlined a structural approach for estimating the overall economic impact of inward FDI on capital formation, skills development, R&D, exports, imports, labor productivity, real output and employment in Canada, using time-series data on disaggregated Canadian industries. Our review of the theoretical and empirical literature suggests that inward FDI could impact the host economy through a number of channels. It provides significant overall economic benefits: increases physical and human capital, expands trade, stimulates innovation and innovation adoption, and improves labor productivity.

However, the available empirical evidence is not suitable for doing any serious policy development work, because as discussed in the previous section, the existing empirical research suffers from a number of major limitations and deficiencies. Therefore, the new research should use a structural approach for estimating empirically the overall economic effects of inward FDI in Canada, similar to the one suggested in section 5. The first task towards the estimation of the small structural model discussed in section 5 is to specify the functional form for each one of the eight equations, and to discuss potential interdependencies between them. The second step is to collect/develop long time-series data (15 to 20 years annual data) on all the dependent and independent variables for detailed Canadian industries. The third step is to estimate them as a system. The last and final step is to use the estimated coefficients and to simulate the overall impact of inward FDI on Canada's overall trade, investment, human capital, R&D, real output, employment and labour productivity.

References

- Alfaro, L. (2003). Foreign Direct Investment and Growth: Does the Sector Matter?, Mimeo, Harvard Business School.
- Alfaro, L., A. Chanda, S. Kalemli-Ozcan and S. Sayek (2004). FDI and Economic Growth: The Role of Financial Markets, *Journal of International Economics*, 64:89-112.
- Baldwin, J. R., D. Beckstead and R. E. Caves (2001). Changes in the Diversification of Canadian Manufacturing Firms and plants (1973-199&): A Move to Specialization, Analytical Studies Branch Research Paper Series, Statistics Canada Catalogue no. 11F0019MIE No.179
- Baldwin, J. R. and W. Gu (2005). Global Links: Multinationals, Foreign Ownership and Productivity Growth in Canadian Manufacturing, The Canadian Economy in Transition Series, Statistics Canada Cat. No. 11-622.
- Baldwin, J. R., and W. Gu (2004). Industrial Competition, Shifts in Market Shares and Productivity Growth, Statistics Canada Research Paper, Catalogue No. 11F0027 MIE-No.21, Micro-Economic Analysis Division, Ottawa: Statistics Canada
- Baldwin, J R., and W. Gu (2006). Plant Turnover and Productivity Growth in Canadian Manufacturing, *Industrial and Corporate Change* 5 (3); 417-465
- Baldwin, J. R., R. Caves and W. Gu (2005). Responses to Trade Liberalization: Changes in Product Diversification in Foreign- and Domestic-controlled Plants, Statistics Canada, Cat. No. 11F0027MIE No. 031
- Baldwin, J. R., and W. Gu (2010). Firm Dynamics and Productivity Growth: A Comparison of the Retail Trade and Manufacturing Sectors, *Industrial and Corporate Change*.
- Baldwin, J. R. and N. Dhaliwal (2001). Hetrogeneity in Labour Productivity Growth in Manufacturing: Differences Between Domestic and Foreign-Controlled Establishments, in Statistics Canada, Productivity Growth in Canada, Statistics Canada Catalogue no, 15-204-XPE.
- Baldwin, R. E. (1994). The Effects of Trade and Foreign Direct Investment on Employment and Relative Wages”, *OECD Economic Studies* No. 23
- Baldwin, R. E. (2012). Trade and Industrialization after Globalization’s 2nd Unbundling: How Building and Joining a Supply Chain are Different and Why it Matters, Mimeo, Graduate Institute, Geneva and University of Oxford.
- Bloomstrom, M. and A. Kokko (1998). Multinational Corporations and Spillovers, *Journal of Economic Surveys*, 12 (3):247-277.
- Bloomstrom, M., S. Globerman and A. Kokko (1999). The Determinants of Host Country Spillovers from FDI: Review and Synthesis of the Literature”, *SSE/EFI Economics and Finance Working Paper*, 239.
- Bosworth, B. and S. Collins (1999). Capital Flows in Developing Economies: Implications for Saving and Investment, *Brooking Papers on Economic Activity*, 1:143-169.
- De Mello, L. (1997). FDI in developing countries and growth: a selective survey, *Journal of Development Studies*. 34 (1):1-34.
- De Mello, L. (1999). Foreign Direct Investment – led Growth: Evidence from Time Series and Panel Data, *Oxford Economic Papers*, 51: 133-151.
- Cameron, G. and P. Cross (1999). The Importance of Exports to GDP and Jobs, *Canadian Economic Observer* 12(11), Statistics Canada Catalogue no. 11-010-XPB.
- Ghosh, M. and W. Wang (2009). Does FDI Accelerate Economic Growth? The OECD Experience Based on Panel Data Estimates for the Period 1980-2004, *Global Economy Journal*, 9(4):1-21.
- Globerman, S., J. Ries and I. Vertinsky (1994). The Economic Performance of Foreign Affiliates in Canada, *Canadian Journal of Economics* 27(1):143-156.
- Head, K. and J. Ries (2001). Offshore Production and skills Upgrading by Japanese Manufacturing Firms, *Journal of International Economics*, 58(1):81-105.

A Canadian Perspective

- Head, K. and J. Ries (2004). Exporting and FDI as Alternative Strategies, *Oxford Review of Economic Policy*, 20(3):409-423.
- Hejazi, W. and P. Pauly (2002). Foreign Direct Investment and Domestic Capital Formation, Industry Canada Working Paper No. 36.
- Hejazi, W. and A. E. Safarian (1999). Modeling Links between Canadian Trade and Foreign Direct Investment, Industry Canada Working Paper, Perspectives on North American Free Trade Series, No. 2.
- Hejazi, W. and D. Trefler (2013). The Impact of FDI Restrictions on the Canadian Economy, Draft Paper.
- Helpman, E, M. J. Melitz and S. R. Yeaple (2004). Export versus FDI with Heterogeneous Firms, *American Economic Review*, 94 (1):300-316.
- Loungani, P. and A. Razin (2001). How Beneficial is Foreign Direct Investment for Developing Countries?, Finance and Development, June, International Monetary Fund.
- Moura, R., R. Forte (2010). The Effects of Foreign Direct Investment on the Host Country Economic Growth – Theory and Empirical Evidence, Working Paper No. 390, Economics Department, Universidade Do Porto.
- Ng, E. and M. Souare (2009). Country Sources of FDI and Productivity Performance in Canadian Industries, Mimeo, Industry Canada.
- Lipse, R.E. (2002). Home and Host Country Effects of FDI, NBER Working Paper 9293.
- Fortanier, Fabienne (2007). Foreign Direct Investment and Host Country Economic Growth: Does the Investor's Country of Origin Play a Role?, *Transnational Corporations*, Vol. 16, No.2.
- Beugelsdijk, S., R. Smeets and R. Zwinkels (2008). The Impact of Horizontal and Vertical FDI on Host Country's Economic Growth, *International Business Review* 17: 452-472.
- Rao, S. and A. Ahmad (1996). Canadian Small and Medium-sized Enterprises: Opportunities and Challenges in the Asia-Pacific Region, in the *Asia-Pacific Region in the Global Economy: a Canadian Perspective*, by R.G. Harris (Edited), University of Calgary Press.
- Rao, S., A. Sharpe and J. Smith (2005). An analysis of the Labour Productivity Growth Slowdown in Canada Since 2000, CSLS, *International Productivity Monitor* 10: 3-23.
- Rao, S., M. Souare and W. Wang (2010). Canadian Inward and Outward Foreign Direct Investment: Assessing the Impacts, Trade Policy Research 2010, Foreign Affairs and International Canada.
- Rao, S. and J. Tang (2005). Foreign Ownership and Total Factor Productivity, in L. Eden and W. Dobson (eds.) *Governance, Multinationals and Growth*, Edward Elgar: 100-121.
- Ries, J. (2002). *Foreign Investment, Trade and Industrial Performance: Review of Recent Literature*, in S. Rao and A. Sharpe (eds.), *Productivity Issues in Canada*, Industry Canada Research Series, Volume 10, University of Calgary Press: 517-536.
- Sharpe, A. (2010). Can Sectoral reallocations of Labour Explain Canada's Abysmal Productivity Performance?, *International Productivity Monitor*, vol.19:40-45.
- Souare, M. (2013). Inward Foreign Direct Investment and Skills Upgrading, Mimeo, Industry Canada.
- UNCTAD (1999). World Investment Report: Foreign Direct Investment and the Challenge of Development.
- Wang, W. (2009). Foreign Multinational Production in the Canadian Manufacturing Sector, Mimeo, Industry Canada
- Zhang, K. (2001). Does Foreign Direct Investment Promote Economic Growth? Evidence from East Asia and Latin America, *Contemporary Economic Policy*, 19 (2):175-185.

Contact Information

Someshwar Rao, SRAO Consulting INC. and Research Fellow, IRPP. Email: someshwar6@gmail.com

Table 1. Global FDI stocks (US\$ Billions)

Year	Inward FDI stock (US\$ Billions)	Outward FDI stock (US\$ Billions)
1990	2078.3	2091.5
2000	7511.3	8025.8
2012	22812.7	23592.7

Source: World Investment Report 2013.

Table 2. Shares of Non-OECD countries in global FDI stocks (%)

Year	Share in inward FDI stock (%)	Share in outward FDI stock (%)
1990	24.8	6.9
2000	24.4	11.5
2012	41.5	20.9

Source: World Investment Report 2013.

Table 3. Canada's Inward and Outward FDI stocks (US\$ Billions)

Year	Inward Stock (US\$ Billions)	Outward FDI Stock (US\$ Billions)	Outward stock minus inward stock (US\$ Billions)
1990	112.8	84.8	-28.0
2000	212.7	237.6	24.9
2012	637.0	715.1	78.1

Source: World Investment Report 2013.

Table 4. Canada's shares in global inward and outward FDI stocks (%)

Year	Inward FDI Share (%)	Outward FDI share (%)
1990	5.4	4.1
2000	2.8	3.0
2012	2.8	3.0

Source: World Investment Report 2013.

Table 5. Structure of Canada's inward FDI flows, 1986-2012

Period	Total FDI inflows, \$ Millions, annual average	U.S. Share, %	Share of mergers & acquisitions, %	Share of reinvested earnings, %	Share of all other flows, %
1986-1990	7645.0	37.1	22.7	35.8	41.5
1991-1995	7804.0	75.0	19.2	13.7	67.1
1996-2000	39777.0	50.8	54.3	20.8	24.9
2001-2005	23850.0	73.5	40.0	62.3	-2.3
2006-2012	66167.0	34.5	48.2	19.2	32.6

Source: Statistics Canada.

Table 6. Geographic distribution of Canada's inward FDI stock, 2004 and 2012

Region/Country	Inward FDI stock, \$Billions, 2004	Inward FDI stock, \$Billions, 2012	Share, 2004, %	Share 2012, %
All Regions/Countries	379.5	633.9	100.0	100.0
North America	248.0	331.6	65.3	52.3
U.S.	243.3	326.5	64.1	51.5
South and Central America	2.0	15.7	0.5	2.5
Europe	110.0	212.1	29.0	33.5
Africa	0.5	3.7	0.1	0.6
Asia/Oceania	19.0	71.9	5.0	11.3

Source: Statistics Canada

Table 7. Distribution of Canada's inward FDI Stock by sector, 2008 and 2012

Sector	Inward FDI Stock, \$ Billions, 2008	Inward FDI Stock, \$ Billions, 2012	Share, 2008, %	Share, 2012, %
All Sectors	540.8	633.9	100.0	100.0
Agriculture, forestry and fishing and hunting	NA	1.5	NA	0.2
Mining and oil and gas extraction	76.8	120.3	14.2	19.0
Utilities	NA	3.7	NA	0.6
Construction	NA	3.4	NA	0.5
Manufacturing	194.3	181.6	35.9	28.6
Wholesale trade	NA	48.1	NA	7.6
Retail trade	NA	30.0	NA	4.7
Transportation and warehousing	4.0	8.8	0.7	1.4
Information and cultural industries	NA	2.3	NA	0.4
Finance and insurance	73.1	85.1	13.4	13.5
Real estate and rental and leasing	NA	6.9	NA	1.1
Professional, scientific and technical services	NA	10.4	NA	1.6
Management of companies and enterprises	59.7	121.6	11.0	19.2
Information and communication technologies	20.9	13.8	3.9	2.2
All other sectors	86.8	10.2	16.1	1.6

Source: Based on Data from Statistics Canada.

Table 8. Share of foreign investment in total Canadian investment spending, %

Year	M&E	Construction	Total
2009	24.9	8.2	13.7
2010	23.3	7.5	12.4
2011	25.6	8.3	13.6
Average: 20009-11	24.6	8.0	13.2

Source: Based on Data from Statistics Canada.

Table 9. Overall inward R&D intensity (inward BERD/total BERD), %

Country	2001	2003	2005	2007
Ireland	66.4	70.2	70.3	72.4
Belgium	58.9	56.8	56.8	59.4
Sweden	44.7	31.5	41.0	46.8
UK	42.8	43.9	40.4	40.5
Canada	28.8	31.9	33.5	35.4
Germany	22.1	25.2	27.5	26.0
France	23.1	22.4	23.5	20.1
USA	13.1	14.8	13.8	15.2
Ja	3.4	4.3	5.1	5.1

Source: Adapted from European Commission (2012).

Table 10. Foreign-controlled R&D in Canada by 2-digit industry

Industry	Foreign-controlled R&D share (%)		foreign-controlled R&D (C\$ Millions)	
	2001	2007	2001	2007
Mining and quarrying	29.9	53.2	64	292
Food, beverages and tobacco	28.7	29.3	27	49
Textiles, wearing apparel, leather and footwear	71.5	NA	68	NA
Wood and paper products, printing, publishing	9.2	20.0	30	82
All chemical products	71.0	57.8	833	942
Drugs and medicines	80.9	NA	665	NA
Rubbeand plastic products	25.8	21.2	20	24
Non-metallic mineral products	14.0	NA	3	NA
Basic and fabricated metal products	8.6	51.5	33	272
Non-electrical machinery and equipment	55.9	26.7	463	184
Machinery and equipment n. e. c.	26.7	20.1	93	118
Office, accounting and computing machinery	77.1	63.5	370	66
Electrical machinery and apparatus n.e.c.	58.3	NA	178	NA

A Canadian Perspective

Radio, TV and communication equipment	9.0	9.1	363	132
Medical, precision, opt. instruments	32.6	NA	88	Na
Motor vehicles	60.8	63.8	216	308
Other transportation equipment	57.2	56.8	559	572
Aircraft and space	NA	NA	545	NA
Furniture, recycling and manufacturing n.e.c.	18.0	NA	14	NA
Manufacturing total	32.2	37.5	2874	3095
Electricity, gas and water supply, construction	2.0	NA	4	NA
Trade, repair, hotels and restaurants	46.7	NA	304	530
Finance, insurance, real estate, business act.	25.4	32.6	771	1491
Other activities	10.5	NA	87	NA
Total Business Sector	29.6	35.4	4104	5622

Source: Hall (2010).