

THE STOLPER-SAMUELSON THEOREM

Prepared for *Encyclopedia of World Trade Since 1450*,
ed. J.J. McCusker et al., New York: Macmillan Reference

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February 6, 2004

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The Stolper-Samuelson theorem is one of the central results of Heckscher-Ohlin theory (q.v.), itself one of the principal theories of international trade (q.v.). It provides a definite answer to a central question in applied economics: what is the effect of changes in the prices of goods, caused for example by changes in tariffs, on the prices of factors of production? As first presented by Stolper and Samuelson (1941), it dealt with a very special framework with many restrictive assumptions, most notably that the economy consists of only two broad sectors, and that production uses only two factors (often labelled "capital" and "labor"). However, subsequent theoretical work has shown that essential features of the theorem hold much more generally. It has also been applied to a range of empirical issues, including the effects of increased globalisation on income distribution in developed countries, and the long-run political allegiances of classes and interest groups.

The Stolper-Samuelson theorem in its original setting can be explained intuitively as follows. Suppose that one sector produces exports and the other produces goods which compete directly with imports. Suppose in addition that the import-competing sector is relatively "labor-intensive," meaning that it uses a higher ratio of labor to capital than the export sector. Now ask what will be the effect of a tariff or some other change which raises the relative price of the import-competing sector's output. Clearly this will encourage that sector to expand. Provided the economy is at or close to full employment of both factors, this expansion must come at the expense of the export sector. The combined expansion of

the relatively labor-intensive sector and contraction of the relatively capital-intensive sector raises the aggregate demand for labor relative to capital, and so puts upward pressure on the wage. Because the price of exports has not changed, a higher wage must imply an absolute fall in the return to capital. This in turn implies that the wage must rise by even *more* than the price of imports. Thus, when import-competing goods are relatively labor-intensive, wage-earners gain and capital-owners lose, irrespective of which bundle of goods they consume. Put simply, protection unambiguously raises real wages.

The starkness and elegance of the theorem in its simplest form prompted much study of its robustness to relaxing the key assumptions. Ethier (1974) and Jones and Scheinkman (1977) highlighted the central prediction of the theorem which survives such relaxations: with many goods and factors a tariff change will always raise the real return of at least one factor and lower the real return of at least one other factor. This generalisation of the Stolper-Samuelson theorem does not contradict the basic prediction of international trade theory that economies facing fixed world prices will gain overall from tariff reductions. However, it highlights the potential for distributional conflict over trade policy. Unless compensation for income losses is actually paid, there are always both winners and losers from any change in trade policy.

Another key assumption is that all factors are fully mobile between sectors. Relaxing this for one of the two factors in the simplest case yields the specific-factors model, which provides an illuminating contrast with the Heckscher-Ohlin model. In line with the general

results of the last paragraph, protection continues to raise the real return of one factor, the one specific to the import-competing sector, and to lower the real return of another factor, that specific to the export sector. However, its effect on the real return of the mobile factor is now ambiguous. The specific-factors model can also be viewed as depicting a short-run equilibrium. Over time, the specific factors lose their distinctiveness and become intersectorally mobile, so the Stolper-Samuelson predictions are restored. (See Neary (1978).)

Among many applications, the Stolper-Samuelson theory has been used to address the "trade and wages" debate. This asks to what extent globalisation in general, and increased imports from low-wage countries in particular, are responsible for widening the differential between skilled and unskilled wages in developed countries. With the two factors reinterpreted as skilled and unskilled labor, the simple version of the model is consistent with a widening differential, and Leamer (1998) presents some evidence in favour of a Stolper-Samuelson chain of causation, though most authors have preferred to explain the fall in demand for unskilled labor by skill-biased technological progress. However, technology and trade are interlinked. Feenstra (1998) and Jones (2000) develop a theory which is consistent with the empirical evidence and has a strong Stolper-Samuelson flavour. Improved communications have allowed large firms to fragment their operations, moving more unskilled-labor-intensive stages of production to countries where unskilled wages are low, so lowering unskilled wages in developed countries while simultaneously raising skilled wages in developing countries.

Finally, the Stolper-Samuelson theorem has also been used to explain the political economy of responses to changes in countries' exposure to trade, most notably by Rogowski (1989). Using an extended model with three factors, labor, land and capital, he deployed a wide range of historical evidence to show how differences in factor endowments could explain cross-country variations in the impact of trade on nations' internal political cleavages.

(873 words)

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