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Chapter 1

# A Survey of Effects of International Trade on Growth

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Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/50097

## 1. Introduction

For many centuries economist simply upgrades Riccardian models and argued that free trade based on comparative advantage and according to geographical distribution of factors of production and specialization leads to efficient use of resources and increases world production frontier a "win-win" situation. While according to liberal economist trade liberalization creates faster growth there are economists who proclaimed that countries become more dependent on foreign resources which control process domestic growth and development. Recent models incorporate economies of scale, imperfect competition, R&D and assume that trade liberalization determine the geographical location of industries therefore gain from trade (Helpman and Krugman, 1985). This paper will review and contrast literatures on Old Trade theories, Post Keynesian, Endogenous Growth Models and International Trade, The New Trade Theory, Economic Geography and Theories of National Competitive Advantage.

## 2. Comparative advantage

Smith (1776) international trade makes it possible to increase extend of the market and specialization due to division of labor increases the productivity therefore economic growth. The international trade generates a dynamic force by intensifying the specialization of labor, encouraging technical innovations and the accumulation of capital, making it possible to achieve economic growth. A Laissez-faire Laissez-passer policy allowed markets to flourish encouraged division of labor, specialization, and technological development, thereby encouraging growth.

Ricardo (1817) theory of comparative advantage is based on the labor theory of value and present a dynamic model of economic growth and characterized it by high savings, capital accumulation, increased production and productivity which increases demand for labor

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forcing wages to increase and growth. But, resources especially land are subject to diminishing returns, the production is immersed by wages in an increasing proportion, this will reduce incentive to investments, and economy will eventually reach the "stationary state." Young (1928) in Smith tradition examined how international trade increases the dimension of the market and limitation of the division of labor therefore productivity. He further studied the inter-relation between industries and creation of new industries and technological progress in the process of economic growth.

## 3. The post Keynesian

The post Keynesian growth accounting the determinants of growth and business cycle, the first model goes back to Kalecki (1935) with many similarities to Keynesian model and develops a consumption function and assumes capitalists save all their income and labor consumes all their income therefore capital formation depends on income distribution can be expanded to a growth model. Domar's (1957) growth model productive capacity and potential output is treated as a constant multiple of stock of capital a "razor's-edge" growth path at which any deviation from exogenously fixed rate of capital output ratio, growth path would diverge from natural growth path and become unstable. The growth rate of GDP was equal to the ratio investment to GDP lagged by one year divided by the ratio of "required" investment to desired growth, the Incremental Capital Output Ratio. Harrod's (1953) fundamental equation the warranted rate of growth is a function of saving and optimal capital output ratio which is different from actual capital output ratio. Capital output ratio was treated exogenously. Harrod-Domar growth model closed economy model was path breaking in the sense they treated growth as an endogenous variable. Domar treats high unemployment rate as a given, therefore the surplus of labor will be absorbed by any additional capital formation. Domar claimed investment had two effects, adds to demand by purchase of new goods also adds to capacity, supply, but the problem was balancing aggregate demand and supply. Domar indicated that these two effects would not necessarily be equal which could cause economy to spiral off into either to prolonged overproduction or prolonged underproduction. If actual capital output ratio does not grow at the same rate as optimal capital output ratio the gap between actual growth and optimal growth will widen and economy will never return to optimal growth path, this financial gap according to World Bank report (1993) countries will require significant amount of foreign capital inflows ... "to provide sufficient resources to sustain economic growth" (p. 32.)

The literature on international trade and growth are built using absolute and comparative advantage and the Hecksher-Ohlin model, the Two by Two by Two model (two countries, two commodities, two factors). Their model makes a clear distinction between domestic and external factor mobility. Factor mobility is within the same country between domestic industries and assumed no international factor immobility takes place. Each country for each good has the same constant returns to scale production function but their capital and labor endowments are different. In the absence of trade, the more labor abundant countries would produce labor intensive goods as would be relatively cheaper than capital intensive goods and the more capital abundant countries would produce capital intensive goods as

would be relatively cheaper than labor intensive goods. After trade, countries export goods intensive in the use of their more abundant factor, and import goods intensive in the use of their scarce factor. In long run trade will equate relative prices in different countries, and relative factor prices, assuming no transportation costs, relative price and factor price will be equal. The Heckscher-Ohlin trade model is focused on the idea that a major source of comparative advantage is international differences in factor endowments, the relative factor abundance and intensity is what drives trade patterns between countries.

Leontief (1953) used United States trade data from 1947 and performed the first empirical test of the Heckscher-Ohlin theorem. The United States was capital abundant relative to the rest of the world should have been importing labor intensive goods and exporting capital intensive goods but results showed the contrary which in literature is called "Leontief's paradox." Leontief's paradox has inspired a large body of research in international trade theory, for example Romalis (2004) developed an comprehensive version of the Heckscher-Ohlin model to be consistent with empirical data by taking into account variables such as multiple countries, technology, production variation, and human capital.

The Stolper-Samuelson theorem or so called Hecksher-Ohlin-Samuelson model examines the effects of international trade on employment and income, and concludes that under free trade the scarce factors of trading nations due to price equalization are to lose under free trade under, therefore in the United States since labor is considered as the scarce factor of production will not benefit from free trade. Rybczynski (1955) (Rybczynski theorem) builds on the Stolper-Samuelson theorem and "allows predictions about the resulting changes in a country's equilibrium trade volume and terms of trade. As the stock of capital grows, desired trade at given terms of trade will increase (decrease) if the country is capital-abundant (labor-abundant) relative to its trading partners. An expansion of the capital stock will thus lead to deterioration (improvement) in the country's terms of trade. Corresponding results hold for an expansion of labor with capital held constant." (Rybczynski, 1955)

The quasi-Heckscher-Ohlin prediction is that "countries capture larger shares of world production and trade in commodities that more intensively use their abundant factor."The quasi-Rybczynski effect is "countries that accumulate a factor faster than the rest of the world will see their production and export structure move towards commodities that more intensively use that factor." (Romalis, 2004)

Feder (1982) developed a framework to show the impact of international trade on economic growth by presenting a dualistic growth model by dividing the economy into two productive sectors, export sector and non-export sector, and concluded that the rate grow of investment, labor and exports explains the rate of growth of economy. Further the allocation of one unit of capital to the export sector would create higher marginal value for the economy than what would be have been generated by a non-export sector.

Ram (1987) expanded Feder's model using of time-series to data for 88 countries for the years 1960-1982 and concluded there was a positive correlation between exports and economic growth for more than 80% of the countries. Coe and Helpman (1993) examined the important role of domestic R&D as well as imported sum of R&D of a country's trade partner on the path

of total productivity factor (TPF). They used accumulated R&D stock as a proxy for each countries stock of knowledge by using data from 22 industrialized economies for the period 1971-1990, the results showed both domestic and foreign R&D have a positive relation effect on a country's TPF. Further the more open the economy the greater the effect of the stock of external R&D on the domestic TPF and that the less developed countries benefited the most from the stocks of external R&D. Keller (1996) questioned Coe and Helpman's results and since he was also able to estimate foreign R&D spillover effects using bilateral trade share rather than the actual trade shares as a country does not have to directly trade with another country such as country A to benefit from the R&D spillover as long as one of its trade partners is engaged in with trade with country A will benefit from spillover.

## 4. Endogenous growth models and international trade

Endogenous growth theories treat growth as endogenous and as a result of scale and accumulation there is a positive relation between scale and productivity which outweigh the impact of accumulation which in the neoclassical model leads to diminishing returns. Schumpeter (1942) coined the seemingly paradoxical term "creative destruction," as primary source of economic growth:

"The opening up of new markets, foreign or domestic, and the organizational development from the craft shop to such concerns as U.S. Steel illustrate the same process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism." (p. 83). Schumpeter, coined the phrase "technological unemployment" the evolutionary process of growth is entrepreneurship and competition which fuel "creative destruction"

"The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates." (p. 83)

Schumpeter (1942), recognized and analyzed the fluctuations in economic activity under capitalism although accepts the Say's Law, that the economy is self-correcting, in long-run equilibrium cannot be at less than full employment. He clearly distinguished between "'invention," the advancement knowledge and the "innovation," the economic activities of using that knowledge as well as capital accumulation as the cause of economic growth. Schumpeter by outlining the trajectories of creativity in five industries steel, automobiles, textiles, electric power and railroads in three countries US, UK and Germany demonstrate the significance of economies of scale and that creative destruction is the engine of capitalism which can be simplified into two terms:

1. The contribution from entry and exit.
2. The contribution of economies of scale

International trade creates specialization and economies of scales therefore economic growth.

Kenneth Arrow (1962) coined the term “learning by doing” and viewed the level of the "learning" coefficient is a function of collective investment. Learning was treated as a function of the absolute level of knowledge already accumulated in. “Learning by doing “ of human capital just like physical capital accumulates and is a function of the accumulated knowledge, the aggregate human capital or “technical knowledge” . There is a positive spillover of accumulation of inputs on productivity which offsets diminishing return. Arrow assumed that $A_i$, the technical augmentation factor, is specific to the firm as well as the total "knowledge" in the economy which arises from past cumulative investment of all firms and is easily available to all forms in the process of "learning-by-doing,” therefore is a public good and is a free good.

Therefore, the "economy-wide" aggregate production function is:

$$Y = A\, K^{a+z} L^{1-a}$$

Where z is accumulates of capital. Arrow (1962) assumed that a + z <1, which implies increase of capital or labor does not lead to increasing returns, rather increasing returns arise because new knowledge is discovered in the process of investment and production and such knowledge became publicly known, external to individual firms.

Barro and Sala -i-Martin (1995) assume “learning-by-doing” is through each firm’s investment, therefore there is a direct relation between a firm’s capital stock and stock of knowledge. Further assume knowledge is a public good therefore all firm could access knowledge at zero cost once discovered, a portion of knowledge spills over instantly across the whole economy. Further the existence of increasing returns to scale does not alter the distribution of the output among the factors of production, the payment of marginal products of each input as in a competitive market, there is not such a mechanism that leads to a socially optimal equilibrium the distribution of knowledge, which implies the social rate of return is greater than the private rate of return of investment. To remedy Barro and Sala-i-Marin suggest subsidizing purchase of capital good or subsidizing production to reach optimum level of investment in the economy.

Paul Romer (1986) uses Arrow’s “learning by doing” and argues that the rate of growth of capital alone may yield increasing returns, that a + z > 1 was possible. Romer presented an endogenous growth model in which “technological change in which long-run growth is driven primarily by the accumulation of knowledge by forward-looking, profit-maximizing agents.” (1003) He further assumes “new knowledge is assumed to be the product of a research technology' that exhibits diminishing returns, this assumption implies that the long run rate of growth is independent of saving-investment quota. That is, given the stock of knowledge at a point in time, doubling the inputs into research will not double the amount of new knowledge produced. In addition, investment in knowledge suggests a natural externality. The creation of new knowledge by one firm is assumed to have a positive external effect on the production possibilities of other firms because knowledge cannot be perfectly patented or kept secret.” (1003) and “knowledge is a capital good with an increasing marginal product.” (1005) Further “Given increasing marginal productivity of

knowledge, increasing marginal productivity of a composite k would still be possible if the increasing marginal productivity of knowledge were sufficient to outweigh the decreasing marginal productivity associated with the physical capital." (1020)

Romer (1990) proposed the technological progress appears with new knowledge formation, the knowledge via human capital can serve as an important production tools that like other forms of capitals which leads to increase in the national income of the advanced countries. In contrast, the developing countries with abundant manpower and capital have not reached a sustainable economic development. "The growth rate is increasing in the stock of human capital, but it does not depend on the total size of the labor force or the population. In a limiting case that may be relevant for historical analysis and for the poorest countries today, if the stock of human capital is too low, growth may not take place at all." (77) In this model Romer treats" knowledge as nonrival good makes it possible to talk sensibly about knowledge spillovers, that is, incomplete excludability." (79)

Romer (1990) model assumes there are four inputs labor, human capital, capital and an index of the level of the technology. Human capital is captured by such factors as education and on the job training, and final output is a function of these inputs. Under the specification of the model the economies with a larger total stock of human capital will experience faster growth and further put forward that free international trade can accelerate growth. Finally the model suggests the low growth rate in underdeveloped economies with large population can be explained by the low levels of human capital.

Spencer and Brander (1983) (1985) papers analyze the role of R&D policy on trade and conclude that R&D could play a significant role in trade. Both papers assume an international duopoly and use Cournot oligopoly model wherein a domestic firm and a foreign firm compete in a third-country market. Spencer and Brander (1983) use game theory in which a mixture of an export subsidy and R&D can increase domestic welfare by diverting profits from the foreign to the domestic firm, further R&D subsidy gives incentive to the domestic firm to increase the level of R&D, causing the foreign firm to reduce its R&D and exports, therefor home government can effectively subsidize or tax the home firm and influence the outcome of the game between firms.

The significance of the linkage between R&D activities, trade and growth has been highlighted intensely in the R&D based open economy growth models of Grossman and Helpman (1990, 1991). Trade leads to an increase in productivity and growth by providing a wider range of intermediate inputs. The analysis mostly focuses on the rate of innovation, which is the main source of sustained growth and how the outcomes of international trade affect innovations.

Models developed by Rivera-Batiz and Romer (1991) and Young (1991) centered on the effects of knowledge spillovers and international trade on the R&D activities that stem within domestic economies. Baldwin and Forslid (2000) also analyze R&D competition at international level and how this competition enhance growth by stimulating competition in the R&D sector at the global scale but they do not show how global competition of R&D affects either trade patterns or factor allocations.

Hausman, Hwang, and Rodrik (2007) maintain that "right" specialization permanently affects long-run growth which implies "leapfrogging" strategies aims to transfer the production of high technology products to developing economies. It is further argued that China's economic policies have led to **an** extensive leapfrogging in technology, and raise concern about its risk to U.S. security and commercial interests (Rodrik, 2006), (Choate and Miller, 2005) (Gomory and Baumol, 2000) and (Samuelson, 2004).

Gomory and Baumol (2000) and Samuelson (2004) use the comparative advantage equilibrium theory to examine how changing patterns of global production can affect the distribution of gains from trade. They conclude that advance of trade may not be the conventional "the win- win outcomes," rather trade expansion may generate winners and losers countries. The distribution of gains that regulates the terms of trade rest on the differences of supply and demand supply such as the relative prices of exports and imports, these factors can change therefore change the gains from trade.

Samuelson (2004) analysis the economic implications effects of increase in productivity of foreign trading partners due to technology catch-up that increase in productivity of foreign trading partners such as China, through domestic innovation or by transfer of technology through U.S. firms outsourcing of production to China, may weaken the United States' share of the gains from trade. China by catching up in the production of traditionally specialized export goods by United States will increase global supply and lowers price U.S. export, worsening the United States' terms of trade while the United States gains from trade but less than prior to China catching up.

Gomory and Baumol (2000) analyze the effects of transfer of industries and loss of the industrial base to other countries. Highlighting on the fact that comparative advantage in the 21th century is created and not endowed unlike the 18th century world when trade was based on endowments natural resource which determined the pattern of comparative advantage. In today's world, technology drives comparative advantage, and technology can be significantly influenced by human actions and policies which have enormous implications for the distribution of gains from trade among countries. Their models help international trade theory to integrate the new realities of globalization.

New endogenous growth models emphasize that international trade increases the rate of economic growth. Yet, less known is that if endogenous growth cans "permanently reduced rates of growth, as when trade pushes an economy to specialize in sectors with no dynamic scale or other benefits. The theoretical relationship between trade and growth is fundamentally ambiguous." (Rodrik, 1999, p.27).

## 5. The new trade theory

Grubel and Lloyd (1975) demonstrated that, a high percentage of trade took place within intra-industry rather than inter-industry. Balassa (1967) indicated that trade within intra-industry incurred with few costs of adjustment. These papers opened the way to new trade theory.

Krugman (1979 and 1981) in a Heckscher–Ohlin model of international trade model changes the traditional assumption of perfectly competitive market to monopolistically competitive market in which specialization occurs via intra-industry trade and large scale production with lower prices and a larger selections of products is the core of new trade theory. The New Trade Theory build on the principal of old trade theory of the factor price equalization and integrates factor markets internationally, the Rybczynski and Heckscher-Ohlin theorems, connecting factor endowments to production and patterns of trade, and the Stolper–Samuelson theorem, linking fluctuations in commodities prices to fluctuations in real factor payments.

Helpman (1987) used the monopolistically competitive model with manufacturing trade data between advanced economies, and showed that its main predictions were consistent. Hummels and Levinsohn (1995) showed that the monopolistically competitive model to work equally well for trade flows between non-OECD (Organization for Economic Co-operation and Development) countries, which one would expect comparative advantage to be overriding. On the contrary Evenett and Keller (2002) empirical work support the monopolistically competitive approach since the data for countries with a greater share of intra-industry trade are a better fit.

Krugman (1991) noted that the home-market effect "wholly dependent on increasing returns; in a world of diminishing returns, strong domestic demand for a good will tend to make it an import rather than an export" (p. 955). Davis and Weinstein (1999, 2002) industry production increases more than one to one with local demand for a good with convincing sign of increasing returns for manufacturing industries in both OECD countries and Japanese regions. Head and Ries (2001) find sign of similar to Davis and Weinstein for Canada and the United States. Both studies are consistent with home-market effects concluded that when technology and factor prices were similar, home-market effects were feasibly strongest.

## 6. Economic geography

The Home Market Effect is the main engine of the accumulation processes stressed by the new economic geography models. (Krugman, 1991) takes incomes as exogenous, but, in his paper titled "Increasing Returns and Economic Geography," published in the Journal of Political Economy in 1991 Krugman treats incomes as endogenous, because fully developed international factor mobility. Brander and Spencer (1985) and Krugman and Obstfeld (1992) formulate the notion of "strategic trade" assume two countries with different elasticities of demand, with national level internal economies of scale, when countries are historically ahead of other countries in producing a good, because of capacity to produce at a lower price due to economies of scale, then they have an advantage over others countries at the starting strategic point.

## 7. Theory of national competitive advantage

According to Stone and Ranchhod (2006), Porter's "focus on competition or 'rivalry' is a diversion from traditional economic thinking." (284) The primary contribution of Porter's

(1990) in The Competitive Advantage of Nations is to the analysis of investment and international trade, within the scope of the economic development of nations. Porter presents a model in which innovation is the focus of formation and sustainment of competitive advantage. Competitive advantage consists of strategies which matches a firm's resources to be successful in the market. Porter formulates a strategy in which firm's resource prospect is not only a function of its own previous investments, but also is a function of the positions of supply and formation of resources within its environment. Porter adopts a Schumpeterian concept of a process of dynamic change in which innovation and imitation constantly creates and destroys positions of competitive advantage. Change may be exogenous through the development of new technologies, change in demand, new industry, change in supply of resources, or changes in government regulations. On the other hand, change may be endogenous through innovation by firms, once created competitive advantage is subject to destruction.

Porter (1990) identifies four classes of a country's features the "National Diamond" land, labor and capital (including human capital), and distinguishes between skilled and unskilled labor, the underlying conditions for the determination the national competitive advantage of a nation and further emphases more on demand differences than on similarities to explain the international competitiveness of countries. In his model both the size of the home demand as well as the sophistication of home country buyers matters as is the configuration of home demand that shapes country's firms production, innovation to maintain their competitive positions to meet expectations of the home buyers. Explicitly, Porter (1990, 1998) regards sophisticated and demanding buyers as the main conditions for home demand to increase the market share of that industry, this maintain the competitive position of a firm and leads international demand.

However, dissimilar demand circumstances in different countries creates different demand structures therefore the geographical location economies of increasing returns, as explained by Economic Geography theories by Krugman & Obstfeld (2003) due to a specific set of demand conditions in a geographical location determines the location of an industry with economies of increasing returns, therefore comparative advantage is determined by demand conditions rather than differences in resource endowments. "Geographic concentrations of interconnected companies and Institutions in the particular field" (Porter, 1998) "Clusters are not seen as fixed flows of goods and services, but rather as dynamic arrangements based on knowledge creation, increasing returns and innovation in a broad sense" (Krugman, 1991)

## 8. Conclusion

The evolution of trade theory, from old trade doctrines Smith and Riccardo to the New Trade Theory, all seem to support of the free trade. In world of inadequate demand and unemployment, strategic policies to stimulate demand through such methods as subsidies and under-valued exchange rates, home industries that benefit from economies of scale, and increasing return, could results in gain from trade at the expense of expense of other

countries. Never the less, these demand policies might increase demand for global production which stimulates the global economy.

Blinder discussed that "Although there are no reliable national data, fragmentary studies indicate that well under a million service-sector jobs in the United States have been lost to offshoring to date. (A million seems impressive, but in the gigantic and rapidly churning U.S. labor market, a million jobs is less than two weeks' worth of normal gross job losses.) However, constant improvements in technology and global communications virtually guarantee that the future will bring much more offshoring of "impersonal services" -- that is, services that can be delivered electronically over long distances with little or no degradation in quality." (2006). Which raise questions about the effects of international outsourcing and transfer of technology on domestic economies. Although companies earn foreign profits, outsourcing can weaken national income if it transfers technology that increases competition for domestic exports industries. On the other hand as corporations transfer the innovation and technology to a foreign production locations it contribute to progress of innovations and advancement of technology increases global production frontier and maximizes global profit but as Samuelson (2004) pointed this might not lead to maximize national gain, there will be winners and losers.

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