An Economic Justification of Protectionism

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AN ECONOMIC JUSTIFICATION OF PROTECTIONISM*

By EVERETT E. HAGEN

I. INTRODUCTION

Manoilesco, Viner, and Haberler

In a 1932 review of Manoilesco's *Theory of Protection and International Trade*,[1] Professor Viner noted that protection of manufactured products would increase real income if a country had "comparative labor advantage" in them but monopoly held wages so high in manufacturing that imports could undersell them.[2] He added that free trade, which would force the monopolists to reduce their wages and cause the comparative advantage of manufacturing to be revealed in market prices, would accomplish the same effect.

Eighteen years later Viner returned to the subject in one of a series of lectures at the Brazilian Institute of Economics.[3] This time he suggested, as appropriate remedies for the wage or price aberration, increasing the mobility of labor in agriculture by providing information and training, and breaking the monopolies, if any, by which

* The thesis presented here was originally presented in a brief note. Discussion of that thesis with a number of persons indicated the desirability of stating the proofs of several steps initially treated as axiomatic or self-evident. These persons include Werner Baer, Francis M. Bator, Richard S. Eckaus, Gottfried Haberler, and Stephen H. Hymer. I am especially grateful to Mr. Hymer for calling my attention to an error in my initial geometry, to Professor Haberler for helpful comments on a draft of the present manuscript, and to Albert O. Hirschman for suggesting elaboration of an ambiguous point. Of course, none of these persons is responsible for errors which may remain.

1. Mihail Manoilesco, *The Theory of Protection and International Trade* (London, 1931). A French edition had appeared in 1929.

2. In *The Journal of Political Economy*, XL (Feb. 1932), reprinted in *International Economics: Studies by Jacob Viner* (Glencoe, Ill., The Free Press, 1951), the argument stated by Viner is not Manoilesco's. Though Manoilesco did not realize it, his basic (and erroneous) equation (p. 103 of his book) reduces to the statement that a country benefits by exchanging agricultural for manufactured products only if its agriculture is more efficient, in some absolute sense, than its manufacturing.

3. Published under the title, *International Trade and Economic Development* (Glencoe, Ill.: The Free Press, 1952).

manufacturing exploits agriculture. Simultaneously, the June 1950 issue of the *Economic Journal* appeared carrying a notable article in which Haberler dealt with the general topic, and three months later Haberler discussed it again in a paper presented to a Round Table held by the International Economics Association.[4]

In his *Economic Journal* article, extending the production-possibility-curve geometry made familiar in the international trade context by the Stolper-Samuelson analysis,[5] he noted that the test of comparative advantage is not relative money costs in the production of different commodities within a country, compared with relative prices of the commodities if imported, but rather the marginal rate of substitution (marginal transformation ratio) within the country, i.e., the amount of one that can be produced by sacrificing output of the other, compared with the relative price if imported. He assumed intuitively that if wages for equivalent labor (or the unit costs of other inputs) are higher in manufacturing than in agriculture, the exchange ratio (with agricultural products in the numerator) will be greater than the marginal transformation ratio. (The exchange ratio is, of course, the reciprocal of the price ratio.) In this case, welfare in the economy may be increased by producing manufactured products at home, even though they are more expensive relative to agricultural products at home than abroad and manufacturing can survive at home only if protected. He demonstrated that in three cases this may (but will not necessarily) be true. The cases are those of complete or partial factor immobility combined with complete or partial factor price rigidity, external economies, and infant industry. In each case, higher aggregate real income is purchased at the cost of some unemployment.

The argument of this paper

It is the purpose of this paper to generalize and extend the Haberler-Viner argument, and to apply it to the case of economic growth. The argument advanced takes as a point of departure the empirically observed fact that in an economy in which per capita income is rising secularly, the output of manufacturing and mining grows secularly relative to that of agriculture, and the inputs required

4. Gottfried Haberler, "Some Problems in the Pure Theory of International Trade," *Economic Journal*, LX (June 1950), 223–40; and "Real Cost, Money Cost, and Comparative Advantage," *International Social Science Bulletin*, Spring 1951, pp. 54–58.

5. Wolfgang F. Stolper and Paul A. Samuelson, "Protection and Real Wages," *Review of Economic Studies*, IX (Nov. 1941), reprinted in *Readings in the Theory of International Trade* (American Economic Association, 1949).

in manufacturing and mining likewise grow secularly relative to those in agriculture. The same statements may be made of all non-agriculture; for simplicity, a two-sector economy consisting of agriculture and manufacturing will be considered, and a comment about the more complex case will be added at the end of the discussion.

As a result of this secular trend, except in the unreal case of perfect geographic and occupational mobility of labor, wages in manufacturing must be higher than in agriculture. This is true even in the long run, and even assuming complete absence of monopoly in all markets. If they are not higher, manufacturing will not obtain the continuing stream of added labor that it needs. This wage disparity is consistent with full employment. As a result of the wage disparity, manufacturing industry having a real comparative advantage will be undersold by imports when the foreign exchanges are in equilibrium. Protection which permits such industry to exist will increase real income in the economy. However, a subsidy per unit of labor equal to the wage differential will increase real income further, and if combined with free trade will permit attaining an *optimum optimorum*.

The proof of these propositions is spelled out in Section III geometrically and where the geometric proof is not obvious algebraically. In Section IV some morals are drawn. Meanwhile, however, empirical background which causes the theory to be of interest is discussed in Section II.

II. The Empirical Evidence

Economic growth and wage differentials

Economic growth — continuing rise in per capita income over the long run — is characteristic of the entire Western world and of some Latin American countries, and may now be beginning in China, India, and elsewhere. It is hardly necessary to introduce empirical evidence to demonstrate that in a growing economy wages for equivalent labor are higher in manufacturing than in agriculture, for the logic of the situation is clear. As is well known, with continuing rise in per capita income comes continuing rise in the share of output contributed by industry (manufacturing, mining, construction, etc.) and continuing fall in the share contributed by agriculture. While labor productivity may rise faster in industry than in agriculture, the differential increase in productivity has historically in every country been less than the differential increase in output, and the fraction of the labor force employed in industry continues to rise and that in

agriculture to fall, in the short, intermediate, and long run (except during depressions).

Coupled with this labor force shift is a differentially greater birth rate in rural than in urban areas, by virtue of which the number of laborers who must be pushed out of farm areas and pulled into industry, decade after decade, is even greater than is indicated by the ever-continuing shift in their fractions of total employment.

In this process there exists a force which throughout the short, intermediate, and long run tends to draw the system away from static equilibrium. Only if there were perfect, i.e., instantaneous, geographic and occupational mobility of labor, could returns to labor be equal in agriculture and industry in such a system. Labor is not perfectly mobile. To shift to an urban job new skills must be learned, friends and acquaintances left, and an old way of life abandoned for a new one which, even though it may be equally or more attractive when adapted to, is initially unknown and perhaps forbidding. A wage differential is required to overcome these frictions. And even though labor moves in response to the wage differential, the labor market remains out of equilibrium and the differential must persist. For the industrial demand for labor continues to grow, and new workers must continually be recruited from rural areas. As the supply curve of industrial labor moves to restore the equilibrium wage, the demand curve moves so as to prevent its restoration. Improvement in the knowledge and training of rural workers would lessen the wage differential, but in view of the other impediments to leaving one's home and community to go to a community with different values and customs, such improvement could not eliminate it.[6]

Though the logic of the wage situation seems conclusive, it may be well to present relevant empirical evidence. There is empirical justification for the assumption that real wage rates for equivalent quality labor, even in the long run, are higher in industry than in agriculture.

The data

That money incomes per person engaged are very generally markedly higher in manufacturing, or in "industry," including mining and construction, than in agriculture is abundantly clear. Where data are available in presently underdeveloped countries, they con-

6. Removing monopoly elements that may be present in the determination of industrial wages might lessen but would not eliminate the agricultural-industrial wage differential. Part of the differential often attributed to monopoly may in fact be due to the force sketched in the text above.

Presumably the differential in real wages will depend not only on the degree

firm the fact.[7] On the basis of national income data for various countries and estimates (some not published) made in the course of research on low income countries, many workers experienced in research in economic development assume as a rule of thumb that income per person engaged in all nonagricultural pursuits combined will in a low income country typically be between 2 and 2.5 times that per person engaged in agriculture including in the latter income in kind, and that income per person engaged in industry, including small scale or cottage industry, will typically be slightly below that in all nonagriculture — say 80 to 90 per cent of the latter.[8] There are undoubtedly a number of exceptions to this rule of thumb, but it gives a rough idea of the general picture.

Firmer quantitative evidence is presented by Simon Kuznets, in his estimates of the sectorial distribution of income over a long period in fourteen countries,[9] and in recent years in forty-five countries.[1]

of imperfection of knowledge and training, but also on the differential rate of expansion of industry and agriculture. The curve of supply of labor to industry is a rising function of the wage differential, and the curve of demand for labor in industry a falling function of the wage differential. If the rate of expansion of industry rises, the demand curve shifts upward, causing the point of equilibrium wage differential to move upward (greater labor flow) and to the right (higher wage differential) along the supply curve.

7. For example, V. K. R. V. Rao, *The National Income of British India, 1931–32* (London: Macmillan & Co. Ltd., 1940), p. 253, estimates that in 1931–32 income per occupied person was Rs. 124–133 in agriculture, and Rs. 192–195 in industry. Official estimates of the distribution of the Indian labor force in 1951 and of Indian national income by industrial origin for April 1950–March 1951 indicate income per person engaged in industry (including mining and small-scale enterprise) 2.33 times that in agriculture. Since the labor force estimates for industry include all construction whereas the national income estimates may exclude construction activity in commerce, transport, communication and government, the calculation may understate the ratio. The labor force data are from *Papers Relating to the Formulation of the Second Five-Year Plan* (Delhi: Government of India, Planning Commission), p. 237, the national income data from *Estimates of National Income, 1948–49 to 1951–52*, Government of India, Central Statistical Organization, Sept. 1954.

8. I make this statement on the basis of discussion with colleagues at the Center for International Studies and with a few research economists elsewhere. Such bases for estimate as are presented in various volumes written by missions of the International Bank for Reconstruction and Development to underdeveloped countries are consistent with this generalization. The sources concerning India cited in the previous note indicate income per person engaged in all nonagriculture 2.57 times that in agriculture and income per person engaged in industry .90 times that in all nonagriculture.

9. Kuznets presents data for fifteen, but for one of these he has no data for manufacturing separately.

1. For both the recent and long-term data, see his *Quantitative Aspects of the Economic Growth of Nations;* II. *Industrial Distribution of National Product and Labor Force*, being a *Supplement* to *Economic Development and Cultural Change*, V, No. 4 (July 1957), Appendix Tables 5 and 6.

To conserve space, the data for recent years are not summarized here, except to state that they show a predominance of markedly higher income in manufacturing than in agriculture throughout the world. The fourteen countries for which data extending farther back in time are available are France, Germany, the Netherlands, Norway, Sweden, the United Kingdom, Italy, Hungary, Japan, Canada, the United States, the Union of South Africa, Australia and New Zealand.[2] In only two of these countries, Australia and New Zealand, where industry did not grow out of agriculture, the two being developed more or less simultaneously by immigrants, do incomes in agriculture show a persistent tendency to be higher than in manufacturing. (This was reversed in Australia during the depression.)[3] For eleven of the countries, data are available back to 1900 or earlier. In every one of these eleven except the United States and New Zealand, the ratio of earnings in manufacturing to those in agriculture rose from the nineteenth century to the twentieth. Table I presents simple averages of the earlier and later ratios. The median of the nineteenth century averages is 1.42, of the twentieth century averages, 1.89

TABLE I

TRENDS IN RATIO OF MONEY INCOME PER PERSON ENGAGED IN MANUFACTURING TO THAT PER PERSON ENGAGED IN AGRICULTURE

Country	Early Period		Recent Period	
	Period	Ratio	Period	Ratio
France	1815–1898	1.50	1906–1949	1.89
Germany	1882–1899	1.42	1905–1951	2.16
Sweden	1869–1901	1.81	1909–1951	2.52
United Kingdom	1895	1.08	1911–1954	1.46
Italy	1862–1901	.94	1906–1954	1.63
Hungary	1899–1901	1.66	1911–1943	2.12
Japan	1878–1902	2.29	1903–1942	2.41
Canada	1880–1900	1.23	1910–1953	2.03
United States	1869–1899	2.17	1904–1954	1.67
Australia	1891–1901	.71	1911–1939	1.04
New Zealand	1901	.65	1926–1936	.53

Source: Computed from Kuznets, *loc. cit.*

These figures, of course, reflect profits and other nonwage earnings. The superiority in manufacturing is so great as to make it virtually certain that wage earnings per worker in manufacturing are also generally higher than in agriculture. Even this deduction does

2. In general, the computations for agriculture include unpaid family workers in the agricultural labor force.

3. In Britain, income per person engaged is higher in agriculture after World War II.

not, however, answer the question pertinent here, namely whether wages for jobs of comparable skill — or, for skills quickly learned by workers of a given level of ability and training — are higher than the wages of such workers in agriculture.

With respect to this comparison in underdeveloped countries the opinion of persons who have relevant knowledge of those countries is, to my knowledge, unanimous. Industrial wages in such countries, paid to workers "fresh from the country," are considerably above agricultural incomes.[4]

TABLE II

WEEKLY WAGES, SELECTED COUNTRIES, WORKERS IN AGRICULTURE, UNSKILLED URBAN WORKERS, AND SKILLED URBAN WORKERS

1 Country	2 Year	3 Unit	4 Agriculture (Male only)	5 Unskilled Urban	6 Skilled Urban	7 5 ÷ 4
Canada	1953	Dollars	37.80	52.86[1]	66.49[1]	1.40
Chile	1952	Pesos	633.60[2]	896.52	1220.28	1.41
Denmark	1953	Kroner	132.60[3]	189.12[4]	216.96[4]	1.43
Finland	1952	Markkaa	3966.00[5]	4931.00[1,5]	5562.00[1]	1.24
Ireland	1953	Pence	1626.00	1542.00	1939.00	0.95
Japan	1950	Yen	1062.00[6]	2338.00[1]	3851.00[1]	2.20
Portugal	1953	Escudos	121.92	172.80	275.04	1.42
Sweden	1952	Kroner	120.98	190.48[7]	226.58[7]	1.57
U. S.	1953	Dollars	34.87	70.52	93.93	2.02

Source: International Labour Office, *Yearbook of Labour Statistics*, 1954: For agriculture' Table 19; for urban workers, Table 20. Data for agriculture are for the "complete wage" (worker remunerated wholly in cash). Generally, data in the *Yearbook* for agriculture were for daily wages; these figures were multiplied by 6 to obtain the weekly wage figures shown. For Finland and the United States, monthly wage figures were divided by 4.33; for Sweden, annual figures were divided by 52.

The figures for unskilled labor for each country are a simple average of wages of unskilled workers in those among the following industries for which data were given for the country: textiles, printing and publishing, chemicals, iron and steel, machinery, construction, electric light and power. The figures for skilled workers for each country are a simple average of wages of skilled workers in those among the following occupations for which data were given for the country: loom fixers, cabinet makers, iron and steel melters, machinery assemblers, garage mechanics, carpenters, truck drivers. Except as shown, the figures are for "average wages." For most countries, data were given for several cities. These were averaged. The data for urban workers were for wages per hour. Weekly wages were computed by multiplying by the average number of hours worked per week in the country. Except as indicated, the number of hours used was that shown in Table 15, "Normal Hours of Work in 41 Occupations, October, 1953."

1. Computed by using "actual hours worked per week" in manufacturing (Table 13-A).
2. "Cash including value of board and lodging."
3. "Average earnings."
4. Computed by assuming 48 hours per week.
5. "Minimum rates."
6. Male and female.
7. "Earnings."

The best direct quantitative evidence available consists of wage comparisons derived from the International Labour Office *Yearbook of Labour Statistics*. Table II presents a comparison of wages of

4. W. A. Lewis suggests that wages in the "capitalist sector" are "usually" equal to income in the "subsistence sector" plus "30 per cent or more." See his "Economic Development with Unlimited Supplies of Labour," *Manchester School*, May 1954, p. 150. His observation is presumably based only on casual empiricism, but it accords in general with the empirical observations of many other observers.

agricultural workers and unskilled and skilled urban workers for all countries for which data are available in the 1954 *Yearbook*.

Except for Ireland (where Kuznets' data for recent years show higher income per person engaged in agriculture than in manufacturing), wages of unskilled urban workers are indicated as markedly higher than wages of males in agriculture. Wages for the fairly high-skilled occupations shown are, of course, much higher still. The agriculture-urban differential exists in underdeveloped and economically advanced countries alike; the available evidence suggests that it does not disappear, or even diminish, in the course of development. It is a persistent long-run phenomenon. While the evidence is not absolutely conclusive, the presumption is very strong.

Are the differences real?

One possible explanation of this wage differential of course is that it is not real. Farm wage statistics are difficult of interpretation; the statistics cited may be unrepresentative. Or, the quality of unskilled labor in cities may be higher than that in the country. Or, the excess money income paid to factory workers may be just enough to compensate them for extra money expenses and the lesser conveniences of city life, and for the lesser satisfactions, or greater dissatisfactions, of factory work. Because of the problem of changed tastes after farm workers have shifted to cities, comparison of costs and satisfactions in the two situations is difficult.

But fondness for the good old days and romantic notions of pastoral life should not make us forget that the city has not only inconveniences, but also great attractions for almost any taste, and that the inconveniences (chiefly of transportation) are at their extreme, not at their mode, in the largest cities, which usually come to our minds. It is clear that persons who have experienced both rural and urban life tend to prefer the urban. Few persons who move from farm to city move back; and few persons ever move from city to farm. It is reasonable, therefore, on purely empirical as well as on logical grounds to conclude that the factory-farm difference in money income includes a significant difference in real income. It is plausible to assume a persisting difference in factor payments to identical inputs, or to inputs identical except for negligible training cost.

A model with a wage differential between agriculture and industry, caused only by the dynamics of the system and the drag of imperfect labor mobility, is therefore of great empirical interest.

III. The Analytical Model

The one-factor case

Conclusions of rather wide importance are drawn here from the assumption of a wage differential. Since they are of a nature that is repugnant to the social welfare "instincts" of many and perhaps most economists, let us consider both a one-factor and two- (many-) factor case, and spell out the proofs with some care.

Figure I illustrates the one-factor case. Let labor be the only input, inelastic in supply. Let A represent the output ("apples") of agriculture, and M the output ("suits") of manufacturing. Let

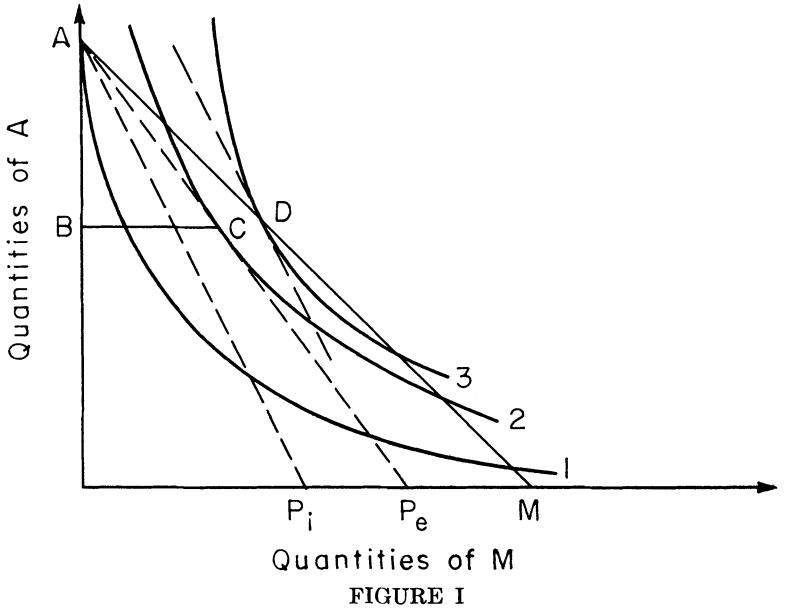

FIGURE I

Free Trade and Protectionism in the One-Factor Case

AM be the marginal transformation curve relative to apples and suits. Since there is only one factor, it is a straight line.[5] But let wages in manufacturing be twice as high as in agriculture. Since the cost of labor is the only cost of production, the domestic price ratio $\frac{P_M}{P_A}$ will be twice as great, and the exchange ratio, the number of units of M exchanged for one of A, one-half as great, as the trans-

5. It will be concave upward at A, if there is a minimum size plant for the production of suits below which size production is inefficient. Similarly at M for the production of apples. As is usual in drawing transformation curves, I ignore this possibility both here and in Figures II and III.

formation ratio. Let AP_i (or the dashed line parallel to it through D) be this domestic exchange ratio. And let the external exchange ratio, AP_e, be between AP_i and AM in slope. The numbered curves concave upward are community indifference curves. With due recognition of the inaccuracy of assuming one set of such curves, because a change in the composition of output changes the distribution of income and hence affects the shape of the curves, I use a single set for convenience in exposition. Since it is reasonable to assume continuity in shifts in the curves, no plausible assumption about shifts in them associated with changes in the composition of output will alter the conclusions reached here.

If free international trade is permitted, no one will buy suits for apples at home, because imported suits are cheaper in terms of apples. The economy will specialize in the production of apples; i.e., production will be at the point A. Since consumers are willing to exchange apples for suits at a ratio equal to the slope of indifference curve 1, they will gladly exchange domestically produced apples for imported suits at the exchange ratio AP_e. AB of apples will be exchanged for BC of suits, bringing the economy to indifference curve 2, the highest curve that can be reached by this trading.

Suppose now that international trade is prevented, by prohibitive tariff or other device. Indifference curve 1 indicates that some consumers are willing to trade apples for suits on even worse terms than the domestic exchange ratio AP_i. They will therefore offer to do so at that ratio, and producers will turn to the production of suits. As they do so, they will however move, not along the exchange ratio line AP_i, but along the transformation curve AM. They will move along that curve as far as the demand for suits at a price equal to or above the exchange ratio AP_i persists, i.e., until that price ratio is tangent to a community indifference curve, as at point D. This is the equilibrium point, for consumers would exchange more apples for suits only at an exchange ratio more favorable to suits; and will exchange suits for apples only at a rate more favorable to apples. At point D, on indifference curve 3, welfare is greater than could be attained by international trade.

The two-factor case

Before drawing implications from this conclusion, let us turn to the two-factor case. In Figure II, ARM is the "efficiency locus," i.e., the transformation curve between A and M assuming perfect competition in all markets and hence identical price in both industries for the units of any input. If now we assume that wages are higher

in manufacturing than in agriculture, then "too little" labor will be used in manufacturing because of its high price, and, capital being relatively cheap, "too much" capital will be used. The opposite is true in agriculture. Production will be less efficient than before.

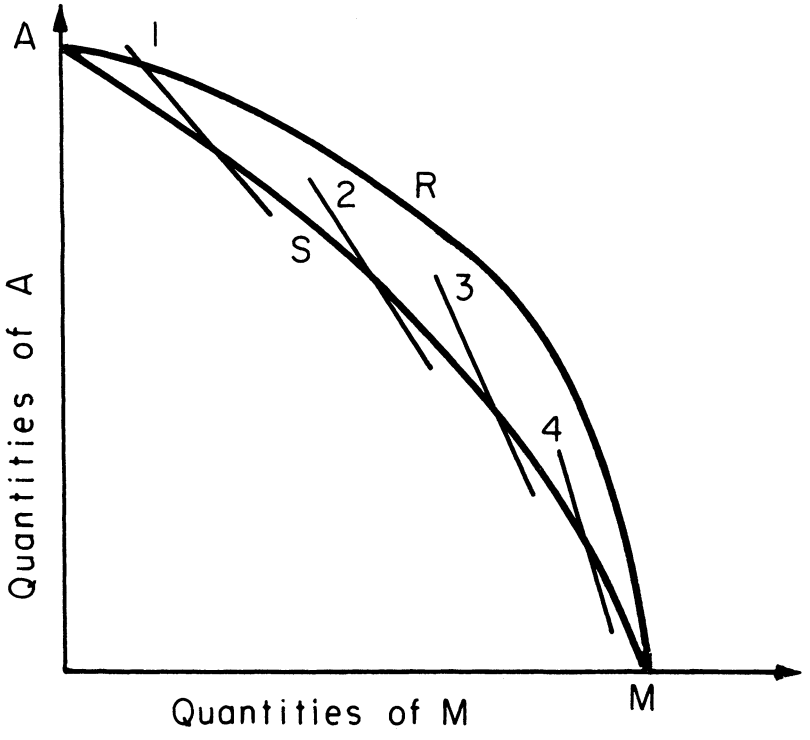

FIGURE II

TRANSFORMATION CURVE AND EXCHANGE RATIOS WITH A WAGE DIFFERENTIAL

The transformation curve which embodies this wage constraint will lie inside the curve *ARM*.[6] In Figure II it is represented by

6. This is intuitively obvious. It can be proved rigorously by use of the Edgeworth-Bowley box diagram from which the locus of an economy's transformation curve is derived. (See Stolper and Samuelson, *op. cit.*) In this diagram, each production possibility curve of *A* is tangent to a production possibility curve of *M*. The efficiency locus is the locus of all of these points of tangency. With the wage constraint, however, the transformation curve is the locus of points of intersection of pairs of production possibility curves at each of which their slopes differ by a definite amount determined by the wage differential. At any given point on this locus, for a given output of either product, less is produced of the other than on the efficiency locus; i.e., any given production-possibility curve of either product intersects a lower curve of the other than the curve to which it is tangent.

ASM. That the two curves coincide at the extremities results from the assumption of full employment implicit in the Edgeworth-Bowley box from which they are derived. This is appropriate in the present model. It should be noted that there is no inflexibility of wages, but only a differential. If excess labor threatens to appear (in agriculture), its competition will cause wages to fall in agriculture and more labor to be used there. At the same time, the increased wage differential between agriculture and manufacturing will increase the flow of labor from agricultural areas to manufacturing, bringing wages down there also and causing labor absorption there. Thus wages in both industries are flexible relative to capital costs, but as they move the interindustry wage differential is maintained by the dynamics of the system.[7]

Lines 1, 2, 3, and 4 are exchange ratios between A and M determined by relative marginal costs of production. Under conditions of perfect competition, the exchange ratios are tangent to the transformation curve. That is, the exchange ratio is equal to the marginal rate of substitution between A and M (marginal transformation ratio). But if wages of equivalent labor are higher in industry than in agriculture, the reciprocal of the marginal money cost ratio is no longer equal to the marginal transformation ratio, and the exchange ratio line will cut the transformation curve as shown, the exchange ratio $\frac{1}{P_A/P_M}$ having a steeper negative slope at any point than $\frac{dA}{dM}$, the slope of the curve.[8]

7. If unemployment should appear in manufacturing, wages will fall there, causing labor absorption; and at the same time the shrinking of the interindustry wage differential will lessen the flow of labor from agriculture, thus causing a fall in wages and absorption of labor there (and maintaining the wage differential).

8. Since the average cost per unit of inputs in producing M is higher than of equivalent inputs in A, intuitively it seems likely that the price ratio $\frac{P_A}{P_M}$ would be lower than the marginal transformation ratio $\frac{dA}{dM}$, and hence that the number of units of A which will exchange per unit of M is greater than $\frac{dA}{dM}$. The proof is as follows:

Let $\frac{X_A}{X_M}$ be the exchange ratio between A and M, that is, the number of units of A that will exchange for one unit of M. $\frac{X_A}{X_M} = \frac{1}{P_A/P_M}$.

Let W = the wage rate, r = the rate of return on capital, and subscripts indicate the industry or output referred to.

To prove that $\frac{X_A}{X_M} \gtrless \frac{dA}{dM}$

We start with the conditions:

$A = A(L,K) \qquad M = M(L,K)$

$r_M = r_A = r \qquad W_M = \alpha W_A$, where $\alpha > 1$.

$$dA = \frac{\partial A}{\partial L_A} dL_A + \frac{\partial A}{\partial K_A} dK_A \tag{1}$$

$$dM = \frac{\partial M}{\partial L_M} dL_M + \frac{\partial M}{\partial K_M} dK_M \tag{2}$$

$$P_A = \frac{\partial L_A}{\partial A} W_A = \frac{\partial K_A}{\partial A} r \tag{3}$$

$$P_M = \frac{\partial L_M}{\partial M} \alpha W_A = \frac{\partial K_M}{\partial M} r \tag{4}$$

$$\frac{dA}{dM} = \frac{\frac{\partial A}{\partial L_A} dL_A + \frac{\partial A}{\partial K_A} dK_A}{\frac{\partial M}{\partial L_M} dL_M + \frac{\partial M}{\partial K_M} dK_M} \tag{5}$$

$$\frac{P_A}{P_M} = \frac{\frac{\partial L_A}{\partial A}}{\alpha \frac{\partial L_M}{\partial M}} = \frac{\frac{\partial K_A}{\partial A}}{\frac{\partial K_M}{\partial M}} \tag{6a}$$

$$\frac{P_M}{P_A} = \frac{\frac{\partial A}{\partial L_A}}{\frac{1}{\alpha} \cdot \frac{\partial M}{\partial L_M}} = \frac{\frac{\partial A}{\partial K_A}}{\frac{\partial M}{\partial K_M}} \tag{6b}$$

Or, multiplying numerator and denominator by the same amount

$$\frac{P_M}{P_A} = \frac{\frac{\partial A}{\partial L_A} dL_A}{\frac{1}{\alpha} \cdot \frac{\partial M}{\partial L_M} dL_M} = \frac{\frac{\partial A}{\partial K_A} dK_A}{\frac{\partial M}{\partial K_r} dK_M} = \frac{\frac{\partial A}{\partial L_A} dL_A + \frac{\partial A}{\partial K_A} dK_A}{\frac{1}{\alpha} \cdot \frac{\partial M}{\partial L_M} dL_M + \frac{\partial M}{\partial K_r} dk_M} \tag{6c}$$

Since $\frac{1}{\alpha} < 1$,

$$\frac{P_M}{P_A} > \frac{dA}{dM}$$

$$\therefore \frac{P_A}{P_M} < \frac{dA}{dM}, \text{ and } \frac{X_A}{X_M} > \frac{dA}{dM} \qquad Q.E.D.$$

That is, the number of units of A which will exchange for one unit of M is greater than the number of units of A whose production must be sacrificed to obtain production of one unit of M. Geometrically, the exchange ratio line 1 of Figure III is more steeply sloped (negatively) than the transformation curve $AP'M$, at any point on the curve.

Now turn to Figure III.[9] As before, the curves concave outward are community indifference curves, and those concave to the origin are the two transformation curves. Line 3 is the external exchange ratio. Lines 1 and 2 are domestic exchange ratios, line 1 being that one that is identical with the external ratio. The external exchange ratio is assumed given, i.e., not affected by shifts in production and trade within the country being analyzed. (Relaxing this assumption, i.e., assuming a curved external terms of trade line, would not affect

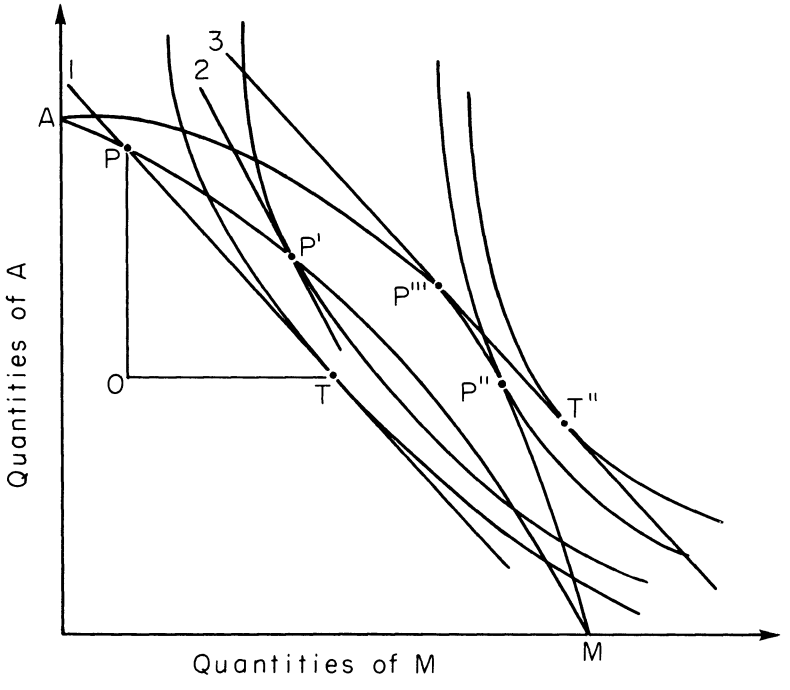

FIGURE III

FREE TRADE, PROTECTIONISM, AND SUBSIDY IN THE TWO-FACTOR CASE

the argument.) If there is free trade, the external exchange ratio will, of course, prevail in the country.

Production in the country will therefore settle at P, the point on $APP'M$ at which the external terms of trade line coincides with the internal exchange ratio (hence not at the point of tangency between the external exchange ratio and $APP'M$). For at any point

9. Though in his *Economic Journal* article, *loc. cit.*, Haberler has no curve such as $AP'M$, the geometry of Figure III is directly derived from the Haberler geometry.

to the left of P, the exchange ratio is flatter, i.e., a unit of M can be produced more cheaply relative to A, than the external terms of trade. Hence to maximize profits producers will increase production of M and decrease that of A. At any point to the right of P, the opposite will occur.

But though production will settle at P, consumption will not. For by exchange with the rest of the world at the prevailing terms of trade, shown by the slope of line 1, the economy can move to a higher indifference curve. Hence PC of A will be exchanged for CT of M, and the economy will reach T, the optimum point attainable under free trade in the given conditions.

Now consider the situation if a tariff or other protectionist measure prevents foreign trade. As the slope of the community indifference curve at P (not drawn) indicates, demand in the economy will bid up the relative price of M, and production will move along $APP'M$ to the point where the community indifference curve and the exchange ratio are tangent, namely P'.[1] But this is a point of higher real income than P. Protection of manufacturing from foreign trade will increase real income.

This, however, is not the end of the story. The economy is still inside the efficiency locus $AP'''P''M$. A subsidy per unit of M could move it farther along $APP'M$ toward M, but no measure which leaves the $\frac{W_M}{W_A}$ ratio unchanged can move it above or outside that curve.

It can, however, be moved to a point on $AP'''P''M$ by a different sort of measure. Assume that a subsidy per unit of labor in industry, equal to the difference in unit labor cost between agriculture and industry, is introduced. If so, the exchange ratio, $\frac{1}{P_M/P_A}$, will be equal to $\frac{dM}{dA}$ and to $\frac{\partial M/\partial L_M}{\partial A/\partial L_A}$ and $\frac{\partial M}{\partial K_M}\Big/\frac{\partial \mathrm{A}}{\partial K_A}$. The transformation curve will therefore move out to $AP'''P''M$, and output will be at some point on that curve. If the prohibitive tariff still prevails, output will settle at point P'', the point of tangency between $AP'''P''M$ and a community indifference curve[2] and therefore the optimum point attainable without trade. But if the tariff is removed,

1. The wage differential will be increased temporarily by the shift of production from P to P', which requires industry to recruit added workers. The exchange ratio may therefore be steeper than line 2. If so, the point of production will temporarily be to the left of P'.

2. Subject to a temporary effect parallel to that stated in the preceeding footnote.

the exchange ratio between A and M will move to identity with the external terms of trade (line 3, parallel to line 1), production will settle at point P''', and by trade the system will move to the still more advantageous point T'''.

(Similarly in Figure I a subsidy per unit of labor would move production to point M, and by trade the system would move to an indifference curve higher than curve 3.)

Extensions and qualifications

Perhaps it is worthwhile to note that the effects sketched will occur whether industry is more or less labor-intensive than agriculture, in any of the several possible meanings of the term *labor-intensive*. They occur not because of differences in factor proportions, but purely because of the factor cost differential.

And perhaps it should also be noted, in conclusion, that since an interindustry differential in the cost of any factor has the effect sketched here, and since interest rates are typically higher in agriculture than in industry, there is in life a counterweight to the effect sketched here.[3] However, interest costs are typically much smaller than labor costs, and specifically the differential in interest costs is typically a far smaller share of total costs than the differential in wage costs. Hence the empirical implications of the argument sketched here are not greatly reduced by the existence of the countervailing interest differential.

The meaning of the conclusion reached may be summarized as follows. Let us express all incomes and prices in terms of the value of one unit of agricultural product, in order to avoid price level problems. In these terms, protectionism raises real income, relative to free trade, if the increase under protection in the aggregate cost of the industrial product to its buyers is less than the increase in income to the factors which shift from agriculture to industry. (This is equivalent to stating that real income will be increased by protectionism if, assuming factor costs identical in agriculture and industry, the economy could produce the industrial product at a lower cost,

3. A counterweight in so far as the relative price of agricultural to industrial products is concerned. By moving the price ratio toward the value it would have under perfect competition, the interest differential tends to move the system toward the "proper" point on the production possibility curve. In another sense, the interest differential accentuates the effect of the wage differential. By making the factor proportion in each industry even farther from the optimum than it would be on account of the labor differential alone, the interest differential reduces even further the efficiency of production, i.e., causes the system to move to a production possibility curve even inferior to that one resulting from the wage differential alone.

expressed in units of agricultural product, than the import price.)

To conclude this analytical section, let me comment briefly on the case of a many-product system and on the question of world versus national welfare. For convenience, I shall consider the many-product system to be composed of three sectors, agriculture, industry, and services. The simplification will not distort the argument.

As per capita income rises, the service sector will grow relative to industry as well. However, the nontransportability of services from abroad provides domestic service industries with a "natural" equivalent of protection. In terms of Figure III, they are always at P' rather than at P. Hence, protection to manufacturing industry creates no distortion as between manufacturing and service industries, and increases welfare, just as in the two-product model.

The effect of subsidies to manufacturing alone is more ambiguous. For if wages in service industries for equivalent labor are as high as in manufacturing, then a subsidy to manufacturing per unit of labor equal to the agriculture-manufacturing wage disparity, will distort the allocation of inputs between manufacturing and services even while it removes the distortion in the allocation between agriculture and manufacturing.

Empirically, it may be questioned whether the agriculture-service wage disparity is as great as that between agriculture and manufacturing, since in general the difference between rural work and that in the expanding service industries is probably much less than that between agriculture and manufacturing, hence mobility is greater. It may also be suggested that in the early stages of development the relative rate of growth in the tertiary service industries is much less than later, hence the two-product case is more clearly applicable. These, however, are empirical questions, and can be settled, if at all, only by empirical research. The only safe simple analytical observation is that the *optimum optimorum* can be reached only by subsidizing all wage differentials resulting from growth.

Protectionism that increased national welfare might in a number of obvious cases diminish world welfare, for (assuming a wage differential in all countries) protection that increased real income in the country previously importing industrial products would in a typical case reduce real income in the country previously exporting industrial products. But free trade without an offset to the factor price disequilibrium is not the optimum situation from the world viewpoint, for it would leave the world on the inefficient transformation curve $APP'M$. Only a labor cost subsidy in every country, combined with free trade, would bring the world to the *optimum optimorum*.

IV. Empirical Corollary: Protectionism and Growth

The broad historical record suggests that protectionism may have accelerated economic development. A number of countries that have entered upon economic development since the original industrial revolution in England have done so behind a protectionist wall. This is true, for example, of the United States, Japan, the Soviet Union,[4] and the three Latin American countries — Brazil, Colombia, and Mexico — whose per capita income is now rising rapidly. In every one of these cases, the rise in per capita income was associated with a sharp increase in the share of total income originating in manufacturing industry. Income originating per person engaged in industry was clearly higher than in the economy as a whole, and in a simple statistical sense industry contributed greatly to the rise in per capita income. If the effect had been only an infant industry one, the rise in income would not have occurred until the industries became viable without tariff protection. In fact, however, it has occurred while they were unable to exist without the tariff.

Now it is possible that the apparent contribution of industry was not real. The higher per capita income in industry was of course accompanied by an increase in the price of industrial products above the imported price. It is possible that if industrial protection had not existed, the entrepreneurs who started industrial ventures would have devoted their energies to other ventures, and would have drawn capital and labor so effectively into other ventures that real per capita income would have increased even faster than it did under protectionism.

It is possible, but it does not seem probable. For the rise in both aggregate and per capita income in protectionist countries possessing no notable resource advantages — Japan and the three Latin American countries, for example — has been rapid, relative to rates of economic growth elsewhere. On the basis of the conventional analytical model, economists have usually assumed either that income rose in spite of protection, or that protection increased income only through an infant industry effect or because of external economies.[5]

4. In the sense that the Soviet Union was isolated from foreign commerce by autarkical state controls. The United States had high tariffs from 1818 to 1833, and from the Civil War on. France and Germany had a mixed tariff history during their periods of industrialization. France had high tariffs from 1808 to 1860, and Germany from 1844 to 1860 and after 1879. The period of low tariffs after 1860 was a period of rapid economic growth in both countries; but development must have begun and taken root before 1860, and Germany's growth after 1879 was also very rapid.

5. Note, however, the implication of Viner's argument. If he accepted the

The model presented here suggests however that the apparent historical phenomenon may be accepted at face value and without need to resort to these explanations.

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reality and necessity of a wage differential, his logic, if pursued, should lead to the conclusions presented here. And see W. Arthur Lewis, *op. cit.*, pp. 185–86. He advances an argument for protectionism, based on the assumption of the existence of "surplus" labor in agriculture whose real marginal cost for use in manufacturing is zero. This is a specific case of the general argument presented here.