

Regional Trade Agreements The Mainstream Approach and an Alternative Treatment

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Abstract

This paper analyses the mainstream approach to regional trade agreements (RTAs) and presents an alternative treatment. Mainstream theory maintains that the principle of comparative advantage is the fundamental explanation for the gains from trade argument or the assertion that ‘free trade is best.’ RTAs are not an exception. They constitute a special case of application of comparative advantage. However, comparative advantage is prefaced on axioms that are irrelevant to the workings of the ‘real world economies.’ As a result, there is no basis on which to argue that free trade among a group of countries is optimal. The paper presents an alternative treatment to RTAs using a two country model (leader-follower). The model follows three traditions: cumulative causation, technological gap, and the balance-of-payments constraint approach to growth. The model shows that free trade can in fact accentuate differences and growth disparities among countries. More importantly, it asserts that the follower economy can catch-up to the leader economy only if the ratio of the income elasticity of demand for the follower country’s exports by the rest of the world to its income elasticity of demand for imports is greater than the ratio of the induced productivity of the leader to that of the follower country. This is our golden rule for policy design and determining the extent to which an RTA can be beneficial to its signatory member states.

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Introduction

Regional Trade Agreements (RTAs, hereafter) have proliferated in the past two decades.² RTAs are recognised by the World Trade Organization (WTO) as long as they are consistent with Article XXIV of GATT and Article V of GATS. Article XXIV authorizes customs unions and free trade zones as an exception to the principle of non-discrimination. The regional agreements and free trade zones are expected to remove barriers to trade with respect to the essential of the trade which originated in the constituting members of the customs union or free trade areas.³

In other words, RTAs are consistent with the principles of multilateral trade as long as they are trade creating arrangements. The arguments are based on the theory of comparative advantage and on the tacit validity of Say's Law. Global free trade suppresses the discrimination between the existing sources of supply. Contrarily by granting preferential market access to its signatory members, RTAs shift the discrimination between the existing sources of supply.

This paper argues that comparative advantage is a valid principle for barter economies where full employment prevails, where uncertainty is absent and where the differences in size and development do not affect the final outcome which happens to be a Pareto Optimum. This does not imply however, that comparative advantage or for that matter Say's Law can be applied to real world economies. The paper presents an alternative approach for the analysis of RTAs using a leader-follower country model. The model is based on cumulative causation, technological gap approach and the balance-of-payments approach to growth. The paper is structured in three sections.

The first section gives a brief presentation of the treatment of free trade and RTAs according to mainstream economic theory. Both are based on the principle of comparative advantage. RTAs exemplify a case where the principle of comparative advantage operates within a confined geographical area. As a result, the mainstream analysis of RTAs focuses on the issues of trade creation and trade deviation.

The second section examines critically the principle of comparative advantage as underpinned by three tacit core axioms, neutral money, the gross substitution axiom and the ergodic axiom. The section discusses their meaning and examines their relevance.⁴

² Between 1958 and 1979 the number of notified RTA's in goods was equal to 16. Between 1980 and 2005, the number of notified RTA's in goods increased to 125. The total number of notified preferential agreements for goods and services is currently equal to 170. See, Jo-Ann Crawford and Roberto V, Fiorentino (2005).

³ What is meant exactly by the essential of trade is not defined in the legal texts. In addition, Article XXIV also states that country members may maintain trade restriction among members of a trade agreement on the basis of GATT's articles XI, XII, XIII, XV and XX. Finally, Article XXIV seems concerned with avoiding the trade deviation effect of free trade areas or customs unions and explicitly states that in order to avoid trade deviation, tariff and/or other trade measures should be established at a level, which in their aggregate, does not make them more restrictive than those previously imposed by the individual members.

⁴ The critique of comparative advantage is undertaken in terms of the assumptions underpinning this basic foreign trade principle. According to Keynes C.W. Vol. VII, p. 21, Say's Law is the 'classical theory's 'axiom of parallels.' Granted this all the rest follows.....the unqualified advantages of laissez-faire in

The third section presents an alternative viewpoint of RTAs using a two-country (leader-follower) model. The model is based on three different approaches: cumulative causation, the technological gap approach and the balance-of-payments constraint approach to growth. Within this model, money is not neutral since monetary arrangements determine the framework within which real forces operate. It also gives primacy to income over substitution effects. Finally the model assumes away the existence of an ergodic environment where by definition ensemble, spatial and temporal averages converge to the same mean. From this follows that the principle of comparative advantage plays no role in the model and that as a result there is no basis for the assertion that free trade is optimal. The final reflections are found in the conclusion.

The treatment of regional trading agreements in economic theory

According to mainstream economic theory, free trade creates ‘welfare gains by allowing consumers and firms to purchase from the cheapest source of supply ensuring that production is located according to comparative advantage.’ In other words, free trade allows the operation of the principle of comparative advantage by suppressing the discrimination between the existing sources of supply.

The properties of the standard mainstream free trade model based on comparative advantage, the Hecksher-Ohlin model or H-O-S model⁵, are found in four well-known theorems: (i) the Hecksher-Ohlin theorem; (ii) the Stolper-Samuelson theorem ;(iii) the Rybczynski theorem; and (iv) the factor-price equalisation theorem.

The Hecksher-Ohlin theorem establishes a relationship between the factor scarcity and factor embodiment in a commodity such that countries export the commodity that intensively uses the abundant factor. It provides the basis for the gains from trade argument. These refer to the increase in output and real income for a given set of inputs or domestic resources that result from trade.

The Stolper-Samuelson theorem complements the above theorem by stating that the intensive use of a factor of production for export (i.e., the abundant factor) raises its rate of return above all other prices. In turn, the consequent increase in the supply of that factor of production will lead to an increase in the output of the commodity intensive in that factor of production (the Rybczynski theorem). Finally, the factor price-equalisation

respect to foreign trade and much else which we have to question.” As explained by Davidson (1994, 2002), these three postulates (neutral money, the gross substitution axiom and the ergodic axiom) underlie Say’s Law. ‘Granted these all the rest follows.’ The principle of comparative advantage is a special case of Say’s Law. There are other critiques of Say’s Law and comparative advantage based on internal consistency arguments or different methodological approaches. From the point of view of the authors of this paper, the critique of the ‘tacit assumptions’ is the most potent critique of the principle of comparative advantage and of neo-classical theory at a more general level.

⁵ The Hecksher-Ohlin (H-O) model was renamed Hecksher-Ohlin-Samuelson (H-O-S) model as Samuelson formalized the basis properties of the H-O model.

theorem stating that trade equalises commodity and factor prices across countries rounds up the case for free trade.⁶

Contrarily, RTAs shift the discrimination between the existing sources of supply among trading partners by granting preferential market access to its signatory members. As a result, these do not necessarily lead to the creation of welfare gains. The standard approach argues that RTAs are welfare enhancing when their trade creation capacity exceeds that of trade diversion.⁷ The standard case is that of the customs union. Trade creation refers to the substitution from a high-cost domestic source to a lower-cost source in a partner country.⁸ Trade diversion results from the substitution away from a lower-cost producer outside the customs area to a higher cost supplier within the customs union area.

Customs Union and in general RTAs exemplify cases where the principle of comparative advantage operates within a confined geographical area when trade creation is greater than trade diversion.⁹ In this sense, according to the neo-classical theory,

⁶ Under conditions of perfect competition, trade in goods acts as a substitute for factor mobility. Under conditions of imperfect competition, free trade does not result in the full equalization of commodity and factor prices. However, free trade reduces commodity and factor price differentials among countries and thus acts as a force of convergence.

⁷ See, Jacob Viner (1950). In his seminal contribution, he identified the conditions that if met by the RTA could improve its efficiency. These included the geographical extension of the RTA, the level of external tariff adopted by members following the formation of the RTA relative to the previous tariff level, the degree of complementarity, differences in unit costs, and the level of tariffs prevailing outside the RTA. The greater the geographical extension, the greater are the opportunities for trade creation. A greater geographical extension means a greater extension of the market and thus a greater scope for trade specialization and the generation of economies of scale. Also a greater geographical area can also involve a greater stock of natural resources implying the possibility of a more diversified export base. Recent findings also indicate that at least in the case of the United States, population is a factor that can account for greater innovation. As put by Hernández-Murillo (March, 2003): ‘Recently economists have found that densely populated areas are increasingly providing the best environment to facilitate the diffusion of new ideas, in addition to serving as the location for the production of goods. The reason is that the agglomeration of people and firms in urban areas promotes a faster exchange of information and ideas and this generates new technologies.’ Finally a greater geographical area can help to reduce transaction costs, when these are defined to include ‘transportation, communications, bureaucratic red tape and transshipment costs.’ The reduction in transaction costs increases profits and thus the incentives to export. The relationship between the degree of complementarity and that of a trade diversion and trade creation of a RTA can be seen from different perspectives. A low degree of complementarity in the production structures of states forming an RTA reduces the scope for trade diversion. Notwithstanding the formation of the RTA, member states will continue to trade with the rest of the world. In the same way a high degree of complementarity may enhance intraregional trade widening the possibilities for trade diversion. Contrarily it may also be stated that countries with a low degree of complementarity are also more vulnerable to asymmetric shocks reducing thus the possibilities for trade.

⁸ This case assumes a discriminatory tariff reduction giving a member of the RTA a comparative cost advantage over a non-member by reducing its production costs. As a result, the member increases its production efficiency over the non-member.

⁹ RTAs maximise welfare when their number equals one, that is, when the geographical area of the RTA coincides with that of the world.

customs unions and RTAs are an approximation, and thus a special case, of a full-fledged, global, free trade situation.¹⁰

The introduction of dynamic factors such as the existence of spillover effects does not alter the validity of the basic analysis. Indeed, it can be shown that if knowledge is freely mobile and equally accessible among countries, patterns of specialization are determined by comparative advantage.¹¹ That is, by construction in mainstream theory, static and dynamic trade theories are one and the same thing when free trade (implying laissez-faire and laissez-passer) prevails.

Comparative advantage and its tacit axioms¹²

The principle of comparative advantage and its purported benefits are based on three tacit axioms: neutral money, the gross substitution axiom and the ergodic axiom (Davidson, 1994, pp.17-18; 2000, p. 171; 2002, pp.43-44).¹³

A neutral economy denotes an economy where money is “a neutral link among real transactions and the effects of monetary changes on real transactions is transitory.”¹⁴ As a result, economic transactions taking place within the framework of each of these approaches is carried out in terms of physical goods and persons, whether it be the trade of goods and/or factors of production as well their remuneration, the production processes involving a given level of technology, and the allocation of resources between alternative productive uses. Money does not in any way affect the economic process,

¹⁰ In the limit when a given geographical area coincides with that of the world there is only scope for trade creation. Using a very simple model where the world is divided into regional blocs (i.e., customs unions) Krugman (1995, pp.75-78) shows that welfare is maximized when the number of blocs is reduced to one and the world has achieved free trade.

¹¹ See Helpman (2004) and Grossman and Helpman (1996).

Trade creation can be enhanced when an RTA member faces high tariffs from the rest of the world in products where it has decreasing costs or when due to size considerations the scale of production is too small to yield an optimum scale of production. The existence of economies of scales can lead to trade creation through a production, consumption and cost reduction effects. The production effect allows the transfer of production to the lower cost trade partner. The consumption effect refers to the gain in the consumer surplus due to a decline in price. The cost reduction effect denotes a change to cheaper sources of supply. Recently, Dunn and Muti (2000) identify three effects that can increase the efficiency of a free trade area: (i) a shift in output, where price is greater than average cost; (ii) a scale effect, where firms' average costs of production fall when output expands; (iii) increase in trade allows for the expansion of in the variety of final goods and intermediate inputs that are traded.

¹² See footnote 10 below for an explanation of ‘tacit assumptions’.

¹³ Davidson (2000) p.160 makes reference to open economy models of the 1960's which were developed using the above core axioms to “prove that free trade and optimum global economic growth required a laissez-faire approach.”

¹⁴ See, Rymes (1989), Keynes's Lectures 1932-35, pp.47-49. Keynes (CW, Vo. XIX, p. 78) defined a neutral economy as one “in which the factors are hired by entrepreneurs for money but where there is a mechanism of some kind to ensure that the exchange value of the money incomes of the factors is always equal in the aggregate to the proportion of current output which would have been the factor's share in a co-operative economy..”

which behaves as that of a barter economy.¹⁵ Money is inessential and does not enter in any way into decision-making processes.¹⁶

The axiom of gross substitution means that any good can be substituted by any other good. In the case of two goods, it is said that these are gross substitutes when,

$$(1) \bar{\delta}_{z_1/\bar{\delta}p_2} > 0 \text{ and } \bar{\delta}_{z_2/\bar{\delta}p_1} > 0$$

Where, $z_i(p_1, p_2)$ is an excess demand function; p_1 and p_2 are the money prices of goods 1 and 2.

The axiom of gross substitution implies that a price path follows a process of adjustment such that the rate of change of prices is proportional to the excess demand function. In other words, it converges towards equilibrium and as a result is globally stable. This is expressed formally as,

$$(2) \lim_{t \rightarrow \infty} p(t) = p^*$$

Where p^* is a vector of equilibrium prices.

In the particular case of the H-O-S model, the axiom of gross substitution is strengthened by the fact that it assumes that production functions and the quality of factors are the same across countries. In other words, the rate of marginal substitution among factors is the same.

Ergodicity implies that ensemble, spatial and temporal averages converge to the same mean. In other words, a given system converges towards a **unique** globally stable equilibrium independent of the initial conditions or the trajectory followed. It also implies, homogeneity, that is, that every member of a given ensemble possesses the same statistical behaviour as that of the whole ensemble. As a result, the statistical behavior of an ensemble can be deduced from the behavior of one sample function. The behavior of the sample function is thus representative of that of the whole ensemble.

Turning to the core of mainstream trade theory, the axioms of neutrality, gross substitution and ergodicity ensure that the principle of comparative advantage is operational.

¹⁵ Schumpeter (1957) also distinguished between Real Analysis and Monetary Analysis. The former denotes that part of monetary thought that views and understands economic relationships in real terms that is, in barter terms.

¹⁶ See for example the attempt by Samuelson (1976) to introduce monetary factors into a standard neo-classical model of international trade. Samuelson writes, *ibid.*, p.640: “.it is shown that the original Ohlin position was right in its contention that there would be a tendency for free trade in goods to serve as a partial substitute for factor mobility and thereby serve to reduce but not wipe out difference in factor prices.” Hence money is an inessential addition to the mainstream framework.

Expenditure is directed to the purchase of the cheaper commodity leading to changes in relative commodity prices, production levels, and factor demands and their respective real remuneration rates. The process leads to price equalization, full employment and net welfare gains for all trading partners. That is ‘free trade is best.’

Moreover, the core axioms imply that a given set of initial conditions is irrelevant to the final outcome. That is, differences in size and development of trading partners do not matter for the final outcome. Trade affects all countries alike and equally, and development and size are a non-issue. As a result, there is no need and indeed no space in the theory and policy for any type of asymmetrical treatment whatsoever. Instead the only focus of trade policy should be to ensure the workings and fluidity of free market mechanisms.

The benefits purported by the H-O-S model and regional integration theory follow logically from these set of premises that guarantee from the start full employment and welfare improvement independently of the initial conditions of the trading partners and of the degree of trade linkages. Once the principle of comparative advantage is operational, ‘free trade areas’ can only be ‘welfare improving areas’, and independently of their geographical extension. The greater the geographical extension, the greater is the improvement in welfare.¹⁷

However, this does not mean that comparative advantage is welfare improving in a world more akin to the real world where neutrality, the axioms of gross substitution and ergodicity are not satisfied. Indeed, the application of the orthodox principles of trade to the ‘real world’ makes the entire argument in favour of free trade suspect of falling prey to the fallacy of *ignoratio elenchi*, that is, of presenting an argument which proves or supports a different proposition than the one it is purporting to prove or support.¹⁸ It is thus not surprising that the empirical studies analysing the welfare effects of the formation of RTAs find that the evidence is ambiguous.¹⁹

¹⁷ See footnote 4 above.

¹⁸ *Ignoratio elenchi* was first identified by Aristotle in “On Sophistical Refutations.” It is translated literally as ignorance of the issue or of the refutation. Keynes mentions the fallacy in the GT, p. 259 (CW, Vol. VII). According to Carabelli (1991 p, 123) it belongs to the category of informal fallacy of relevance. An informal fallacy of relevance establishes a relationship between the relevance/irrelevance of the premises of arguments and its conclusions. Irrelevance means that the premises and the conclusion are not connected. The fallacy is explained by the fact that the key assumptions of neoclassical theory (and indeed the core axioms) are tacit. Keynes, C.W. XIII p.79 argues that “...you will search in vain for any express statements of the simplification which have been introduced or for the relationship of its [those of the neutral economy] hypothetical conclusions to the facts of the real world.” (See CW XIX, pp.408-411 for a similar argument). The brackets in the citation were introduced by the authors of this paper.

¹⁹ Panagariya (2000) distinguishes two approaches to this issue. The first is based on some type of general equilibrium models whereby starting from a base model with a given structure and parameters tariff barriers among trade partners are removed. The second type of approach is based on gravity equation estimates. According to Panagariya (Ibid. p.326) writes: ‘Consider first the simulation approach. It is relatively easy to manipulate the structure of the model, functional forms and parameter values in these models to obtain one’s desired results.’ Regarding gravity equation estimates the criticism focuses on the fact that the success of the RTA is based on aggregate trade creation or diversion when in fact the question is to identify whether trade creation and trade diversion has occurred at the sectoral levels which in fact demands significant information requirements, which are difficult to obtain. Finally, it is to be noted that

Changing the core premises and incorporating non-neutral money as well as income rather than substitution effects and assuming the existence of a non-ergodic environment, can radically alter the conclusions of mainstream trade theory and regional integration theory in a fundamental way. This is shown in the next section, which presents a simple model for two economies of different size and development.

An alternative approach to RTAs: a simple two-country model

The model is built on three approaches to economic growth. The first is encapsulated in Kaldor's notion of cumulative causation and its development in the work of McCombie and Thirlwall (1994) and McCombie et al. (2002). The second follows the Balance-of-payments constraint approach to growth as developed by Thirlwall (1979) and McCombie and Thirlwall (1994).²⁰ Finally, the third strand is that of the technological gap approach to growth.

The cumulative causation approach views growth as being internally generated. Technological innovation through the growth of embodied or disembodied productivity generates growth in demand which feeds back into productivity growth. The growth linkage between productivity and demand is explained by terms-of-trade effects, increased income and expenditure, and changes in income distribution. The linkage from demand to productivity is explained by returns to scale, specialization and the size of the market, embodied technical progress and learning by doing (Castellaci, 2001). Within this approach growth is generated internally through innovation activity.

The approach disparages with the notion of equilibrium and thus convergence and stability. However, it does not deal with technological spillovers or international diffusion that can occur through trade linkages, that is, it does not address the issue of country interdependence. This is one of the main hypothesis of the technological gap approach.

The technological gap approach asserts that a country's growth rate depends on the level of its technological development. It also states that a country that has a lower technological level relative to the world innovation frontier can increase its rate of growth through a process of 'catching up' or imitation. Finally, the absorptive capacity of the latter depends on its "ability to mobilize resources for transforming social, institutional and economic structures" (Fagerberg and Verspagen, 2001, p.11). The technological gap recognizes that all countries are not alike; that the levels of development are an important determinant of growth and welfare and that not all countries benefit to a similar extent from trade and the transmission of trade linkages.

the analytical exercise in trade creation-trade diversion does not contemplate two crucial aspects for trade negotiations, trade in services which for the smaller economies of the Caribbean is the main form of international trade and the relationship between foreign direct investment and free trade areas.

²⁰ Thirlwall and McCombie (1994) and León-Ledesma (2002) extend the Kaldorian cumulative growth model to include the technological gap approach. For conceptual purposes the cumulative and technological gap approach are viewed as two different approaches to growth (See, Castellaci, 2001).

The third approach, the balance-of-payments-constraint approach, asserts that trade, trade linkages and growth performances cannot be understood or analysed in real or 'barter' terms. Trade and growth are intimately linked to the architecture and workings of the existing international financial order. The architecture and workings of the existing international financial order is the main constraint to economic growth and development.²¹

International trade flows are not carried in real 'barter' terms, but in money terms and more precisely in terms of the international reserve currency (or currencies). Countries can only build their economic infrastructure and develop by importing capital and raw materials, inputs as well as technology if they can acquire the reserve currency, which the greater majority of countries cannot issue. As a result, countries' export potential must be commensurate to that of their import capacity. As a result, over the long run countries must maintain equilibrium in the balance of payments or at least in the basic balance. Countries can only grow over the long run at rates of growth compatible with their external position. In this sense, countries are said to be balance-of-payments constrained.

Within this framework money is not neutral. A process of technological catch-up through imitation derived from a process of cumulative causation cannot occur if economies do not have the means to obtain the reserve currency. More to the point, the extent to which countries can benefit from a 'catch-up' process depends on the extent to which they can access international liquidity.

The model postulates the existence of two economies, a developed economy and a developing economy. By definition, the developing economy is also the smaller economy. The developed economy is termed the leader (denoted by the subscript l) and the developing economy is the follower economy (denoted by the subscript f).

The leader has higher levels of productivity and is technologically more advanced. The follower economy is assumed at this stage to be closely linked to the leader economy. It is furthermore assumed that the leader economy issues the international reserve currency, which is by definition also used by the follower economy. As a result, the follower country is balance-of-payments constrained, while the leader country is not.²²

The model begins by defining the technology gap (G_p) between both the leader and the follower economy (P_l and P_f respectively) in logarithmic terms such that the rate of growth of the gap (g) can be expressed as the difference between the rates of change of the productivity of the leader and follower country respectively (Thirlwall and McCombie, 1994; Targetti & Foti, 1997). That is,

²¹ See, Davidson (1992), pp. 93-96 & Davidson (2002), pp. 158-161.

²² Countries are balance-of-payments constraint in the sense that "their performance in overseas markets, and the response of the world financial markets to this performance, constrains the rate of growth of the economy to a rate which is below that which internal conditions would warrant" (McCombie and Thirlwall, 1999) p.49.

$$(3) G_p = \text{Ln}(P_l/P_f)$$

$$(4) g = p_l - p_f$$

The rates of productivity growth in the leader and follower economies are equal to the sum of the rates of growth of autonomous (exogenous) and induced productivities. That is they are modeled according to Verdoorn's Law.²³ The interpretation of the autonomous and induced coefficients adopted in this paper is that of Thirlwall and Dixon, 1975 and McCombie and Thirlwall, 1994.²⁴

As stated by McCombie and Thirlwall (1994), p.464, autonomous productivity depends on "the autonomous rate of disembodied technical progress, the autonomous rate of capital accumulation, and the degree to which technical progress is embodied in capital accumulation." For obvious reasons, the rate of growth of autonomous productivity in the leader economy is greater than that of the smaller country (i.e., $p_l > p_f$).

For its part, induced productivity is captured by the parameter λ , also known as the Verdoorn coefficient. Again as stated McCombie and Thirlwall, *Ibid*, it is a function of "learning by doing", the degree to which capital accumulation is induced by economic growth (y_l and y_f for the leader and follower economies respectively) and the extent to which technical progress is embodied in capital accumulation."²⁵

Formally,

$$(5) p_l = p_{la} + \lambda_l y_l$$

$$(6) p_f = p_{fa} + \lambda_f y_f$$

Note that as formulated, Eqs.(5) and (6) capture the presence of increasing returns due to the greater specialization induced by economic growth.²⁶ In turn, a greater degree of specialization entails a greater rate of growth, which permits the expansion of the potential for specialization. Hence the process described by Eqs.(5) and (6) is cumulative.

²³ McCombie et al. 2002, p.1. Verdoorn's Law is a "statistical relationship between the long-run rate of growth of labour productivity and the rate of growth of output, usually in the industrial sector." (*Ibid*). This relationship was formulated by the Dutch economist P.J. Verdoorn (1949) and was restated as a law by Kaldor (1966).

²⁴ Soro (2002) pp.45-53 considers three interpretations of Verdoorn's Law. The first two were suggested by Verdoorn and are based on complementarity and perfect substitutability of the factors of production. The third one which is the one adopted in this paper follows the Kaldorian interpretation. A key component of Kaldor's interpretation is the existence of increasing returns to scale. Following Young (1928) Kaldor subscribed to a macroeconomic rather than microeconomic concept of increasing returns. See, Soro, *Ibid* and Chandra and Sandilands (2005).

²⁵ A value of $\lambda > 0.5$ indicates the presence of increasing returns.

²⁶ This means that increasing returns derive from specialization rather than scale. This is the point of view of Alwyn Young and Nicholas Kaldor. See Young (1990).

As stated earlier, the follower economy is balance-of-payments constrained. That is, its rate of growth has to conform in the long-run to the rate of growth consistent with balance-of-payments equilibrium. Such is not the case of the leader economy because it issues the reserve currency.

Following ample empirical evidence on the balance-of-payments constraint literature (Thirlwall and McCombie, 2004), the model postulates that income effects predominate over substitution effects and that the long-term rate of growth of the follower economy (y_f) is determined by Thirlwall's Law. That is, the long term-rate of growth of the follower economy (y_f) is determined by the long-term rate of growth of the leader economy (y_l) multiplied by the ratio of income elasticity of demand for the follower country exports by the rest of the world (π) to its income elasticity of demand for imports (ξ). Formally,

$$(7) y_f = y_l(\pi/\xi)$$

Successive substitution of Eq.(7) into Eq.(6) and of Eqs.(5) and (6) in Eq.(4) yields the following expression for the rate of change of the productivity gap,

$$(8) g = (p_{la} - p_{fa}) + \lambda_1 y_l - \lambda_f(\pi y_l/\xi) \Leftrightarrow (p_{la} - p_{fa}) + y_l(\lambda_1 - \lambda_f(\pi/\xi))$$

Eq.(8) shows that the rate of change of the productivity gap over time will depend on two factors: (i) the differences in autonomous productivities; (ii) the rate of growth in the leader economy; (iii) the difference between the Verdoorn coefficient in the leader country and that of the follower country augmented by the ratio of the export to import elasticities.²⁷

According to Eq.(8) as long as $\pi < \xi$, the rate of growth of the productivity gap will increase (due mainly to the fact that $p_{la} > p_{fa}$ and $\lambda_l > \lambda_f$) leading to a process of divergence and the follower country will not catch up to the leader economy. This result holds for any given level of the rate of growth of output in the leader economy.

Moreover Eq.(8) shows that when the rate of growth of output approximates zero, the rate of growth in the productivity gap (g) is equal to the difference between the autonomous productivities. Positive rates of growth of output of the leader economy (y_l) increase the rate of growth of the follower economy (y_f). This follows from Thirlwall's Law (Eq.7) above). But at the same time, these increase the rate of growth of g (when

²⁷ The approach adopted in this paper follows the Post-Keynesian tradition in emphasizing income over substitution effects (Davidson, 1992, p.22). In this sense relative prices do not play a role in the determination of the long-run rate of growth of output or the productivity gap. See, Dixon and Thirlwall (1975) and León-Ledesma (2002) for a different approach in which the effect of Verdoorn's Law is captured through its effect on relative prices. Relative prices determine exports, which in turn, determine the rate growth of output. If the price elasticity in the export demand function is insignificant then Verdoorn's Law plays no role whatsoever in the determination of the rate of growth of output. In other words, increasing returns and the process of cumulative causation are dependent on the workings of relative prices. Thus these models thus ultimately place the weight of the analysis on the validity of the axiom of gross substitution.

$\pi > \xi$) (Eq.8 above).²⁸ As a result, increases in y_1 constitute an additional divergent force on g . That is,

$$(9) \quad dg/dy_1 = (\lambda_l - \lambda_f(\pi/\xi)) > 0 \text{ since, } \lambda_l > \lambda_f \text{ and } \pi/\xi < 1.$$

Within the framework provided by Eq.(8) there is no inherent mechanism for convergence. Rather, the initial conditions (i.e., higher productivity in the leader country and higher value added of its exports relative to its imports) and thus the principle of absolute advantage determine the outcome of a free trade agreement between the leader and follower countries.

A closer approximation to finding a mechanism for convergence can be found by assuming that the difference in autonomous productivities between both the leader and follower economies is equal to zero ($p_{la} - p_{fa} = 0$). Under this hypothesis, it can be shown that the rate of change of the gap will increase, decrease or be equal to zero according to whether the ratio of the Verdoorn coefficients between the leader and follower economies is greater, less or equal to the ratio of export-import elasticities. That is,

(10)

$$g = 0 \begin{matrix} >0 \\ <0 \end{matrix} \iff y_1 (\lambda_l - \lambda_f(\pi/\xi)) = 0 \iff \lambda_l / \lambda_f = \pi / \xi$$

In other words, excluding discrete changes in the Verdoorn coefficients, the closure of the induced productivity gap requires that the difference between induced productivity in the leader and follower economy be offset by improved external performance in the follower economy (that is, π must increase and/or ξ must decrease).²⁹

²⁸ This result that can be inferred from Thirlwall's Law. See for example Moreno and Pérez (2003). As shown here, this result presupposes that the autonomous and induced productivities in the leader economy surpass those of the follower economy.

²⁹ There are three competing hypotheses in the balance-of-payments-constrained literature regarding the determinants of the import and export elasticities. The first follows from Prébisch and Singer and relates the size of the elasticity parameters to the manufacturing and technological content of the exported and imported products. According to this reasoning the income elasticity of exports increases as external sales move up the value-added chain ladder from primary commodities, to labour intensive and resource based manufacturing, to manufactures with low, medium and high skill and technological intensity. Developing economies have a lower export elasticity of income than labour intensive. In other words, the income elasticity of demand for their exports by the rest of the world is low and their income elasticity of demand for imports is high. The less developed countries, which export commodities subject to Engel's Law are especially prone to be in this category (Davidson, 1992). The main policy implication following the logic of Thirlwall's Law is that unless countries undergo a process of structural change that changes the elasticity parameters, the cleavage between developed and developing economies will widen over time and less developing countries are condemned to poverty. The second hypothesis states that while the income elasticity of demand for imports tends to remain more or less constant, the income elasticity of demand for a country's exports by the rest of the world varies over time with the level of development (Bairam, 1997). More specifically the income elasticity of demand for a country's exports by the rest of the world is inversely related to the level of development and tend to decline with the level of development. As a result an increase in external demand or the expansionary phases of the world cycle (or that of main trading

Up to this point, the development of the model assumed that the Verdoorn Equations and more specifically the induced productivities of the leader and follower countries are independent of one another. However, when countries trade and become more integrated, their performance is influenced by each other's level of economic development. That is, interdependence generates spillover effects among countries. One of the most important channels of transmission of economic development is the diffusion of knowledge.³⁰

Within the setting of the model presented in this paper, the spillover effects of knowledge are transmitted from the bigger and more developed economy (i.e., the leader) to the smaller less developed economy (i.e., the follower). The spillover effects are transmitted via the absorptive or learning capability of the follower. The absorptive or learning capability of the follower is limited by the extent of the productivity (or technological gap between both economies) (Nelson & Phelps, 1966; Abramovitz, 1986; Targetti & Foti, 1997; Rogers, 2004). The greater is the absorptive capacity of the follower, the more powerful becomes the knowledge spillover effect.³¹

Following Targetti and Foti (1997) induced productivity can be modeled as a non-linear function of the gap. Formally,

$$(11) \lambda_f = a (1/G_0)(e^{-G/\theta}) = a\varphi e^{-G/\theta}$$

Where,

a = factor of proportionality.

$\varphi = (1/G_0)$ = inverse of the initial productivity gap and $0 < \varphi < 1$.

θ = policy parameter.

partners) have a positive effect on developing countries' external position. The third hypothesis sustains that changes in the said income elasticities are brought about by shifts in commercial policy and/or through measures designed to transfer liquidity between countries. Changes in commercial policy involve changes in trade barriers (tariffs and quotas). Measures to recycle liquidity comprise the increase in surplus nations' imports and unilateral transfers from the surplus to the deficit nations (Davidson, 1992, p.153). Thus far the empirical work shows that the import elasticity of income rises with trade liberalization and that the export elasticity of income depends on what the market and consumers and producers are demanding are demanding at certain time. Thus while the income elasticity of income depends on institutional factors which include changes in commercial policy as put forward by the third hypothesis above there seems to be is no clear core factor determining the export elasticity of income.

³⁰ See, Helpman (2004), pp.60-69 & Rogers (2004), CJE, 28, pp.577-596.

³¹ According to Abramovitz (1979, 1986, 1995) countries can realize their catch-up potential if they exhibit 'social capability', 'technological congruence' and possess natural resource endowments. The term 'social capability' includes a wide variety of factors including social attitudes and political institutions, educational attainment, organizational and commercial skills, and adequate levels of infrastructure. 'Technological congruence' highlights the fact that technology in the leader economy may not always be appropriate for the follower economy (Los & Verspagen, 2002; Criscuolo & Narula, 2003). Absorptive capacity is defined by Dahlman and Nelson (1995) as: "the ability to learn and implement the technologies and associated practices of already developed countries." It is a concept narrower than 'social capability.' According to Rogers (2004) p.579, the absorptive or learning capacity depends on : "accessibility to overseas technology, learning ability, and the incentives or barriers to implementing new technologies."

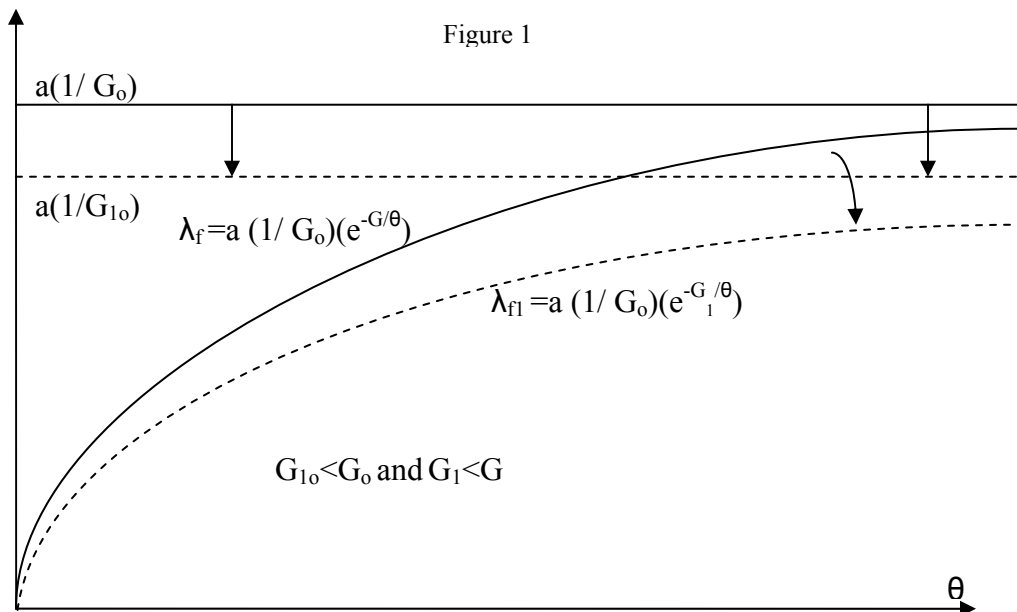
According to Eq.(11), induced productivity in the follower country is proportional to the inverse of the initial productivity gap. That is, the greater (smaller) is the initial productivity gap, the lower is φ and, other things being equal, the weaker (stronger) is the spillover effect.

Eq.(11) is also a function of the extent to which the follower economy is able to acquire and incorporate knowledge from the leader economy (i.e., the absorptive or learning capacity of the follower economy).³² This is captured by $e^{-G/\theta}$. The basic mathematical properties of Eq.(11) are listed below and Figure 1 plots the function.

$$(12) \quad \lim_{\theta \rightarrow 0} \lambda_f = 0 \quad \text{and} \quad \lim_{\theta \rightarrow \infty} \lambda_f = a(1/G_0)$$

$$\lambda_f'(\theta) = a(1/G_0)(G/\theta^2)(e^{-G/\theta}) > 0 \quad \text{and}$$

$$\lim_{\theta \rightarrow 0} \lambda_f' = \infty \quad \text{and} \quad \lim_{\theta \rightarrow \infty} \lambda_f' = 0$$



Induced productivity is an increasing function of the parameter θ . However, as θ increases, induced productivity tends to the limit $(1/G_0)$. That is the extent to which the follower country is able to use its learning capacity to catch-up to the leader economy is bounded by the initial productivity gap (G_0). It is actually the learning capacity's

³² Absorptive capacity is defined by Dahlman and Nelson (1995) as: "the ability to learn and implement the technologies and associated practices of already developed countries." It is a concept narrower than 'social capability.' According to Rogers (2004) p.579, the absorptive or learning capacity depends on: "accessibility to overseas technology, learning ability, and the incentives or barriers to implementing new technologies."

boundary. The greater the initial productivity gap, the lower the ‘learning capacity’s boundary’ (as shown by the difference between the straight continuous line (corresponding to G_0) and the straight dashed line (corresponding to G_{10} and $G_{10} > G_0$) in Figure 1 above). In a similar manner, any increase in the actual gap reduces, for any initial size of the gap, the follower’s induced productivity. This is shown in Figure 1 above by the difference between the straight and dashed lines induced productivities (λ_f and λ_{f1} respectively), which correspond to different levels of the gap (G and G_1 respectively where $G_1 > G$).

Substitution of Eq.(11) into Eq.(8) yields the following expression for the rate of change in the gap,

$$(13) \quad g = (p_{1a} - p_{fa}) + \lambda_1 y_1 - (a\varphi e^{-G/\theta} y_1 (\pi/\xi)) \Leftrightarrow (p_{1a} - p_{fa}) + y_1 (\lambda_1 - (a\varphi e^{-G/\theta} (\pi/\xi)))$$

Eq.(13) shows several important features of ‘gap dynamics.’ First, for any given level of y_1 and of (π/ξ) , the direction in the rate of change in the gap will depend on the difference in the rate of growth of autonomous productivities, the induced productivity of the leader and the extent to which the follower country can benefit from the spillover effects, which basically depend on its degree of adaptability or learning capacity (i.e., θ).

Second, an increase in the leader’s country growth rate (y_1) will produce both divergent and convergent effects on the follower’s country ability to catch-up or its ability to narrow the gap. On the one hand, it will translate into an increase in the rate of growth of the follower country through the workings of Thirlwall’s Law. The magnitude of the pull effect of the leader on the follower country will depend on the ratio of export to import elasticities (π/ξ) . This will narrow the gap. At the same time, it will widen the gap through its induced productivity effect ($y_1 \lambda_1$). Formally, by taking the derivative of the g with respect to y_1 , it can be shown that the path of the gap can be divergent, convergent or neutral. That is,

$$(14) \quad dg/dy_1 = \lambda_1 - (a\varphi e^{-G/\theta} (\pi/\xi))$$

and

$$(15) \quad \begin{aligned} dg/dy_1 > 0 &\Rightarrow \lambda_1 - (a\varphi e^{-G/\theta} (\pi/\xi)) > 0 \Leftrightarrow (\lambda_1/a\varphi e^{-G/\theta}) > (\pi/\xi) \quad : \text{Divergent gap path.} \\ dg/dy_1 = 0 &\Rightarrow \lambda_1 - (a\varphi e^{-G/\theta} (\pi/\xi)) = 0 \Leftrightarrow (\lambda_1/a\varphi e^{-G/\theta}) = (\pi/\xi) \quad : \text{Neutral gap path.} \\ dg/dy_1 < 0 &\Rightarrow \lambda_1 - (a\varphi e^{-G/\theta} (\pi/\xi)) < 0 \Leftrightarrow (\lambda_1/a\varphi e^{-G/\theta}) < (\pi/\xi) \quad : \text{Convergent gap} \\ &\text{path.} \end{aligned}$$

According to the set of Eqs.(15), growth in the leader economy (y_1) will narrow (widen; not affect) the rate of growth of the gap only if the differences in the induced productivities of the leader and follower economies are smaller (bigger; equal to) than the difference in the export elasticity of income relative to the income elasticity of the follower’s import demand (i.e., $(\lambda_1/a\varphi e^{-G/\theta}) < (\pi/\xi)$; $(\lambda_1/a\varphi e^{-G/\theta}) > (\pi/\xi)$; $(\lambda_1/a\varphi e^{-G/\theta}) = (\pi/\xi)$).

The same result (i.e., the same relationships and conclusion) holds in general terms when $y_1 > 0$ and under the assumption that, for analytical purposes, the difference in the rate of growth in autonomous productivities is equal to 0. Under these assumptions, Eq.(13) can provide a benchmark or criteria for convergence. That is,

$$(16) \quad g = y_1 (\lambda_1 - (a\varphi e^{-G/\theta})(\pi/\xi))$$

and

$$(17) \quad \begin{aligned} g > 0 &\iff (\lambda_1 - (a\varphi e^{-G/\theta})(\pi/\xi)) > 0 \iff \lambda_1 / (a\varphi e^{-G/\theta}) > (\pi/\xi) \\ g = 0 &\iff (\lambda_1 - (a\varphi e^{-G/\theta})(\pi/\xi)) = 0 \iff \lambda_1 / (a\varphi e^{-G/\theta}) = (\pi/\xi) \\ g < 0 &\iff (\lambda_1 - (a\varphi e^{-G/\theta})(\pi/\xi)) < 0 \iff \lambda_1 / (a\varphi e^{-G/\theta}) < (\pi/\xi) \end{aligned}$$

Both sets of Eqs.(15) and Eqs.(17) point to the fact that no parameter (whether it be the learning capability (θ) or the elasticity of exports or imports) or no policy aimed at a single objective can guarantee convergence. As an example, policies seeking to increase the export elasticity relative to the income elasticity (say policies to encourage activities producing goods with high income elasticity) may turn out to be unsuccessful unless these manage to offset the differences in induced productivities (either through complementary policies that improve the ‘learning capacity’, or, if the same policies have a positive effect of the ‘learning capacity’ of the follower country).

Conclusion

The principle of comparative advantage is the cornerstone of mainstream trade theory, whether applied at a global scale or within the confines of a limited geographical area (RTAs). Comparative advantage at a global scale ensures the realization of welfare gains by allowing consumers and firms to purchase from the cheapest source of supply. Contrarily, RTAs shift the discrimination between the existing sources of supply among trading partners by granting preferential market access to its signatory members. As a result, these lead to the creation of welfare gains when their trade creation capacity exceeds that of trade diversion, which corresponds to a situation where the principle of comparative advantage is operative. Viewed in this way, RTAs are a special case of application of the principle of comparative advantage.

Comparative advantage forms the basis on which to argue that free trade is best and that the gains from trade can only be realized under a Laissez-Faire regime. However, its underlying assumptions (neutral money, the axiom of gross substitution and the ergodic axiom) make the entire argument prey to the '*ignoratio elenchi*' fallacy.

The paper presents an alternative framework to analyse RTAs, exemplified at this stage by a two country model consisting of a leader and follower. The leader is more developed and it also issues the international reserve currency.

The framework is based on three approaches to economic growth: cumulative causation, the technological gap approach and the balance-of-payments constraint growth approach.

Cumulative causation disparages with the notion of equilibrium and convergence. Differences in productivity and growth can persist and widen over time. Within this approach, the impetus for growth and the interrelationship between growth and productivity is generated internally. The technological gap approach addresses the issue of country interdependence and is a vehicle for analyzing the spillovers from trade. The third approach complements the other two by providing the monetary context within which the cumulative causation and technological gap approaches operate.

According to the model presented, there is no mechanism that guarantees the optimality of free trade, the convergence between countries or in fact that ensures a known outcome. The final outcome of free trade may depend on a variety of parameters and variables. It may even be shaped by history, crucial decisions and unforeseen events.

The model argues that the growth impetus of the leader economy has both a convergent and divergent effect on the follower country. The convergent effect works through two channels, the adaptive capacity and Thirlwall's Law. The divergent effect works through the induced productivity-cumulative causation mechanisms.

In addition, it asserts that the all the follower country can do is to take advantage (through spillover effects) from the productivity gains of the leader country. The extent to

which the follower country can profit from spillovers depends on its adaptability, ability to earn reserve currency and on its initial conditions including its stock of reserve currency. As a result, monetary policies that soften the existing the balance-of-payments constraint can be as important as educational policies aimed at improving human capital.

Finally, the model states that the follower can narrow the gap only if the difference in the elasticities ratio is greater than the difference in the induced productivity coefficients. Countries gain nothing in terms of convergence by improving their net export potential unless it offsets the induced productivity differential. This is the golden rule of convergence proposed in this article and that should provide a benchmark and guideline for economic policy design.

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