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Center Discussion Paper No. 135

A THEORETICAL ANALYSIS OF PARTIAL ECONOMIC REFORM

by

Thomas Birnberg

and

Benjamin I. Cohen

December 1971

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A Theoretical Analysis of Partial Economic Reform*

Thomas Birnberg

Benjamin I. Cohen

December 1971

"If economists could manage to get themselves thought of as humble, competent people, on a level with dentists, that would be splendid!"

J. M. Keynes

I

In dealing with questions of macroeconomic policy, there is a fairly well developed theory whose central theorem can be summarized as saying that in a world of perfect certainty one needs at least as many instruments of policy as independent policy objectives if all objectives are to be achieved; when the number of macro objectives exceeds the number of instruments, one deals with the evaluation of trade-offs among objectives. In general equilibrium theory one objective--such as maximizing consumers' utility or achieving a Pareto optimum ("efficient") production mix--is postulated, and then one derives the necessary and sufficient conditions for an "efficient"

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situation. Much analytical work then concentrates on the impact of one market imperfection, such as a uniform tariff on imports, the existence of one monopolist among a group of competitive industries, or the existence of a single technological external economy or diseconomy in a society. For example, Johnson and Mieszkowski recently analyzed the impact of labor unions in the United States under the assumptions that all other factor markets are perfectly competitive and that final product markets are competitive.¹

The analysis changes when we are dealing with an economy that has more than one market imperfection. The General Theorem of the Second Best states "...in a situation in which there exist many constraints which prevent the fulfillment of the Paretian optimum conditions, the removal of any one constraint may affect welfare or efficiency either by raising it, by lowering it, or by leaving it unchanged."²

This theorem does not prevent some professional economists from offering what they claim is "objective" advice on partial economic reform. Such advice frequently appears to be of the following sort: (1) scan the real world until one observes something that diverges from one of the theoretically derived equilibrium conditions for an "efficient" economy, (2) recommend that this discrepancy be entirely eliminated by a set of new policies, and (3) occasionally note that the government should make "lump-sum" transfers

¹Harry G. Johnson and Peter Mieszkowski, "The Effects of Unionization on the Distribution of Income: A General Equilibrium Approach," Quarterly Journal of Economics, 84 (November 1970), pp. 539-561.

²R. G. Lipsey and Kelvin Lancaster, "The General Theory of Second Best," Review of Economic Studies, Vol. 24 (1956-57), p. 12.

of income to those hurt by the reform. Government officials tend to move more slowly than their advisors wish, perhaps because of a feeling that the future environment is highly uncertain, that present actions tend to have unforeseen consequences, that social experiments are frequently irreversible, and lump sum transfers of income will not be made.

The impact of market imperfections may also be mitigated by macroeconomic policy. For example, Brimmer finds that the inflationary period in the U.S. from 1965-1968 was accompanied by an increase from 55 percent to 63 percent in the ratio of median non-white family income to median white family income. The "distortion of inflation"--in Brimmer's words--apparently partially offset the impact of (past and present) racial discrimination in the labor market.¹

The proclivity of economists confidently to offer policy advice after studying only one part of a real economy may stem from an intuitive belief that in most cases reducing the number of imperfections in the economy is unlikely to reduce total output; we know of no analysis that suggests even a vague probability of such an occurrence. One major area where theoretical analysis has demonstrated a Second Best case is in tariff policy, where world output may fall when tariffs by some countries are eliminated while tariffs against other countries are maintained (i.e., more trade diversion than trade creation may result from the creation of a customs union).

This paper uses a simple theoretical model to generate a numerical example where the elimination of an imperfection in one input market--

¹Andrew F. Brimmer, "Inflation and Income Distribution in the United States," Review of Economics and Statistics, 53 (February 1971), pp. 37-48.

say labor--leads to a lower level of real output when the imperfection in the second input market--say capital--is maintained. Following the presentation of the general model in the next section, the following section solves the model for some specific numerical examples, which in turn are the basis for some general conclusions in the last section.

II

Following the precedents of Fishlow and David and of Johnson,¹ who analyzed some of the problems in this area, we consider two outputs--

¹A. Fishlow and P. David, "Optimal Resource Allocation in an Imperfect Market Setting," Journal of Political Economy, 69 (December 1961), pp. 529-546. Harry G. Johnson, "Factor Market Distortions and the Shape of the Transformation Curve," Econometrica, 34 (July 1966), pp. 686-698.

agriculture (A) and manufacturing (M)¹--and two inputs labor (L) and capital (K),² and we ignore any dynamic effects--such as the effect of distortions on savings. We assume each output is produced with a Cobb-Douglas production function. Let Q_i be the quantity of the i th good produced and L_i and K_i be the amounts of labor and capital allocated to the production of the i th commodity.

$$(II - 1) \quad Q_A = L_A^{\alpha_A} K_A^{1-\alpha_A} \quad \text{where } 0 < \alpha_A < 1$$

$$(II - 2) \quad Q_M = L_M^{\alpha_M} K_M^{1-\alpha_M} \quad \text{where } 0 < \alpha_M < 1$$

The total supplies of labor (\bar{L}) and of capital (\bar{K}) in the economy are held constant:

$$(II - 3) \quad L_A + L_M = \bar{L}$$

$$(II - 4) \quad K_A + K_M = \bar{K}$$

We wish to maximize the value of the combined output of agriculture and manufacturing (Y), with the prices (P_A and P_M) being fixed,

$$(II - 5) \quad Y = P_A Q_A + P_M Q_M$$

¹The labels of output are obviously unimportant. One might identify the two sectors as large firms and small firms, unionized firms and non-unionized firms, or domestic firms and firms owned by foreigners.

²For those who dislike talking about short-run shifts in the allocation of a stock of capital and a price of capital, the second input could be considered as imported raw materials, whose value is fixed by the net flow of foreign capital into the country; as will be discussed later on, we assume the value of exports of final goods equals the value of imports of final goods.

This procedure allows us to avoid specifying a utility function (as Fishlow and David did), and we rationalize it in one of two ways:

(i) governments frequently announce an objective of achieving a certain level of real output over the next few years in "constant prices," which in practice either are the prices observed in some base period (the actual working of the economy) or are prices set by the government's planners (representing the planners' utility function) or

(ii) international trade theory shows how a society maximizes its "utility" by producing at the point on its transformation curve that maximizes its output valued at world prices and then trading at world prices to reach its highest "indifference curve"; for a "small" country world prices can be taken as exogenous.

We introduce market distortions into our society by stipulating that for a particular input its price in one sector is some constant (D_i) times its price in the other sector:¹

$$(II - 6) \quad P_{KM} = D_K P_{KA} \quad \text{where } D_K > 0$$

$$(II - 7) \quad P_{LM} = D_L P_{LA} \quad \text{where } D_L > 0$$

Market distortions ($D_L \neq 1$ and/or $D_K \neq 1$) may occur for reasons such as: (i) governments (or other groups) adopt policies--such as minimum wage legislation or differential taxes on capital--which differentially affect prices in the two sectors or (ii) inputs are allocated to firms by means other than market prices, such as licensing of capital or imports. We assume--

¹ Johnson introduces a single distortion by stipulating that $P_{KM}/P_{LM} \neq P_{KA}/P_{LA}$. Johnson, op. cit.

based on the characteristics of some developing countries--that the manufacturing sector faces a lower price for capital and a higher price for labor than does the agricultural sector.¹ We further assume that producers in each sector maximize profits, which implies that the capital labor ratio is higher in manufacturing and lower in agriculture than it would be in the presence of perfect factor markets. We assume the economy is in equilibrium when profits are zero in both sectors. We also assume that in equilibrium there is a positive marginal productivity of both labor and capital in both manufacturing and agriculture (i.e., there is no corner solution). Some readers may feel this last assumption makes our analysis inapplicable to developing countries with "surplus labor." Rather than attempt to survey the extensive literature on "labor surplus economies," we simply note while this model does not describe such economies, the problems of partial economic reforms can occur also in these economies.

¹Not all economists would consider this a realistic assumption. Iida says that in Japan every factor earns more in the "modern" sector than it does in the "backward" sector. Tsuneo Iida, "A Non-Neoclassical Analysis of Resource Allocation in the Dual Economy," Economic Journal, 75 (September 1965), p. 557.

III

To get numerical solutions, we assume that firms maximize profits and face output prices of $P_A = P_M = 1$ and that the technological coefficients¹ of the economy are now specified as follows:

$$(III - 1) \quad Q_A = L_A^{.8} K_A^{.2}$$

$$(III - 2) \quad Q_M = L_M^{.4} K_M^{.6}$$

$$(III - 3) \quad L_A + L_M = 100$$

$$(III - 4) \quad K_A + K_M = 100$$

$$(III - 5) \quad Y = Q_A + Q_B$$

$$(III - 6) \quad P_{KI} = .5P_{KA}$$

$$(III - 7) \quad P_{LM} = 1.22P_{LA}$$

These factor market distortions are plausible for developing countries. Williamson estimates that within manufacturing in the Phillipines in 1966, wages in one SIC sector were as low as 59 percent of wages in another SIC sector, capital costs were as low as 51 percent of capital costs in another sector, and the ratio of capital costs to labor costs in one sector was as low as 45 percent of another sector's ratio.²

¹We note that we did not have to experiment with different sets of coefficients to obtain our results; this was the first set we tried.

²Jeffrey G. Williamson, "Capital Accumulation, Labor Saving, and Labor Absorption Once More," Quarterly Journal of Economics, 85 (February 1971), p. 52.

In this situation, real output is 106.860. With a perfect labor market ($P_{LM} = P_{LA}$) and a distorted capital market ($P_{KM} = .5P_{KA}$), output is 105.835. Output with two distortions is, with these parameters, greater than output with one distortion. Output with no distortions is 109.023. Thus the assumed discrepancies of 50 percent in the capital market and 22 percent in the labor market reduce output by only 2 percent.¹

This result occurs even when the two distortions are, as in this example, not in the same direction. One might expect that reducing the discrepancy in the ratio of the relative factor prices in the two sectors from .41 (.41 ~ .5/1.22) to .5 (.5 = .5/1) would increase income, but in fact it lowers the income that would be produced under our assumed behavioral rules.

What is the economic explanation for these results? Since initially each sector was earning zero profits, at the initial levels of output agriculture will incur losses and manufacturing will show positive profits upon the elimination of the wage distortion, as the initial effect will be to lower labor costs in manufacturing and to raise labor costs in agriculture. So output of manufacturing will expand and output of agriculture will decline until each sector again earns zero profits. As labor and capital shift from agriculture to manufacturing, the prices of labor and of capital will be different in the new equilibrium position than in the initial one.² Because agriculture

¹The size of this reduction is consistent with the conclusions of Johnson, op. cit., and is dependent on the technological specification of the model.

²In our computer program, we do not actually trace the transition from one equilibrium to another. Rather, we derive the transformation curve with one distortion and then scan it until we find the point where the equilibrium conditions are satisfied. This output point is then compared to the point on the two-distortion transformation curve where the equilibrium conditions are satisfied.

is more labor intensive than manufacturing, the new uniform wage rate is lower than the old separate wage rates in both agriculture and manufacturing, and the new separate interest rates are higher in both sectors than the old separate interest rates.

Since the various transformation curves are so close together, we show in Figure I only the transformation curve representing a distorted capital market and a perfect labor market; this transformation curve is, of course, inside the (undrawn) transformation curve where both factor markets are perfect. Point 2A is the equilibrium point on the transformation curve (also not drawn) representing distortions in both factor markets. Point 1B--on the transformation curve with one distortion--is superior to point 2A in the sense that a larger quantity of manufactures and the same quantity of agriculture is produced at 1B than at 2A. Point 1A gives a larger output (at the assumed world prices) than either points 1B or 1C. Yet with one distortion society produces at point 1C--where profits are approximately zero--rather than at either 1B or 1A because at 1B and 1A large profits are earned in manufacturing. It should be noted that in the presence of distortions the world price ratio-- pp in diagram I--is not tangent to the transformation curve at the point where profit maximizing firms produce.¹ Profits are as shown below:

¹E. Hagen, "An Economic Justification of Protectionism," Quarterly Journal of Economics, Vol. 72 (November 1958), pp. 507-508. Hagen considers one distortion, but his proof is easily extended to two distortions.

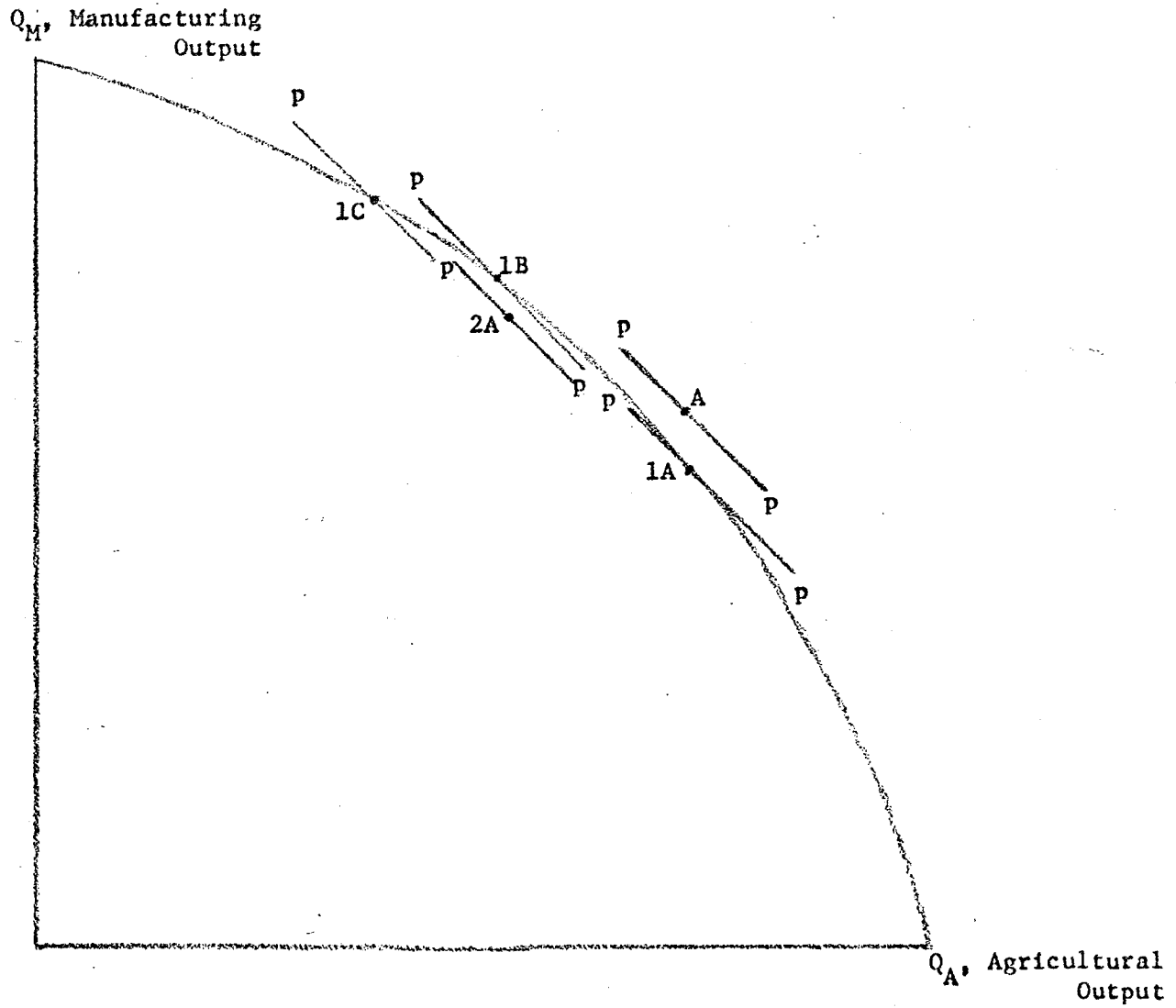


Figure I

Distorted Capital Market Transformation Curve and Output Points

Table 1

Point	OUTPUT		PROFITS		Total Output in Fixed Prices
	Agriculture	Manufacturing	Agriculture	Manufacturing	
A	56.211	52.811	.000	.000	109.023
1A	56.211	51.623	0	11.615	107.834
1B	44.112	63.382	0	8.012	107.494
1C	28.377	77.458	0	0	105.835
2A	44.112	62.748	0	0	106.860

This example simply reaffirms the obvious proposition that the results of economic policy depend on how producers respond to prices as well as on "technical" parameters. In the presence of distortions, real output could be greater if firms did not maximize profits.

Suppose that for political reasons the distortion in the capital market cannot be eliminated. We have already shown that eliminating the distortion in the labor market will reduce output. To maximize output, one could reduce the distortion in the labor market and also introduce a distortion in the output market. The output distortion takes the form of a tax on one commodity (or a subsidy on the other) so that the ratio of domestic output prices no longer equals the ratio of world output prices. In our example, a capital market distortion coefficient of .5, a labor market distortion coefficient of .5, and a ratio of domestic output prices of .5 will lead the economy to produce the same output--valued at world prices--as it would produce with no distortions. The input price distortions are set so as to move the economy to the

transformation curve representing no input distortions, and the output distortion moves the economy along this curve to the point (A in figure I) that maximizes the value (in world prices) of output produced. Thus three distortions are equivalent to no distortions.

IV

Suppose a decision maker wants his economy eventually to be free of distortions. He may then view implementing a set of micro policy reforms as an investment decision. He may agree with his technical advisor on the implications of a proposed set of policies and still refuse to implement it because the rate of return is less than his social rate of time discount. For example, suppose that the economy is initially as described in Sections II and III, at the beginning of the first year the distortion in the labor market will be eliminated, and at the beginning of the third year the distortion in the capital market will also be removed. So output in world prices will be as follows:

<u>Year</u>	<u>Status Quo</u>	<u>Policy Package</u>
1	106.86	105.84
2	106.86	105.84
3	106.86	109.02
4	106.86	109.02

The rate of return on this policy package is 3.9 percent over a three year time horizon and about 45 percent over a four year time horizon.

In his perceptive analysis of decision-making, Lindblom says "...a wise policy-maker consequently expects that his policies will achieve only part

of what he hopes and at the same time will produce unanticipated consequences he would have preferred to avoid...His decision is only one step, one that if successful can quickly be followed by another..."¹ If the indices by which "success" is measured are subject to "second-best" problems, then a decision-maker may need the courage to pursue a particular strategy in apparent disregard of the "facts." Suppose the underlying structure of the economy described above was unknown, but it was observed by everyone that factor prices were unequal in the two sectors. The decision-maker is assumed to have enough data to compute output at world prices and has secured agreement that changes in output are the measure of the success of his program.² Slowly eliminating the distortion in the labor market will slowly reduce output below the status quo level. Citizens, ignorant of the economy's structure, could interpret this result as a refutation of the micro-economic theory they have learned. The decision-maker, also ignorant of the economy's structure, will be unable to "prove"--via changes in the measure of success--that his policies are correct until he has eliminated both the labor market distortion and the capital market distortion. Even if everyone has the same discount rate and uses the same index of success, "incremental decision-making" may be very controversial unless everyone is prepared to suspend judgment on a new program until the results of the entire set of new policies are known.

¹Charles E. Lindblom, "The Science of 'Muddling Through'," Public Administration Review, 19 (Spring 1959), p. 86.

²Lindblom argues that consensus frequently can be reached only on policies and not on objectives, but presumably one needs agreement on indices of success in order to evaluate policies.