Growth and convergence in Regional Integration Agreements

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Abstract

This paper analyses some of the main issues, effects and implications of regional trading agreements for smaller economies. To this end the paper develops a leader-follower productivity gap model incorporating three outstanding features of real world economies: (i) money is non-neutral; (ii) the axiom of gross substitution does not hold; and (iii) the economic world is non-ergodic. The model shows that within such a framework trade flows in regional trading agreements are driven by absolute rather than comparative advantage and that the effects of free trade are not necessarily beneficial. These depend on a host of parameters among which the most important are autonomous and induced productivities, the import and export income elasticities, economies of scale parameters and the ability with which the follower can incorporate the technology and innovations of the leader country. The model begins by considering that the induced productivities in the leader and follower economy are independent. Under these circumstances the closure of the 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. Once induced productivities are allowed to be interdependent the model shows that convergence requires, in general, policies whose scope is beyond those designed to stimulate economic growth. It also states the design of policies to improve the export elasticity of income and contain (or reduce) the rate of growth of the import elasticity can improve growth performance but not guarantee convergence. That is, policies aimed at improving exports or containing imports are at most incomplete policies.

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Introduction

Regional Trading Arrangements (RTA) have proliferated in the past two decades. It can be easily argued that

RTA 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. [2]

In other words RTA are consistent with the pirnciples of multilateral trade as long as they are trade creating arrangements. The arguments are based on the theory of comparative advantage. 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 in 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 can be applied to real world economies or that it is a valid principle for smaller such as those of the Caribbean. It develops an alternative model based on the pronciple of cumulative growth to overcome these shortcomings. The paper is structure in three sections.

The first section argues that the theoretical principle underpinning the formation of regional integration agreements and multilateral trade is in essence the same. Both are guided by the principle of comparative advantage. The second section asserts that the principle of comparative advantage is based on three tacit assumptions. These are the neutrality of money, the gross substitution axiom and ergodicity.

The third section tries to ascertain and delineate the conditions under which a regional free trade agreements such can improve growth prospects and promote greater levels of convergence among its signatory countries and in particular its smaller member states. To this end the section presents a leader-follower productivity gap model that bars the main premises of orthodox trade theory and incorporates size and development as fundamental determinants of trade flows and outcomes. The final reflections are found in the conclusion.

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[2] 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 at a level, which in their aggregate, does not make these more restrictive than those previously imposed by the individual members.

The treatment of regional trading agreements in 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.[3]

RTAs' do not suppress 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. As a result these do not necessarily lead to the creation of welfare gains. The standard approach to RTA's was developed by Jacob Viner (1950). It is a static approach. It views the issue in terms of trade creation versus trade diversion. [4]

Trade creation refers to a change in production of a good from a high-cost domestic source to a lower-cost source in a partner country. In this case given the fact that the product was not imported there is no loss in exports for any country.

Trade diversion refers to a change in production from a lower-cost producer not belonging to the free trade area to a higher-cost producer belonging to the free trade area. 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.

[3] The properties of the most basic model based on comparative advantage, the Hecksher-Ohlin model, 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.

[4] In his seminal contribution, Jacob Viner (1950) identified the conditions that if met by the RTA could improve its efficiency. These included, the geographical extension of the RTA, the level of the external tariff adopted by the 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 transhipping 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 as 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.

RTAs approximate a free trade situation and thus render operational, to a limited extent, the principle of comparative advantage when trade deviation is greater than diversion. Under these circumstances they are thus welfare enhancing. RTAs maximise welfare when their number equals one, that is, when the geographical area of the RTA coincides with that of the world.

The introduction of dynamic factors, such as growth and investment, or imperfect markets do not alter, in the least, the validity of standard static analysis. [5]

The analysis of the workings of free trade and of the principle of comparative advantage is similar to that of RTAs. The starting point in both cases is that of autarky. Trade openness leads to changes in relative prices. Producers respond to price changes. In turn, vaRTAtions in output cause changes in factor demands and factor prices respond. The difference is the geographic extension within which free trade applies.

The reason for the similarity in their workings and for the fact that, RTAs are ultimately a special case of the H-O-S theory is simple. Both share the same analytical foundations or more to the point the same core premises. Following Davidson (2003) these can be condensed into three: free trade theory is framed in terms of real analysis, the gross substitution axiom and absence of uncertainty. These are dealt with in the next section.

Comparative advantage and its tacit premises

Real analysis views and understands economic relationships in real terms that is, in barter terms. As in the example above countries 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 is carried out in terms of physical goods and persons. At most money is present but monetary vaRTAbles adjust to the tune of real vaRTAbles. Hence, real analysis and orthodox trade theory has no place for money and money does not enter into decision-making processes.

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) $\delta z_1/\delta p_2 > 0$ and $\delta z_2/\delta p_1 > 0$

Where, $z_i(p_1,p_2)$ is an excess demand function.

[5] 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.

The axiom of gross substitution implies that a price path determined by a process of adjustment such that its rate of change is proportional the excess demand function, converges towards and equilibrium, that is it is globally stable. This is expressed formally as,

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

where p^* is a vector of equilibrium prices.

Turning to trade theory, the axioms of money neutrality and gross substitution makes the principle of comparative advantage operational. It ensures that expenditure is directed to the purchase of the cheaper commodity leading to changes in prices, production, and factor demand and prices which in a free trade situation will result in price equalization and net gains for trading partners. That is free trade is best for everyone. The axiom of gross substitution are sufficient to ensure that free trade leads to full employment since by definition it is a sufficient condition to prove the stability of an equilibrium position. That is, it guarantees the tendency for a system to converge to a full employment situation.

In the particular case of the Hecsksher-Ohlin 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. This means that 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.

In the particular case of trade and RTA's, the ergodic axiom implies that the differences in size and development (or in general initial conditions) of countries joining a RTA do not matter for the final outcome. Trade affects alike all trade partners and development and size do not matter. They are simply are irrelevant to the entire issue of the formation of RTA's. As a result there is no need and indeed no space in the theory and policy for any type of asymmetrical treatment whatsoever. Instead policy should focus on ensuring the fluidity of market mechanisms.

As a result the benefits purported by RTAs and the RTAA follow logically from a set of premises that guarantee from the start full employment and welfare improvement independently of the initial conditions of its member and of the degree of trade linkages. Once the principle of comparative advantage is allowed to work, RTAs can only be welfare improving.

However, this does not mean that RTA's are welfare improving in a world more akin to the real world where the core premises do not hold. That is the RTAA can only be

beneficial in an ideal world which may well be very different than our 'real world.' It is thus not surprising that the empirical studies analysing the welfare effects of the formation of free trade areas find that the evidence is ambiguous. [6]

Changing the core premises and incorporating non-neutral money, income rather than substitution effects and differing initial conditions thereby rendering the process path dependent into the analysis can alter the conclusions regarding free trade and RTA's in a fundamental way. This is shown in the next section, which presents a simple model for two economies of different size and development.

A simple two-country model

Assume the existence of two economies that decide to enter in a RTA. One of the economies, which is termed the 'leader' (denoted by the subscript l) is the bigger and more developed economy. It has higher levels of productivity and is technologically more advanced. The follower economy (denoted by the subscript f), is assumed at this stage to be closely linked to the leader economy. It is furthermore assumed that the follower economy is balanced-of-payments constrained while the leader economy is not.

The model begins by defining the productivity 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. That is,

(3) $G_p = Ln(P_l/P_f)$

(4) $g = p_l - p_f$

Following Mc Combie and Thirlwall (1994) the rates of productivity growth in the leader and follower economies are equal to the sum the rates of growth of autonomous and induced productivities. That is they are modelled as Verdoorn equations.

[6] 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 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.

In turn as the rates of growth of autonomous productivities depend 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" (McCombie and Thirlwall, 1994, p.464). The rate of growth of autonomous productivity in the larger economy is greater than that in the smaller economy (i.e., $p_l > p_f$).

Induced productivity is captured by the parameter λ, also known as the Verdoorn coefficient. It depends on "'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" (Ibid).

That is,

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

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

Note that Eqs.(5) and (6) capture the presence of dynamic economies of scale due to the greater specialization induced by economic growth. These entail cumulative growth because a greater degree of specialization entails a greater rate of growth. In turn the faster the growth the greater the potential for specialization.

As stated earlier it is further assumed that 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. In an economy, such as the follower economy that trades mainly with the leader economy but that also has trade linkages with other trade partners, the balance-of-payments constrained rate of growth (under the assumption that income effects predominate over price effects, see Thirlwall and McCombie, 1994, p.487) is equal to:

(7) $y_f = (w_{xlf}\, \varepsilon_{fl} y_l + w_{xrw} \varepsilon_{frw} y_{rw}) / (w_{mfl} \pi_{lf} + w_{mfrw} \pi_{rwf})$

Where,

ε_{fl}, = the leader's income elasticity of demand for the follower exports.

ε_{frw} = the rest of the world's income elasticity of demand for the follower exports.

π_{lf} = the follower's income elasticity of demand for imports from the leader.

π_{rwf} = the follower's income elasticity of demand for imports from the rest of the world.

w_{xlf}, w_{xrw} = Shares of exports from the follower and rest of the world in total imports of the follower.

w_{mfl}, w_{mfrw} = Shares of imports from the follower and rest of the world in total imports of the follower.

y_{rw} = rate of growth of the rest of the world.

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

(8) $g = (p_{la} - p_{fa}) + (\lambda_l y_l - \lambda_f((w_{xlf}\,\varepsilon_{fl} y_l + w_{xrw}\varepsilon_{frw} y_{rw})/(w_{mfl}\pi_{lf} + w_{mfrw}\pi_{rwf})))$

(9) $g = (p_{la} - p_{fa}) + \lambda_l y_l - \lambda_f y_l (w_{xlf}\,\varepsilon_{fl})/(w_{mfl}\pi_{lf} + w_{mfrw}\pi_{rwf}) - \lambda_f y_{rw}(w_{xrw}\varepsilon_{frw})/(w_{mfl}\pi_{lf} + w_{mfrw}\pi_{rwf})$

Eq.(9) shows that the behavior of the rate of change of the productivity gap over time will depend on two factors: (i) the differences in autonomous productivities and (ii) the difference between the induced productivity in the leader and follower economies. This takes into account that induced productivity in the follower country depends on the rate of growth of the leader and the rest of the world weighted by their ratio of export to import elasticities multiplied by their respective share of trade.

As in the case of the OECS it may be easily assumed that the follower trades mainly with the follower country and has only weak trade linkages with the rest of the world. As a result it can be safely assumed that $w_{xrw,}\, w_{mfrw}$ approximate zero and w_{xlf}, w_{mfl} approximate one. Eq. (9) is reduced to,

(10) $g = (p_{la} - p_{fa}) + \lambda_l y_l - \lambda_f y_l(\varepsilon_{fl}/\pi_{lf}) \Leftrightarrow (p_{la} - p_{fa}) + y_l(\lambda_l - \lambda_f(\varepsilon_{fl}/\pi_{lf}))$

According to Eq.(10) as long as the autonomous productivity in the leader economy is greater than that of the follower economy the gap will, other things being equal continue to increase. In the same vein, an increase in the rate of growth of output, in that of the coefficient of scale or in the exports elasticity of income of the leader economy will widen the gap. Contrarily, an increase in the scale coefficient of the follower economy or in that of its export elasticity will have the opposite effect.

Assuming that the difference in autonomous productivity between both economies is equal to zero, it can be shown that the rate of change of the gap will increse, decrease or equal to zero according to whether the ratio of scale coefficient between the leader and follower economies is greater, less or equal to the ratio of export elasticities. That is,

(11)

$$\begin{array}{ccccc} >0 & & >0 & & > \\ g=0 & \Leftrightarrow & (\lambda_l - \lambda_f(\varepsilon_{fl}/\pi_{lf}) = 0 & \Leftrightarrow & \lambda_l/\lambda_f = (\varepsilon_{fl}/\pi_{lf}) \\ <0 & & <0 & & < \end{array}$$

In other words closing the 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. In other words, since the dynamic economies of scale imply a relationship of cumulative circularity between output growth and productivity there is no mechanism through which the follower country can catch-up to the leader country unless the parameters in Eq.(9) change. That is a catch-up process can only occur if there is a change or shift in one of the vaRTAbles or parameters intervening

in the cumulative process. Excluding discrete changes in λ_l and/or λ_f which are unlikely the only other possibility is to shift ε_{fl} or π_{lf} to offset the induced productivity gap. At the policy level this means that barring protectionist measures, a process of catch-up implies improving the competitiveness of imports and/or exports (that is ε_{fl} increases and/or π_{lf} decreases).

Up to this point we have assumed that the Verdoorn Equations for the leader and follower countries are independent of one another. However, as shown in the relevant literature trade creates spillovers among participating countries. RTA's are not an exception. In the case here presented the spillovers are transmitted from the bigger more developed economy (i.e, the follower) to the smaller less developed economy (the follower). The degree to which the follower can benefit from these spillovers and indeed translate them into higher productivity will depend on the initial size of the gap and on the absorptive capacity of the follower. Following Targetti and Foti (1997) induced productivity can be modelled as a non-linear function of the gap. Formally,

(12) $\lambda_f = a\,(1/G_o)(e^{-G/\theta}) = a\varphi\, e^{-G/\theta}$

Where,

a = factor of proportionality.
$\varphi = (1/G_0)$ = inverse of the initial productivity gap and $0<\varphi<1$.
θ = degree of adaptability.

According to Eq.(12) 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.(12) 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 capacity of the follower economy). This is captured by $e^{-G/\theta}$. This is a function of the level of the gap and the degree of adaptability of the follower economy (θ). The function $e^{-G/\theta}$ displays a bell shaped curve or phase diagram. The curve is similar to that of a neo-classical production function for any given level of G. That is for a given level of G, the function increases at an increasing rate as the degree of adaptability (θ) rises after which diminishing return set in and the function increases at a decreasing rate and then decreases.

Substitution of Eq.(12) into Eq.(10) yields the following expression for the rate of change in the gap,

(13) $g = (p_{la} - p_{fa}) + \lambda_l y_l - (a\varphi\, e^{-G/\theta})y_l(\varepsilon_{fl}/\pi_{lf}) \Leftrightarrow (p_{la} - p_{fa}) + y_l(\lambda_l - (a\varphi\, e^{-G/\theta})(\varepsilon_{fl}/\pi_{lf}))$

Eq.(13) shows that for any given level of y_l and $\varepsilon_{fl}/\pi_{lf}$ the direction in the rate of change in the gap will depend on the difference in the rate of growth of autonomous

productivities and the extent to which the follower country can benefit from the spillover effect of the leader country, which basically depends on the degree of adaptability of the follower country (i.e., θ). In other words the balance-of-payments constraint workings, which is a monetary phenomena provides the framework within which the 'real' forces (productivity and learning) operate.

If for analytical purposes the difference in the rate of growth in autonomous productivities is equal to 0, Eq.(13) simplifies to yield,

$$(14)\quad g = y_l(\lambda_l - (a\varphi\, e^{-G/\theta})(\varepsilon_{fl}/\pi_{lf})$$

and

$$(15)\quad \begin{matrix} >0 \\ g=0 \\ <0 \end{matrix} \;\Leftrightarrow\; (\lambda_l - (a\varphi\, e^{-G/\theta})(\varepsilon_{fl}/\pi_{lf}) \begin{matrix} >0 \\ =0 \\ <0 \end{matrix} \;\Leftrightarrow\; \lambda_l/(a\varphi\, e^{-G/\theta}) \begin{matrix} > \\ = \\ < \end{matrix} (\varepsilon_{fl}/\pi_{lf})$$

Eq.(15) shows in addition two features of the model worth mentioning. First, the increase in the degree of adaptability of the follower country does not necessarily guarantee convergence. This can be easily seen if it is assumed that the parameter $\theta = \infty$. In this case $e^{-G/\theta}=1$ and g=0 (>;<) according to whether $\lambda_l/(a\varphi) = (>;<)(\varepsilon_{fl}/\pi_{lf})$.

Second, convergence requires, in general, policies whose scope is beyond those designed to stimulate economic growth. This can be seen most simply in the case where the income elasticity of exports is equal to that of imports. From Eq.(…) above it can be seen that the rate of growth of the follower country is equal to that of the leader. The follower country can improve its growth performance according to whether the leader country decides to increase its demand. Yet this does not guarantee convergence. Indeed, both economies will converge, diverge or remain along similar growth paths according to whether $\lambda_l = (> \text{ or } <)\ (a\varphi\, e^{-G/\theta})$.

Third, in the same vein, the design of policies to improve the export elasticity of income and contain (or reduce) the rate of growth of the import elasticity can improve growth performance but not guarantee convergence.

Policies to alter the value of the said parameters will lead to convergence when $\varepsilon_{fl}>\pi_{lf}$ if $\theta = \infty$ and $\lambda_l = (a\varphi)$, that is if the degree of adaptability is infinite and the induced productivity of the leader is equal to initial productivity gap. Thus most likely policies aimed at improving exports or containing imports are at most incomplete policies.

Conclusion

The paper examines the conditions under which a RTA can be beneficial to its signatory members in particular to the smallest states. To this end, it develops a productivity gap model for a two economies, the leader and follower economies. The leader economy is assumed to be the bigger and more developed economy. The model

adopts alternative core premises than those espoused by orthodox trade theory such as the non-neutrality of money and the predominance of income over substitution effects.

The model implies that free trade may widen the gap between the leader and follower economy and that therefore absolute advantage may indeed shape the pattern of trade between both. In addition the model shows that the only way for smaller economies to benefit from trade is to undertake policies to either improve the export performance or the productivity of imports and to improve the learning capacity and adaptation that will allow them top benefit from the spillovers of the leader economy.

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