

in *Economic Growth and the Structure of Long Run Development*,
Luigi L. Pasinetti and Robert M. Solow (eds.), London: Macmillan, 45-64 (1994).

**INCOME DISPARITY AMONG COUNTRIES
AND THE EFFECTS OF FREER TRADE***

by

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ABSTRACT

This paper examines the convergence issue from the perspective of trade liberalization's impact on the process. While unconditional income convergence among countries is not very common, it does appear to be an appropriate description of income behavior within groups that liberalized trade. Furthermore, the convergence seems to be closely linked to the timing of liberalization. Implementation of extensive trade reform coincides with reductions in income differentials that had been relatively steady prior to the liberalizations. Also, different periods of liberalization coincide with different periods of convergence.

* I would like to thank John J. Antel, Robert C. Feenstra, Paul M. Romer, Roy J. Ruffin and participants in the NBER's 1992 Summer Institute workshop in International Trade and Investment for their valuable comments, suggestions and assistance. The research on which much of this paper is based was supported by a grant from the Advanced Research Program of the State of Texas.

I. INTRODUCTION

In recent years, there has been a considerable amount of attention devoted to the question of income convergence among countries. The empirical validity of the neoclassical convergence predictions was questioned in the pathbreaking work of Romer (1983, 1986) and Lucas (1988), leading them in search of alternative theoretical explanations that could produce, among other things, a more accurate account of the behavior of income differentials over time.

The lack of convergence among 113 market economies is evident in figure 1.¹ Average annual rates of growth of real per capita income for each country, between 1960 and 1985, are measured along the vertical axis. Along the horizontal axis are the real per capita income levels of each country in 1960 relative to the U.S., which was the wealthiest country at the time.²

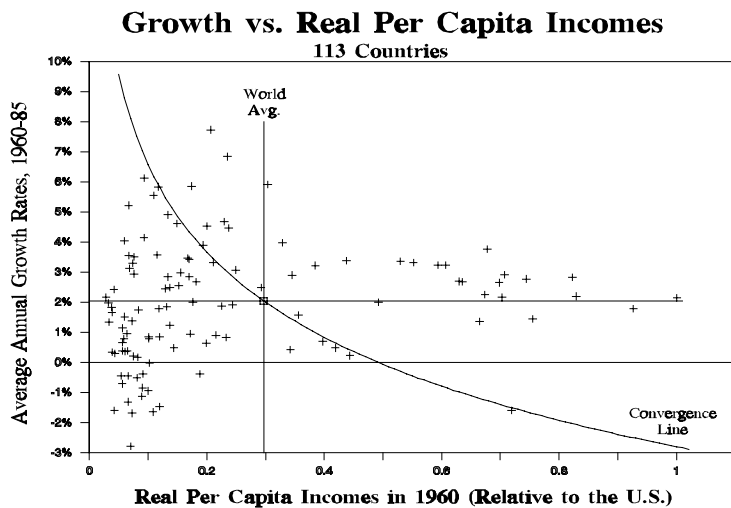


Figure 1

The crossed lines in the

¹ This is a variant of scatterplots utilized by Romer (1987 and 1989) to illustrate the lack of convergence among countries.

² It is more accurate to use the Summers and Heston (SH) data for the disparity in levels on the horizontal axis (as is done in figure 1) and *actual* rates of growth on the vertical axis, rather than growth in the Summers and Heston PPP-adjusted GDPs. IMF *International Financial Statistics* data (that matched 87 of the 113 SH countries from 1970 to 1985) was used to calculate actual growth rates. A plot of these was very similar to a scatterplot for the same countries and years using the Summers and Heston data. Since the SH data affords a glimpse of more countries during a longer time span, it was used here.

center of the graph depict the average world level of per capita income in 1960 (which was just under 30 percent of the U.S. level) and the annual growth rate of average world income over the 25 year span. These lines divide the figure into four quadrants. Convergence requires that all countries be located in either the top left quadrant, or the bottom right one.

The sloped line represents the locus of points which the countries would have to be on to reach the world's average level of income in 1985. The height of the schedule at each point is determined by the following equation:

$$\lambda_i^{60-85} = 100 \left[\left(\frac{Y_{avg}^{85}}{Y_i^{60}} \right)^{\frac{1}{25}} - 1 \right]$$

where Y_i^{60} equals country i 's level of real per capita income in 1960, Y_{avg}^{85} equals the average global level of income in 1985, and λ_i^{60-85} equals the average annual rate of growth of country i between 1960 and 1985 that would be necessary for country i 's income to equal the world's average level of income in 1985.

Clearly, the country growth rates are not arrayed in any formation that even approximates the sloped convergence line. In fact, the majority of observation points do not even fall into the top left and bottom right quadrants.

While convergence does not appear to be borne out by the overall data, there are conditions that may increase the likelihood of reducing the income gap. In particular, trade and the degree of openness may have a direct bearing on the degree of disparity among countries. The assumption of diminishing returns combined with unrestricted factor movements enhances the prospects of convergence in the neoclassical model.

In the absence of factor movements, free trade alone may contribute to a reduction in

disparity. That is the conclusion of the factor price equalization theorem, which states that under certain conditions, free trade in commodities will not only equate commodity prices, it will also result in the equalization of factor prices (which can usually be assumed to be an indication of income convergence).³ Furthermore, openness plays a role in the diffusion of technology which also acts to reduce the gap between those who have it and those who don't.

Are there empirical indications that the degree of openness has an impact on the degree of income disparity among countries? That question is the focus of this paper. Specifically, the objective is to highlight the relationship between trade liberalization and the behavior of cross-country income differentials.

The next section describes some recent empirical evidence on the convergence question in general. Section three examines the impact of trade reform on income disparity and section four concludes.

II. THE GENERAL ISSUE OF INCOME DISPARITY

Based on the cross-sectional and time series behavior of nine countries, Chenery and Syrquin (1986) created a hypothetical composite nation and found that growth rates tend to be positively related to levels of per capita incomes up to a certain point, whereupon the relationship becomes negative. Their purpose, and that of Syrquin (1986), was to analyze the structural changes that occur as countries industrialize and to examine how these changes affect their

³ For more on the relationship between the equalization of factor prices and the equalization of incomes, see Ruffin (1987).

overall growth.

Chenery and Syrquin's observation that growth rates initially accelerate and later slow down is supported by Kristensen's (1982) findings based on 118 countries from 1970 and 1978. Aggregation of the countries into seven groups according to their 1978 per capita incomes reveals that growth rates are highest for the two middle groups (numbered 3 and 4 from the top). Utilizing the same country groupings to look at 1960-70 growth rates, Kristensen finds that the middle group (number 4) grew the fastest.

However, the implication of the Chenery, Syrquin and Kristensen results is that the observation points in figure 1 should be arrayed along a hump-shaped curve rather than what appears to be a mean-preserving wedge.

Baumol (1986) found that wealthy countries tend to converge towards one another, but as a group, they displayed a tendency to diverge from the remaining countries. Baumol, as well as Abramovitz (1986) who also found evidence of convergence among these countries, attributed the reduction in disparity to the catch-up phenomenon, through which the degree of "backwardness" of a country is positively related to its potential to catch-up to the leading country (provided that the underlying reason for its backwardness does not inhibit it from utilizing its capacity to adopt the existing technologies of the leader).

The Baumol and Abramovitz findings would tend to support the downward sloping, or right-hand side, of the Chenery-Syrquin-Kristensen development hump. On the other hand, Baumol found that middle-income countries also exhibited reductions in income differentials amongst themselves, though they too tended to grow faster as a group than the countries that were in the third, and poorest group.

In a comment on Baumol's paper, De Long (1988) argued that grouping countries ex post,

as Baumol had done, biased the results towards convergence. By grouping together wealthy countries (circa late 1880's), De Long rejected Baumol's observation that there exists a convergence club among the world's wealthiest countries. The De Long criticism also applies to the Kristensen country groupings which are based on end-of-period incomes rather on an ex ante partitioning of the world.

This might explain why convergence is not readily apparent in figure 1, despite the evidence from the above papers. However, it is still quite possible that the triangular results in the figure are due to a "wrong" choice of initial and terminal years. That is, if either 1960 or 1985 (or both) were outlier years, then calculation of average growth rates between the two would lead to mistaken conclusions.

One way to avoid this type of an error is to pool together the real per capita incomes and annual growth rates for each of the 113 countries in each of the 25 years. The correlation coefficient for these 2825 observations is 0.05, indicating no overall link between income levels and rates of growth.

Suppose that the observations were ranked by the real per capita incomes. If the hump is the correct depiction of the relationship between incomes and growth, then there should be a positive correlation between the two for the bottom, or lower income group, while the higher income group should exhibit a negative correlation.

Correlation coefficients of 0.12 and -0.09 for the bottom and top groups, respectively, do not provide much evidence supporting the existence of a hump. A further breakup of the observations into equal groups of 706 (i.e. into quartiles) is not any more supportive either (see table 1). The column on the right indicates the range of countries with at least one observation in the specified quartile (where the wealthiest country in 1960, the United States, is ranked

number 1, and the poorest country that year, Tanzania, is ranked 113).

These results do not provide much support for either convergence among countries, or for a hump-shaped curve between income levels and growth rates. In fact, as figure 2 shows, a plot of the 2825 combinations of annual

incomes and subsequent annual growth rates for all 113 countries between 1960 and 1985 reveals a mean-preserving wedge very similar to figure 1. There does not appear to be any obvious relationship between levels of development and rates of growth per se. The wider dispersion associated with lower income levels may be the result of a more defined distribution as the preponderance of observation points per income level is increased.

Table 1

Country Quartile	Correlation	
	Coefficient	Range
First	-0.05	1 - 68
Second	-0.04	7 - 91
Third	0.12	42 - 100
Fourth	-0.04	64 - 113

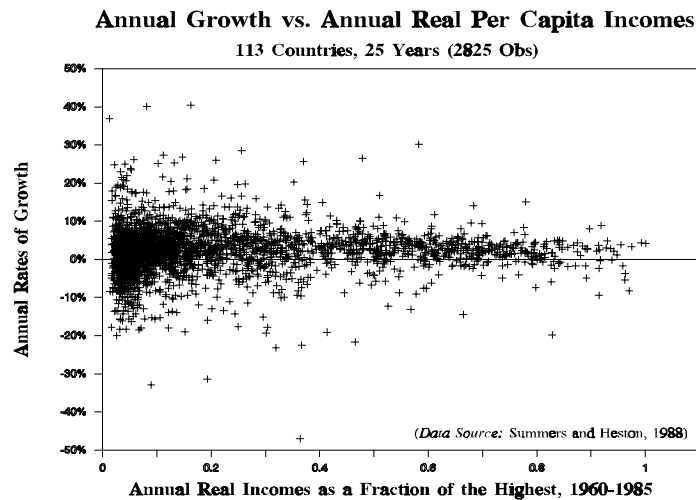


Figure 2

wide sample of countries. Adding a proxy for human capital accumulation strengthens the

A different approach to the convergence question was adopted by Dowrick and Nguyen (1989). By regressing rates of growth on initial levels of incomes and including investment to GDP ratios and population growth as additional right-hand side variables, they find evidence of conditional convergence among a

convergence outcomes even more according to Mankiw, Romer and Weil (1992). Their results corroborate those of Barro (1991) who used additional right-hand side variables (such as government expenditures, political instability, etc.) to find conditional convergence.

Since different authors controlled for different combinations of variables, there is a question of how sensitive the various conditional convergence results are to the inclusion or omission of one or more variables. Levine and Renelt (1992) tested the robustness of a large number of possible explanatory variables and found that only a few (e.g. investment's share of GDP, initial levels of human capital, and the ratio of trade to output), were significant regardless of the other variables that were included.

In most of these studies, findings of convergence, be it conditional or otherwise, were due to estimations of equations that put cross-sectional rates of growth on the left-hand side and the cross-sectional initial levels of income on the right-hand side, together with other variables, as the case may be. The question is, how vulnerable are these results to determination of the period's initial and terminal years, and how much do they vary when the composition of the countries change? Levine and Renelt tackle this issue in their robustness tests, though they are still somewhat limited (as far as testing for sensitivity of different dates) by their choice of the cross-sectional regressions.

In a departure from the standard practice of averaging growth rates for an extended period and estimating their relationship with initial incomes in the cross-section, this paper defines convergence by calculating the log differences between each country's level of income and the group's average and then examining how these differences behave over time. This reduces the dependence of the outcomes on the period's initial and terminal years. More on this methodology appears below.

Bernard and Durlauf's (1990) cointegration tests offer yet another method to test for convergence. They find little evidence of convergence other than a few examples among some European countries. However, they do not elaborate on whether the convergence, when it occurred, was a process that took place over the entire sample period, or just during specific sub-periods. This point is key to the analysis that follows.

III. TRADE AND CONVERGENCE

In light of the non-convergence findings, how does one go about identifying trade's effect on cross-country income differentials? One might want, for example, to compare the changes in income disparity among U.S. states to changes in cross-country income disparity.

In this kind of an example, the U.S. could proxy for an integrated world economy with free trade and mobility of factors. The U.S., for example, has exhibited significant income convergence for over five decades, as is evident in figure 3.⁴ Nearly all the states with 1929 personal incomes below the U.S. average

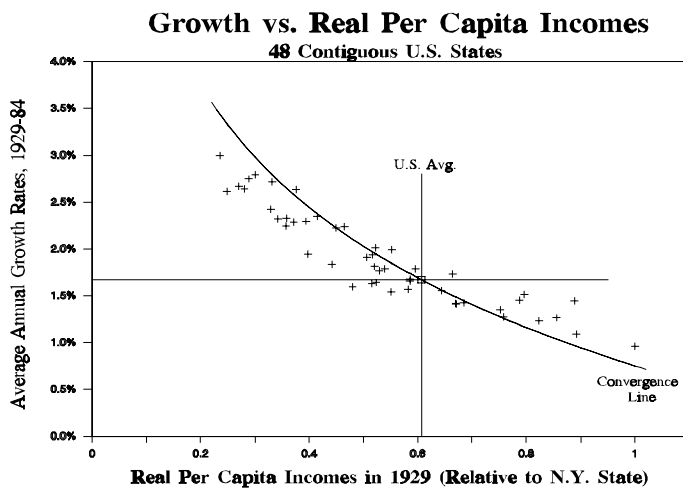


Figure 3

⁴ Data Source: Bureau of Economic Analysis, U.S. Department of Commerce.

exhibited above average rates of growth (28 out of 34), while only one of the 14 states with above average 1929 incomes grew at a faster than average rate. Put differently, 85 percent of the states were in the top left and bottom right quadrants.

While poorer states tended to grow faster, the rate of growth for most states with 1929 incomes below the national average was nonetheless insufficiently high for complete convergence to occur (i.e. they were below the convergence line). The wealthier states also displayed a negative relationship between growth rates and initial incomes. But the fact that the majority of them were above the convergence line in the "affluent" quadrant means that while the United States achieved a reduction in the degree of income disparity, the rich states in 1929 also tended to remain relatively more prosperous a half century later.

The visual evidence from figures 1 and 3 is corroborated by correlation coefficients (measuring the relationship between initial incomes and average annual growth rates) of -0.92 for the U.S. states versus 0.16 for the 113 countries.

The question is whether it is the relatively free flow of goods between states that is the primary force behind the U.S. convergence, or could there be other explanations as well? Presumably, since impediments to trade within the U.S. are not of the same magnitude as international barriers, then internal trade liberalization could not be the source of this reduction in income disparity. On the other hand, transportation costs represent natural obstructions to trade and a steady fall in these over time would have the same effect as the removal of man-made obstacles to trade. However, a reduction in transportation costs facilitates the movement of both goods *and* factors between the states and regions of the United States. The existence of a central government may also contribute to the convergence process by providing an infrastructure that enables and arguably enhances the smoother flow over time. So how is it

possible to isolate trade's contribution to the U.S. convergence?

The answer is that, in lieu of trade data between states, this is very hard to pin down. Trade data does exist for countries. However, an analysis of countries brings with it another question: How should the countries be grouped?

In the U.S. example for example, this problem does not exist, since the number of states is defined by U.S. law to be 50 (or 48, if one examines only the contiguous states). When one looks at sovereign nations however, the criteria for grouping countries is not as clear-cut, though it is of paramount importance.

If the countries are grouped "correctly", it is possible to produce any sort of result, from outcomes that depict significant convergence over time to those that exhibit significant divergence.

Income classification is one method that is common in the literature for determining the composition of groups (e.g. high income countries in one group, middle income countries in a second group, and low income countries in a third group). This is the methodology used in most of the papers described in the previous section.

There are several types of problems with this type of partitioning. In addition to the issue of an ex ante versus ex post choice of group members, there remains the matter of group size. What should be the criteria for determining who belongs and who doesn't?

There is an additional problem associated with grouping countries by income classification that is much more relevant to the issue at hand. If one wants to examine trade's effect on income differentials, then it is not obvious that income groupings are the appropriate vehicle for analyzing this relationship. A more intuitive method would be to examine the convergence issue on a regional basis. This is based on the premise that, as a nation opens up to trade, it will

initially increase trade with its neighbors, rather than with other nations of similar wealth that might be over-the-horizon. It should be noted however, that the regional approach is also subject to the same sample selection problems that plague the income approach. Specifically, how does one define a region and determine which countries belong?

In this regard, the European Economic Community (EEC) alleviates many of the problems discussed above, while at the same time providing a platform for analyzing the impact of trade on income disparity. This is due to the fact that the EEC represents a *fixed* grouping of countries that formally integrated most of their trade policies.

The formative years of the Community are particularly enlightening for a variety of reasons. The period of trade liberalization among the six member countries (Belgium, France, Luxembourg, Germany, Italy and the Netherlands) lasted for a specified "transition" period of ten and a half years, from January 1959 through July 1968, by which time nearly all tariffs and quotas were abolished.⁵ The existence of a specific timetable for their removal makes it possible

to test for changes in the degree of income disparity within the EEC that occurred prior to, as well as during and after the liberalization period. Furthermore this period of trade reform was characterized primarily by heightened trade among the Six, while factor flows

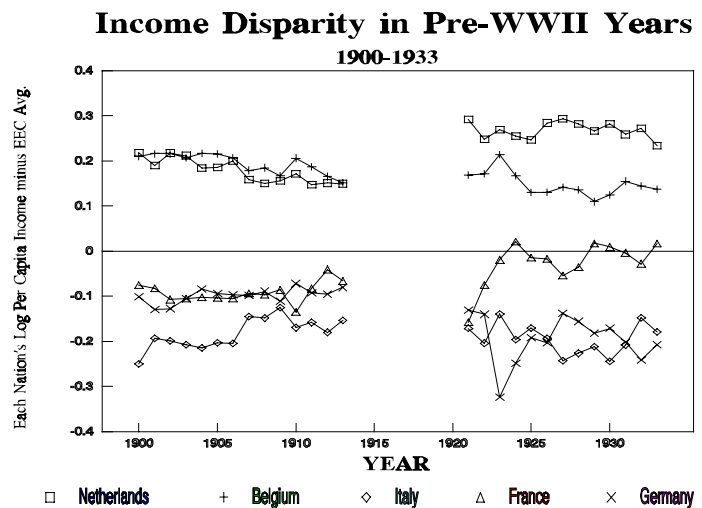


Figure 4

⁵ Agricultural barriers were a notable exception to the otherwise comprehensive elimination of formal trade restrictions. Other exceptions included the erection of non-tariff barriers.

exhibited only negligible improvement.⁶

The income disparity among five of the six countries that would later form the EEC is plotted in figures 4 and 5 (Luxembourg, the sixth country does not appear in Maddison's [1989] data, though from an examination of the Summers and Heston data for the postwar period, its exclusion does not substantially alter the outcomes). The vertical axis measures the annual differences between the log per capita incomes of each country and the group's average income.

Prior to the Second World War, the countries do not exhibit any apparent reduction in income differentials. However, in figure 5, which focuses on the postwar years, the countries display a substantial amount of convergence to the group average.

Income Disparity Among EEC Countries

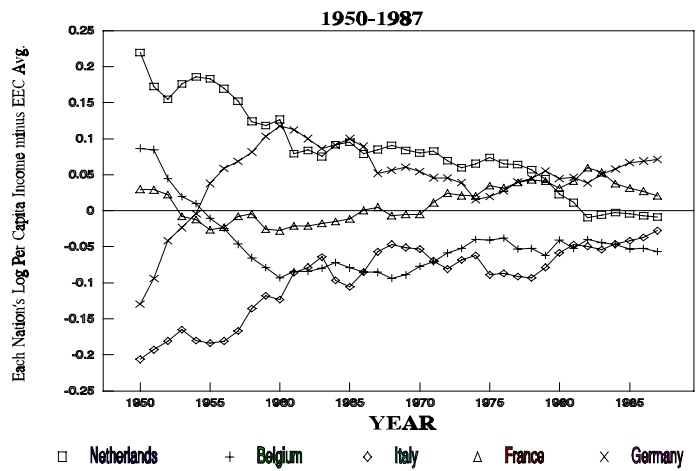


Figure 5

Using the following model

to test for convergence among the six EEC countries,

$$(1) \quad y_{i,t} - \bar{y}_t = \phi (y_{i,t-1} - \bar{y}_{t-1}) + \varepsilon_{i,t}$$

where $y_{i,t}$ is the log per capita income of country i and \bar{y}_t equals the group's average income in year t , Ben-David (1993) shows that ϕ , the convergence coefficient, falls significantly

⁶ Studies by Jensen and Walter (1965), El-Agraa (1985), Ben-David (1991) and others report that the removal of internal EEC barriers resulted in significant increases in the volume of intra-EEC trade. On the other hand, factor mobility among the countries did not exhibit significant improvement during this period. Collins (1975) and Mayes (1985), as well as reports by the EEC Commission (EEC 3rd General Report, para. 284.), indicate that each of the six countries imposed considerable limitations on labor movements. Balassa (1975) found that capital flows among the countries during the EEC's evolutionary period did not increase noticeably either.

below unity during the postwar period.⁷ The number of years for the average level of disparity to be cut in half, that is, the half-life of the convergence process (which equals the log of 0.5 divided by the log of ϕ) within the Community during the postwar period, equaled 23.5 years. During the transition subperiod, this fell to 13.3 years, an outcome that is very similar to the half-life of 15.3 years for the states of the U.S. and it contrasts with the EEC countries' behavior prior to World War II when their convergence coefficient which was not significantly different from unity, indicating no reduction in income differentials for that period.

Comparing the EEC to other benchmarks, which included groups of industrialized countries that did not experience the extensive trade reforms undergone by the Community, reveals a lack of convergence over the *postwar* period that is very similar to the *prewar* non-convergence exhibited by the EEC prior to its liberalization of trade. For example, the 25 wealthiest non-EEC countries from the Summers and Heston data (which included countries a little wealthier than the wealthiest EEC member through countries a little poorer than its poorest member) exhibited a convergence coefficient of 1.0027 that was not significantly different from unity. A subgroup of the 14 non-EEC countries with incomes ranging *between* the wealthiest and poorest EEC countries had a ϕ of 1.0132 that also did not differ significantly from 1.

Other instances of major postwar liberalizations also highlight the link between the removal of trade barriers and the convergence of incomes, though none of these episodes was quite as extensive as that of the EEC. One example is the bilateral agreement between the

⁷ These postwar convergence results were obtained by pooling together the countries. Robustness tests were also conducted by excluding first the wealthiest country, then the top two countries, followed by the poorest country, the two poorest countries, and finally the wealthiest and poorest countries. The results remained robust to this sensitivity analysis. An alternative approach included country dummies, but these turned out to be insignificant. The pooling is done under the implicit assumption that the magnitude of the contemporaneous shocks is marginal. This assumption is tested by Ben-David and Bohara (1992) using Zellner's Seemingly Unrelated Regressions approach. We find that postwar outcomes of convergence within the EEC are still significant, while the non-convergence results prior to WWII are also maintained.

United States and Canada within the framework of the Kennedy Round agreements that were signed under the auspices of the GATT. In general, the Kennedy Round agreements called for 35 to 40 percent across-the-board reductions in tariffs beginning in 1968, with one fifth of the tariff cuts being implemented each year until 1972. Since the U.S. and Canada, are the major trading partners of one another, it is interesting to see if the liberalization between the two might be related to changes in their income gap. For consistency with previous and future graphs, figure 6 plots the difference between the log per capita income of each country and the mean incomes of the two (thus the bottom half is simply a reflection of the top half).

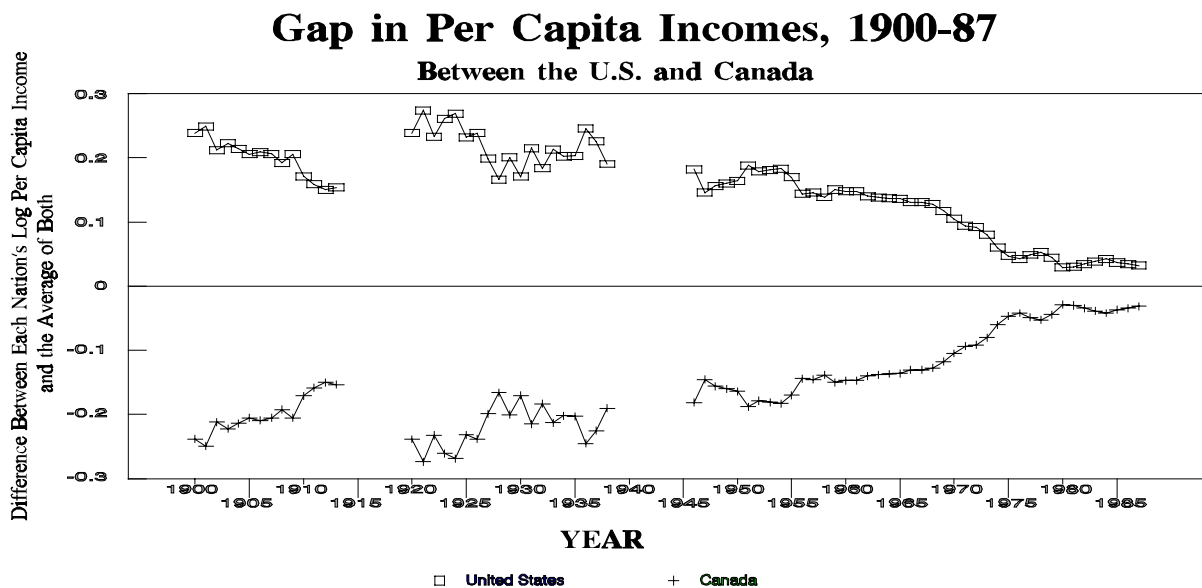


Figure 6

The gap broke below 0.13 for the first time in 1968 and stabilized at its lower level in the mid-seventies after the agreement had run its course. While ϕ is not significantly different from unity prior to the enactment of the Kennedy Round agreements, the no-convergence null is rejected for the liberalization period that began in 1968.

Note that the timing of the U.S.-Canadian liberalization differed from that of the EEC's

transition period. While both groups experienced significant postwar convergence (which followed stable gaps prior to the war), the reduction in income differentials did not occur at the same time in both cases, but instead it coincided with their periods of trade reform.

Another example of major postwar trade reform occurred in Europe with the formation of the European Free Trade Association (EFTA). This group comprised eight countries: Austria, Norway, Denmark, U.K., Finland, Sweden, Switzerland, and Portugal (though Finland was not an "official" member so as not to antagonize the Soviet Union). Since Portugal received waivers throughout the liberalization process, it will not be included in the analysis that follows. Neither will Austria, which was an outlier to the EFTA convergence process.⁸ The behavior of income differentials within the six remaining members of EFTA prior to World War Two is depicted in figure 7, with no apparent income convergence. During the postwar period however (figure 8), income differentials within the group decreased quite a bit. Liberalization on industrial goods within EFTA began in 1960 and was completed in 1967. The bulk of EFTA's income convergence however, began in the late sixties rather than at the beginning of the decade, with ϕ 's significantly less than unity only from 1968 through 1977. One explanation for the lack of a link between EFTA liberalization and EFTA convergence may be due to the fact that these countries were not the primary trading partners of one another. Thus, while the removal of trade restrictions among these countries led to increased intra-EFTA trade, this trade still did not comprise the bulk of their commerce. That distinction belonged to the EEC, from whom the relatively small EFTA countries imported the most.

⁸ Throughout the postwar period, the country was recovering to its relatively wealthy level (at the turn of the century) vis-a-vis the other EFTA nations. Since it was in the process of catching up with the other countries, it causes the EFTA results to exhibit convergence throughout the postwar period. With the removal of Austria, the EFTA results are much more robust.

Trade was liberalized between these two groups beginning in 1968 with the implementation of the Kennedy Round agreements. The elimination of nearly all industrial tariffs was completed in 1977, within the framework of EEC-EFTA agreements, which continued without interruption the reform process that began in 1968. It appears that liberalizing trade with the European Community was more closely related to the internal EFTA convergence than were EFTA's internal trade reforms. In addition, the EEC-EFTA liberalization also coincided with a reduction of the income gaps that had existed between the EFTA countries and the EEC.

**Income Disparity in Pre-WWII Years
1900-1933**

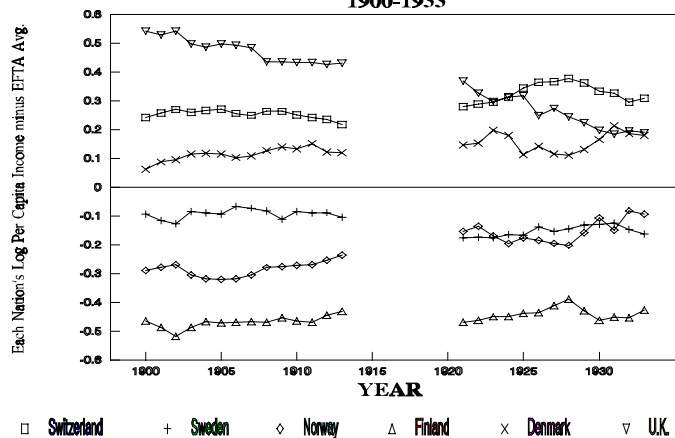


Figure 7

**Income Disparity Among Six EFTA Countries
1950-1987**

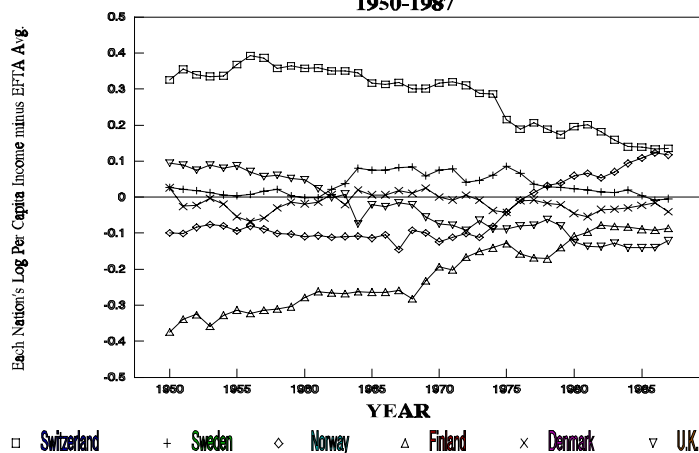


Figure 8

How closely is the reduction in income differentials associated with the timing of trade liberalization in the above cases? One method for examining this relationship is to partition the postwar years into subperiods that are associated with the various trade reforms. This was done in Ben-David (1993) and some of the results were summarized here. An alternative method is

to construct a variable that represents the reduction in formal trade barriers.

For example, tariffs were reduced at approximately 10 percent a year within the EEC between 1959 and 1968. Let the EEC tariff index have the value of 100 from 1950 through 1958. From 1959 until 1968, this index fell by 10 points each year, becoming 0 in 1968 and maintaining this value until 1985. Let the EFTA tariff index equal 100 from 1950 until 1959. EFTA tariffs fell by 20 points in 1960, followed by further drops of approximately 10 points per year until the final drop of the remaining 20 points in 1967. From that year on, the EFTA tariff index equals 0. For the United States and Canada, let the tariff index equal 100 from 1950 through 1967. The Kennedy Round agreements required an average reduction of 35 to 40 percent in tariffs in 5 equal installments from 1968 through 1972. Therefore, let the U.S.-Canada tariff index fall by 8 points each year from 1968 until 1972 becoming constant at 60 from 1972 until 1985.

The elimination of European quotas was most intense during the fifties, prior to the creation of the EEC and EFTA. By the early sixties, both groups had abolished nearly all of their quantitative restrictions. Let the European quota index equal 100 in 1950 and let it fall in 12 equal installments so that the index equals 0 from 1962 onwards.⁹

Creation of overall trade barrier indexes for each group requires some sort of a combination of the tariff and quota indexes. Two weighting schemes are adopted here. The first is to apply equal weights to each index. In other words, sum the annual value of each index and divide by two to derive the overall index. The alternative method is to grant twice as much weight to the tariff index as to the quota index. In the U.S.-Canada case, only the tariff reduction

⁹ The EEC for example, abolished their existing quotas by 20 percent a year beginning in 1959 and completed the process in 1962 by removing all remaining quantitative restrictions.

schedule will be used, in lieu of data on the removal of quantitative restrictions.

Admittedly, these are extremely crude measures of trade barriers. But they are probably more representative than a simple trend line. While regressions of postwar income differentials on trend indicate that postwar disparity has declined within these groups (as opposed to other country groupings), it is interesting to test whether the annual changes in disparity are more closely tied to the removal of trade restrictions than to just a simple trend.

Let $\Delta y_{i,t} = y_{i,t} - \bar{y}_t$. Then, squaring $\Delta y_{i,t}$, summing over i and dividing by $n-1$ (where n equals the number of countries in the group) gives the income variance within a given group at time t . Let $\sigma_{k,t}$ represent group k 's standard deviation at time t , and $\Delta\sigma_{k,t}$ be the annual change in the group's disparity. If $\tau_{k,t}$ is the group's overall trade barrier index, then let $\Delta\tau_{k,t}$ equal the annual change in this index at time t . The dependence of income disparity within group k on the trade barrier index and as well as a simple trend may be estimated using the following equation

$$(2) \quad \Delta\sigma_{k,t} = \alpha + \beta\Delta\tau_{k,t} + \epsilon_{k,t}$$

where the constant represents the annual changes in trend. In the U.S.-Canada case, the annual change in the income gap (ΔGAP_{US-Can}) will be used instead of $\Delta\sigma$. The test for convergence between EFTA and the EEC will have the annual changes in the difference between the average EFTA and EEC incomes (ΔGAP_{EF-EC}) rather than $\Delta\sigma$ on the left-hand side.

To enable better comparisons of the impact of changes in trade barriers on changes in disparity, the dispersion measures used in the regressions are indexed with the 1950 values equaling 100 (this only affects the size of the coefficients, but not the t -statistics or goodness of fit measures).

The results appear in tables 2 and 3 and it is clear that there is not much of difference

between the two weighting schemes as far as the importance of the trade barrier index (TBI) is concerned. While the TBI usually exhibits slightly higher t -statistics with the equal weights method, these results are not overly sensitive to the method chosen.

Income differentials within the EEC are more closely related to the trade barrier index than to the simple trend. EFTA σ 's are not significantly related to either the EFTA TBI or the trend. They appear to exhibit more of link with the removal of trade restrictions between the EEC and EFTA. The gap between the average incomes in the EEC and EFTA depended significantly on the liberalization of trade between the two groups. The U.S.-Canada income gap also appears to be related to the partial relaxation of tariffs that occurred between the two countries.

IV. CONCLUSIONS

This paper examined the convergence issue from the perspective of trade liberalization's impact on the process. It also highlighted a different method for measuring convergence that utilizes annual information and is less sensitive to possibly problematic specification of a period's beginning and end points.

While unconditional convergence is not a very common finding overall, it does appear to be an appropriate description of income behavior within groups that liberalized trade. Furthermore, the convergence seems to be closely linked to the timing of liberalization. Implementation of trade reform coincided with reductions in income differentials that had been

Income Disparity and the Trade Barrier Index

Table 2: Equal Weights for Tariffs and Quotas

Dependent Variable	Constant	Trade Barrier Index for Group:				R^2
		EEC	EFTA	EEC-EFTA	US-Can	
$\Delta\sigma_{EEC}$	-0.402 (-0.54)	0.453** (2.59)				0.169
$\Delta\sigma_{EFTA}$	-0.965 (-0.98)		-0.041 (-0.19)			0.001
$\Delta\sigma_{EFTA}$	0.430 (0.36)			0.448† (1.37)		0.054
ΔGAP_{EF-EC}	1.635 (1.04)			1.199*** (2.79)		0.190
ΔGAP_{US-Can}^a	-1.119 (-0.57)				1.147* (1.76)	0.086

^a Tariff index only.

Table 3: Tariffs have Double the Weight of Quotas

Dependent Variable	Constant	Trade Barrier Index for Group:			R^2
		EEC	EFTA	EEC-EFTA	
$\Delta\sigma_{EEC}$	-0.733 (-0.98)	0.337* (2.00)			0.108
$\Delta\sigma_{EFTA}$	-0.957 (-1.02)		-0.038 (-0.20)		0.001
$\Delta\sigma_{EFTA}$	0.328 (0.31)			0.412† (1.54)	0.067
ΔGAP_{EF-EC}	0.790 (0.55)			0.903** (2.50)	0.159

t -statistics in parentheses.
35 observations.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.
† Significant at the 20% level.

relatively steady prior to the liberalizations. Also, different periods of liberalization coincided with different periods of convergence.

These results are certainly not meant to infer that other factors do not play a role in the convergence process. However, they do highlight the fact that liberalizing trade can also provide an impetus for convergence.

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