

PART 3

TRADE THEORIES AND
THE REAL WORLD
TRADE PATTERNS

7. Time Preference in Dynamic Trade Models:
An Empirical Critique

Economic Development and Cultural Change
July 1988

TIME PREFERENCE IN DYNAMIC TRADE MODELS: AN EMPIRICAL CRITIQUE

I. INTRODUCTION

In this article, I present an empirical critique of one of the results of certain two-sector dynamic trade models: that under free trade a country may save less than under autarky or limited trade.¹ This result implies that in the long run the attainable level of consumption per capita would be lower under free trade than protectionism.² In the short run, of course, consumption would be increased because of the reduced rate of savings associated with free trade. Dynamic trade models such as those formulated by Stiglitz, Deardorff, Samuelson, and Findlay conclude that, in general, the opening up to trade increases the differences among countries in savings rates and in some other

¹The neoclassical dynamic trade model of Stiglitz characterizes countries in terms of constant but different rates of time preference (or different propensities to save), and as a result opening to trade leads to complete specialization in at least one country and to increasing disparity in consumption levels. Maintaining the assumption of "constant" but different rates of time preference (or savings propensity) in each country, the long-run steady-state capital-labor supply ratio of the high time preference (or low-savings propensity) country can increase only if the consumption good is labor-intensive and, furthermore, if there is a very substantial increase in the price of consumption goods after the entrance into world markets. The "Austrian" dynamic trade model of Findlay characterizes two countries in terms of constant but different time preference "structures," and as a result opening to trade leads to incomplete specialization in both countries but still leads to increasing disparity in savings propensity, with the patient country saving more. See Joseph E. Stiglitz, "Factor Price Equalization in Dynamic Economy," *Journal of Political Economy* 78, no. 3 (May/June 1970): 458-88; and Ronald Findlay, "An Austrian Model of International Trade and Interest Rate Equalization," *Journal of Political Economy* 86, no. 6 (December 1978): 989-1007.

²The familiar result is that "an impatient country tends to take the gains from trade in the present rather than the future and may even use the opportunity presented by free trade to reallocate consumption from the future to the present; a patient country makes the reverse choice." See Alasdair Smith, "Capital Theory and Trade Theory," in *Handbook of International Economics*, ed. R. W. Jones and P. B. Kenen (Amsterdam: North Holland 1984), 1:289-324, esp. 306.

economic variables.³ In particular, they conclude that a developing country with a low savings rate will reduce its rate of savings after increasing its trade with advanced countries that have relatively high savings rates. This hypothesis is tested and rejected in this article.

I contend that what the existing dynamic trade models show us is not the likely path that each country will follow after opening to trade. Instead, I demonstrate the limited usefulness of models based on the postulation of "constant" rates of time preference or preference structures. The objection to the existing dynamic trade models is essentially that they take the time-preference structures as "given" rather than as molded by international contact. In this article, it is suggested that trade is likely to shift the time-preference structure of a developing country, inducing the developing country to save more as its citizens strive to catch up with the higher living standards of the advanced country. I contend that the most important result of opening to trade is the possible change in the time-preference structure of each country itself, which may lead to a reduction in disparities in steady-state savings propensity as well as in capital-labor ratio.

Section II conceptually explores the possible direction of changes in the aggregate savings propensity of a developing country after opening to trade. Section III presents an empirical verification of the hypotheses outlined in Section II and concludes that the implications of existing dynamic trade models are not compatible with actual observations of the pattern of trade and growth of developing countries. Section IV considers possible criticisms that may be raised against my interpretation of the empirical data and gives concluding remarks.

II. ALTERNATIVE HYPOTHESIS ON INTERTEMPORAL TIME PREFERENCE

In a two-factor Heckscher-Ohlin framework, the opening to trade usually implies an encounter of the rich and the poor or, stated differently, an encounter of the more patient and the less patient societies in consumption behavior. Such an encounter is bound to affect the tastes of people on both sides. The most conspicuous change may occur in the poor country, in the form of an enhanced aspiration among the general public to acquire the

³See Alan V. Deardorff, "The Gains from Trade in and out of Steady State Growth," *Oxford Economic Papers* 25 (July 1973): 174-91; and Paul A. Samuelson, "Trade Pattern Reversals in Time Phased Ricardian Systems and Intertemporal Efficiency," *Journal of International Economics* 5 (November 1975): 309-63.

material affluence they see in the rich country. Then the likely outcome of opening to trade is a rapidly rising nationwide savings propensity in the poor country, intended to accumulate capital and catch up to the high standard of living of the rich country as fast as possible. This outcome holds true either with active government leadership or without it. This is the main alternative hypothesis to be tested against the one suggested by the dynamic trade models; that is, that a developing country starting with a low savings rate will save less after opening to trade with advanced countries that have relatively high savings rates. My primary hypothesis is based on the observations that in the real world there exists a group of developing countries that have conspicuously revealed, after entering world markets, rapidly rising aggregate propensities to save, as well as rapid improvements in the living standards of the general public and in overall distributional equity. In these developing countries, we have seen aggregate savings propensities become substantially higher than in wealthier countries; more important, these high savings propensities are being sustained.

I also consider a secondary hypothesis by allowing another possible outcome: increased exploitation of the masses by a small power group in the poor country, with little or no improvement in the incomes of the vast majority of the population. In this case there may be no substantial increase in the aggregate savings propensity of the country after opening to trade but, rather, a substantial reorganization of the economic structure that results in a massive income and wealth redistribution in favor of the chosen few. This secondary hypothesis is based on the observation that in the real world there also exists a group of poor countries that have shown negligible increases in aggregate savings propensity, insignificant improvement in the living standard of the general public, and a rather serious deterioration in overall distributional equity after opening to trade. In these countries, one often observes trade leading to an increase in the affluence of a privileged class in the midst of mass poverty. The initial concentration of economic power and political power balance in a country prior to trade may significantly influence the growth path of the country after trade.

The primary and secondary hypotheses offer two alternative pictures of developing countries exposed to international trade: one type in which there is a sort of nationwide thrift-demonstration effect, where trade with a wealthier partner leads the poor country, in aggregate, to save more so that it can also become rich; and a second type in which the effects of trade are instead detrimental to aggregate savings efforts because the demonstration effects are confined to a small elite power group.

The effect of another familiar variable, per-capita GDP, will also be

considered to determine whether it helps to explain changes in the savings propensity.

There are two reasons why empirical verification of the two hypotheses is difficult. The first is that the shifts in time-preference structure are not directly observable. Second, almost all countries have engaged in trade throughout history, so that there is no experience with absolute autarky from which to draw data. It is therefore necessary to examine shifts in savings propensity, taking a reasonably long time interval for comparison. For this purpose, I have chosen the interval between 1960 and 1981. Obviously, the world's developing countries were not in a state of autarky in 1960, but their export/GDP ratio as a whole expanded significantly (by 63%) over this interval. When considered from a rather broad perspective of economic history, such a shift appears to be very significant progress in the opening of developing economies to trade—progress that is bound to have some appreciable impact on the intertemporal tastes of these developing countries. More specifically, my hypotheses lead to the expectations that, first, an increase in the degree of openness of a developing economy to trade (as measured by the export/GDP ratio) will shift the intertemporal time-preference structure of the country in such a way as to increase its aggregate savings propensity, and second, that the more uneven the personal distribution of income of a country is when it first opens to trade, the weaker will be the savings-enhancing effect of its trade expansion. For developed economies, the hypotheses do not suggest anything definite.

III. EMPIRICAL OBSERVATIONS

In this section, I will test the hypotheses proposed in Section II, using cross-section data from the World Bank for the years 1960 through 1981. *The World Tables*, published by the World Bank in 1980 and 1983, and *Size Distribution of Income*, compiled by Shail Jain and published by the World Bank in 1975, together provide a complete set of income-distribution, export, and savings data for 14 advanced countries and 42 developing countries (see App., table A1).⁴ In order to investigate the effects of opening to trade and of initial conditions of income distribution, as well as the effects of the shift in

⁴See Shail Jain, *Size Distribution of Income: A Compilation of Data* (Washington, D. C.: World Bank, 1975); World Bank, *World Tables*, 2d ed. (Baltimore: Johns Hopkins University Press, 1980), and *World Tables*, 3d ed. (Baltimore: Johns Hopkins University Press, 1983). The per capita GDP data were obtained from the United Nations, *Yearbook of National Accounts Statistics*, 1972 and 1982 (New York).

per-capita GDP on aggregate savings propensity, the following semi-logarithmic specification is adopted:

$$S = \alpha + \beta \ln X + \gamma \ln G + \delta \ln Y + u,$$

TABLE 1
TRADE, GROWTH, DISTRIBUTION, AND SAVINGS PROPENSITY

	R ²
42 developing countries:	
S = 1.08 + 1.11 lnX (12.77)** (6.66)**	.53
S = .84 + 1.06 lnX - .34 lnG (3.27)** (6.12)** (.98)	.54
S = .93 + 1.10 lnX - .35 lnG - .06 lnY (2.57) (5.43)** (1.00) (.35)	.54
14 advanced countries:	
S = .83 + .21 lnX (11.47)** (.93)	.07
S = .73 + .21 lnX - .09 lnG (4.26)** (.92) (.60)	.10
S = .79 + .20 lnX - .09 lnG - .02 lnY (2.58) (.81) (.53) (.21)	.10

NOTE.—Figures in parentheses represent t-values.

** Denotes statistical significance at the 1% level.

where S represents the shift in average gross savings propensity: that is, $S = S(1977-81)/S(1960-65)$, where S (1977-81) represents the average of the savings propensities of a country for 1977 and for 1981 and S(1960-65) the average of 1960 and 1965 figures; X represents the shift in export/GDP ratio of each country (i.e., $X = X[1977-81]/X[1960-65]$); G, the Gini coefficient of each country at around 1960; Y, the shift in per capita GDP (i.e., $Y = Y[1979-81]/Y[1960-63]$); and u , the disturbance term.⁵ Table 1 presents the regression results obtained through the ordinary least squares estimation method.

⁵X(1977-81) represents the average of the export/GDP ratios of a country for 1977 and for 1981, X(1960-65) the average of 1960 and 1965 figures. Y(1979-81) represents the average of per capita GDPs of a country for 1979 and for 1981, and Y(1960-63) the average of 1960 and 1963 figures.

The regression results as presented in table 1 are consistent with my primary hypothesis. In developing countries, opening to trade has a statistically significant positive effect on the aggregate savings rate. Though statistically much less significant, the figures also suggest that unequal distribution of income at the outset exerts a negative effect on the aggregate savings rate. The per capita GDP variable is not significant at all. The regression results from 14 advanced countries, however, have the correct signs for X and G but quite insignificant coefficients, as expected in view of the nature of the basic hypotheses. Since at least significant intercepts for these advanced countries were obtained, one can look at the equation with the insignificant variables dropped, which, in this case, would amount to calculating the mean value of S . The data yield an average of 0.9 for the 14 advanced countries and a range that suggests that the hypothesis that the average value of S is 1.0 cannot be rejected. This implies that the aggregate savings propensities of the advanced countries have been quite stable over the period 1960-81.

According to the *World Tables*, the average export/GDP ratio of the 124 developing countries as a whole (excluding the seven high-income oil exporters) increased by about 64% (from 0.153 to 0.25) and the average savings/GDP ratio of this group increased by about 32% (from 0.16 to 0.2111) during 1960-81. In the meantime, the average export/GDP ratio of 21 advanced countries as a whole also increased, by some 71% (from 0.116 to 0.198), yet the average savings/GDP ratio of this group fell by 5% (from 0.232 to 0.22). Of course, simply looking at how trading economies evolve over time is not necessarily a good indicator of the effects of trade. Trade has greatly increased over the decades examined in this article, and this may indeed explain a large part of the step from autarky to free trade. The argument would be more compelling if evidence were offered that the growth of trade over this period was exogenous—for example, resulting from the removal of trade restrictions—and that the growth of trade was not an endogenous phenomenon associated with, say, income growth. One objective piece of evidence of exogeneity that can be provided is the oil crisis of the 1970s. The drastic jump in the price of crude oil forced most countries, including the United States, to greatly expand their export earnings to finance costly crude oil imports. Additional evidence of exogeneity can be found in the deliberate export-oriented growth strategy (which naturally was also associated with expanding imports) pursued by the so-called newly industrializing countries (NICs) in the 1960s and 1970s.⁶ Apparently the

⁶In Korea, the export/GDP ratio increased from about 0.05 in 1960-64 to about 0.31

dramatic rise in the export/GDP ratio in these NICs was largely a policy-induced phenomenon.

IV. CONCLUDING REMARKS

Over a decade ago, many economists including Chenery and Eckstein, Maizels, and Lee, had already shown a positive correlation between exports (or export/GDP ratio) and savings (or savings propensity) in developing countries.⁷ They attributed such findings to the dependence of investment on export earnings for financing capital goods imports and also to the higher marginal propensity to save found in the export sector of developing countries. My results may also be interpreted as showing the effects hypothesized by those authors.⁸ Indeed, an alternative hypothesis, consistent with the association of the change in export/GDP ratios and the change in savings propensities, is that the causation is actually the reverse of the relationship hypothesized in this paper; that is, an exogenous increase in saving frees more resources for export.

The focus of this article, however, is the fairly general property of neoclassical intertemporal trade models, which is that the shift from autarky to trade induces low-saving countries to shift consumption even more toward the present. The object of this article is to cast doubt on this story on empirical grounds. Without addressing the problem of interpreting the

in 1976-80. In the meantime, the average propensity to save increased from 0.05 to 0.26. In Taiwan, the average propensity to save increased from 0.15 in 1960-64 to 0.34 in 1976-80, while the export/GDP ratio rose from about 0.15 to 0.51. In Hong Kong, the savings propensity rose from 0.02 in 1960 to about 0.30 in 1976-80, while the domestic-commodity-export/GDP ratio rose from about 0.49 in 1960-64 to 0.61 in 1976-80. In Singapore, the savings propensity rose from about 0.02 in 1960-64 to about 0.34 in 1976-80, while the domestic-commodity-export/GDP ratio increased from 0.10 in 1960-64 to 0.83 in 1976-80.

⁷See H. B. Chenery and P. Eckstein, "Development Alternatives for Latin America," *Journal of Political Economy* 78 (July/August 1970): 966-1006; Alfred Maizels, *Exports and Economic Growth in Developing Countries* (Cambridge, Mass.: Harvard University Press, 1968); and Joong-Koon Lee, "Exports and the Propensity to Save in LDC's," *Economic Journal* 81 (June 1971): 341-521.

⁸Because the analysis completely ignores the savings-enhancing effect of export (cum import) expansion in those developing countries that are likely to show a significant savings response, my findings may also be interpreted as support for the now familiar argument that the two-gap analysis is liable to overstate the ex ante savings gap for such countries.

correct causality, the results clearly suggest that the increasing discrepancy between the developing and advanced countries that is suggested by existing dynamic trade models is not compatible with real-world empirical observation. I conclude that the reason this hypothesis does not hold is that there is a basic flaw in the dynamic trade models: they assume that rates of time preference are invariant with respect to the degree of trade.

The gap between the existing dynamic trade theory and the reality is real and serious. The traditional approach to trade problems is to exhaust all other possibilities to “explain” the data before resorting to changes in tastes. Apparently the dynamic trade model does not prove amenable to this traditional approach. Dynamic trade theory should therefore adapt to incorporate and explain the positive real-world correlation between exposure to international trade and savings rates.

ADDENDUM

In the semi-logarithmic specification of $S = \alpha + \ln X + \ln G + u$, if we let S represent the shift in average gross savings propensity between 1960 and 1981; i.e., $S = S(1981)/S(1960)$, X the shift in export/GNP ratio during the same interval, i.e., $X(1981)/X(1960)$, and G the Gini coefficient of each country at around 1960, we obtain the following regression results:

$$S = -0.30 + 1.38\ln X - 2.0\ln G$$

(0.63) (5.72)* (3.19)* $R^2 = 0.59$

where * denotes statistical significance at the 1% level. The results are more consistent with our basic hypothesis: in developing countries, the opening up to trade has a statistically significant positive effect on the aggregate savings rate *while the unequal distribution of income at the starting point exerts a statistically significant negative effect on the aggregate savings rate.*