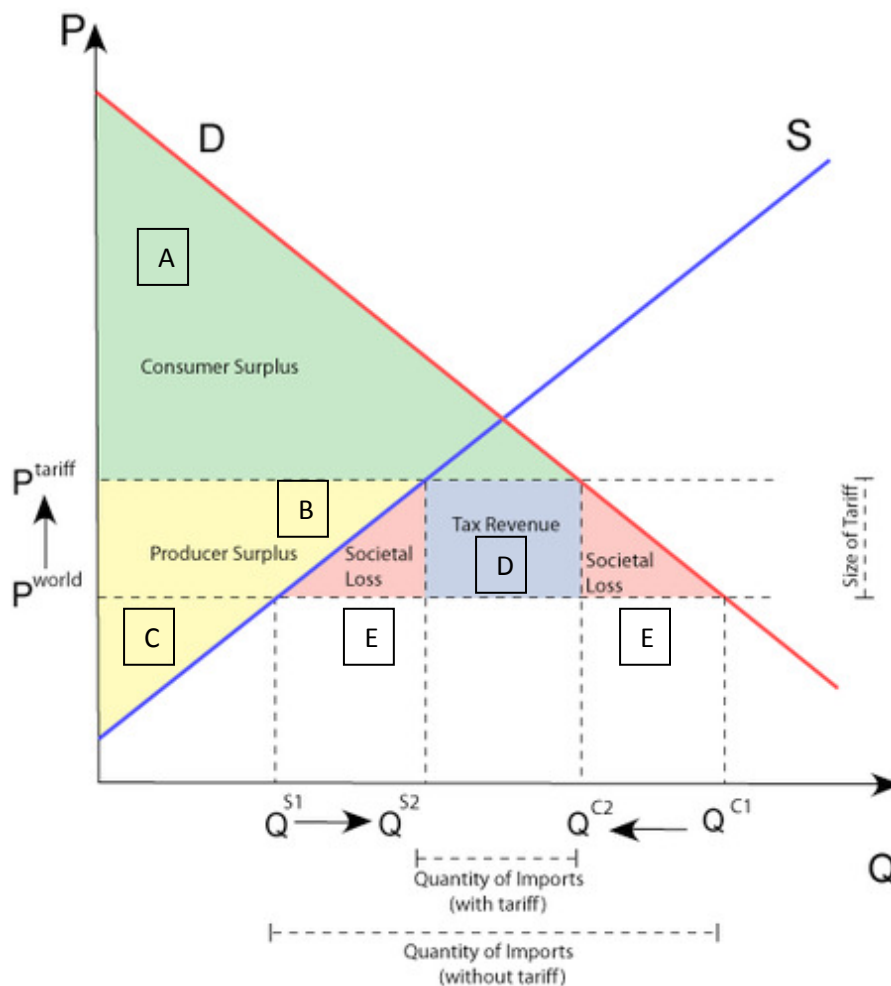


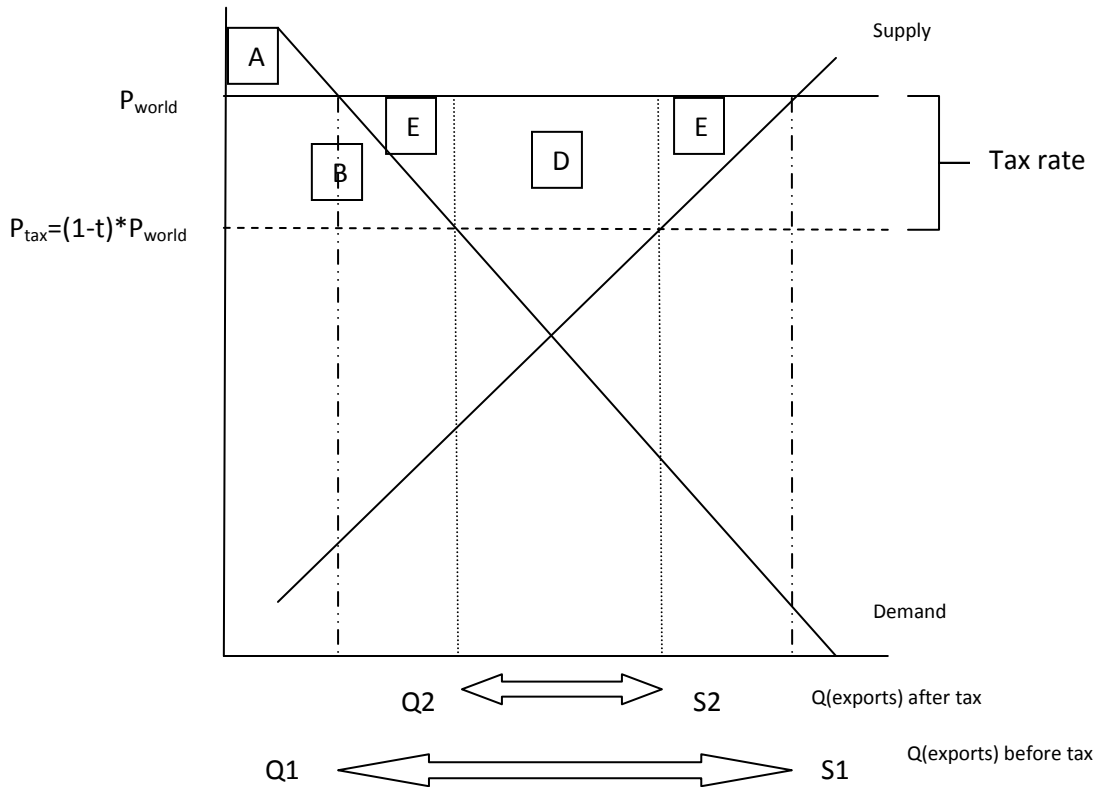
Who gains and who loses from an import tariff? An export tax? (Assume world prices are fixed).

Governments usually impose import tariffs, taxes levied on imports, to promote industries considered to be essential to the economy or to improve the balance of payments. Import tariffs effectively drive a wedge between external world prices and the prices paid domestically for a particular good by raising the cost of the good by the size of the tariff. As shown in the figure below, producers gain as a result of the higher price of the good. Producer surplus, originally equal to the area below P_{world} and above the supply curve (C), now expands to the full area below P_{tariff} (C+B). Conversely, domestic consumers face a higher price, thus making them worse off. Consumer surplus falls from the original level of A+B+E+D to only A. Through the tariff, the government captures revenue equivalent to the total quantity of imports under the tariff multiplied by the size of the tariff (Area D). Defining the net effect of a tariff on welfare as consumer loss minus producer gain and government revenue, we arrive at the net societal loss amount equal to area E. Since the small open economy does not affect world prices, there are no terms of trade gain from the imposition of the import tariff. In effect, a tariff on imports raises the prices of the importable, representing a subsidy on each unit produced at home and a tax on each unit consumed at home. Since the small open economy cannot affect world prices, the tariff is inefficient and distortionary because it induces domestic resources to move into the excess production of production from S_1 to S_2 . Although the government generates revenue equivalent to Area D, the overall tax base is very narrow, levied solely on the quantity of imports in comparison to the overall consumption base.



An export tax results in a similar societal loss with the net effect of decreasing the amount of exports. Defined as a tax collected on exported goods, an export tax benefits the consumers within the country by lowering the price of

the product domestically, while harming producers who export the product overseas. In short, export taxes incentivize exporters to sell the good at home rather than export abroad – the tax thus decreases the amount supplied from S1 to S2, but demand increases to Q2 as a result of the drop in prices due to greater availability of the product at home. As shown in the figure below, consumer surplus increases from A to A+B, while producer surplus decreases by B+E+D. By taxing exports, the government receives revenue equivalent to the tax rate multiplied by the quantity of exports after the tax, shown visually as area D. The net effect is a societal loss of area E.



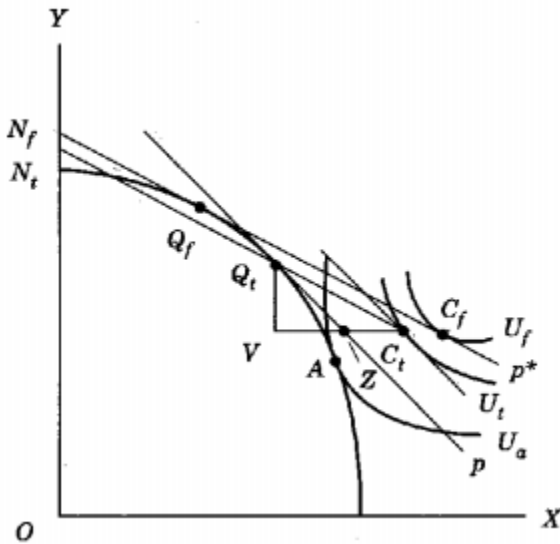
In general, the notion that tariffs and taxes on trade are particularly distortionary and inefficient is widespread among economists¹ – most economists argue that both income taxes and excise taxes dominate import tariffs. Other economists, however, believe that the relative efficiency of a country's import tariffs, income taxes, and excise taxes is an empirical question. For example, income taxes may contain special deductions, credits, and rate differences that alternatively reward or penalize taxpayers on a variety of activities or scales. Likewise, an unequal levy of excise taxes across goods and services may introduce greater excess burden as a proportion of revenue generated than that of import tariffs.² More recently, a study by Emran and Stiglitz showed that with the presence of a large informal economy, the traditional consensus that indirect tax reform through reducing trade taxes and increasing VAT to raise revenue may, on the contrary, decrease societal welfare. Although a government may attempt to achieve coordinated reform through revenue-neutral switching between import tariffs and VAT, the incomplete coverage of VAT due to the inability to tax the informal sector renders the entire reform useless.³

¹ Kearl, et al. "A Confusion of Economists?" The American Economic Review. Vol. 69, No. 2, Papers and Proceedings of the Ninety-First Annual Meeting of the American Economic Association (May, 1979), pp. 28-37

² Rouslang, Donald. "The Opportunity Cost of Import Tariffs." Kyklos., Vol. 40, 1987.

³ Emran, Shahe; Stiglitz, Joseph. "On selective Indirect Tax Reform in Developing Countries." Journal of Public Economics. 89 (2005) 599– 623

In aggregate, as a result of Lerner symmetry, import tariffs are equivalent to export taxes. As shown in the diagram below,⁴ an import tariff levied on good X such that the domestic price ratio becomes $p = -p_x(1+t)/p_y$ is equivalent to an export tax on good Y such that the domestic ratio becomes $p = -p_x/p_y(1-t)$. Both tariffs and export taxes penalize both imports and exports in general equilibrium. The country produces at Q_t and consumes at C_t rather than at the Q_f and C_f , reflecting a decrease in aggregate welfare and a reduction in national income from ON_f to ON_t . In the case of the import tariff, $MRS = MRT = p = p^*(1+t) > p^*$. To maximize welfare, domestic consumers and producers will equate the domestic MRS in consumption and MRT in production to the domestic price ratio, which is greater than the world price ratio. Hence, in the post-tariff equilibrium, the slopes of the consumption indifference curve and the production frontier will be equal to each other, but greater than the slope of the world price ratio. As a result of the balance of payment constraint, optimal post-tariff consumption must intersect the world price ratio.



The diagram above confirms that the post-tariff level of welfare (U_t) is lower than the free trade level of welfare (U_f), but higher than the autarky welfare (U_a). In effect, the tariff shifts production from Q_f back closer to the autarky production. The reduction in imports caused by the tariff likewise induces a decline in the volume of exports, resulting in the trade triangle of Q_tVC_t . Since exports of VQ_t are worth VZ at domestic prices but VC_t in world prices, the quantity ZC_t depicts the tariff revenue, measured in units of the import good X. By implicitly assuming that the government rebates the revenue to citizens in a lump-sum fashion, society reaches consumption equilibrium at point C_t . In effect, as described earlier, by raising the price of X, the tariff makes X more valuable domestically than the going world rate. As more resources are diverted into production of X, gains of specialization are lost with the distortion of the true pattern of comparative advantage.

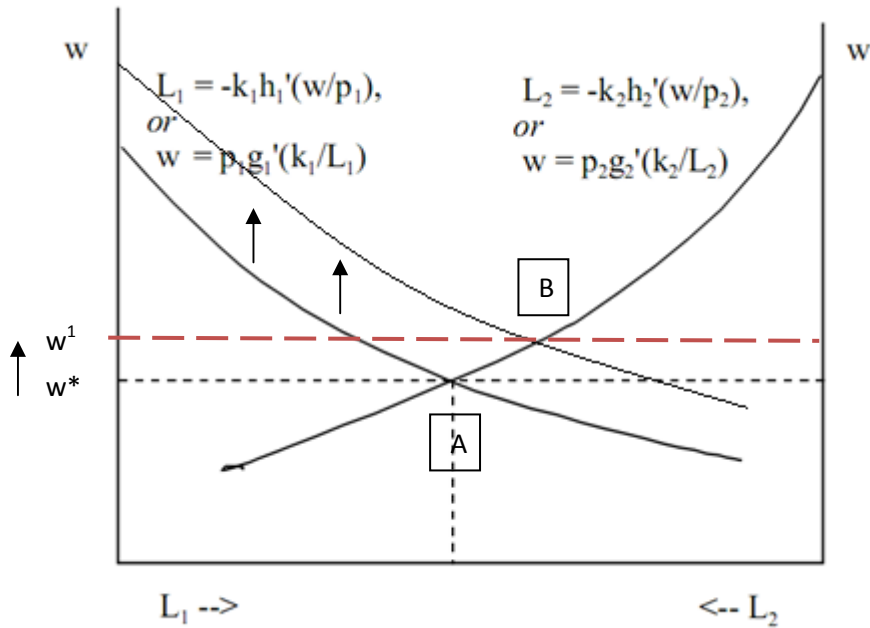
In addition to reducing overall income, tariffs likewise redistribute income. In shifting production from Q_f to Q_t , factor prices will change. Under the Heckscher-Ohlin model, increase in the price and production of X will increase the real income of the factor used intensively in the production of that good and decrease the real income of the other factor – an outcome of the Stolper-Samuelson theorem. As a result, the losses shown in the diagram above are shared unevenly. Due to the fact that overall welfare in the economy falls, then it must follow that gain in real income of the factor used intensively in the production of the X does not offset the welfare loss in the other factor.

Export tariffs are equivalent in principle because they tend to raise the relative domestic price of imports and lower the relative domestic price of exports, thus shifting resources out of export industries into import-competing industries. The effect on welfare, production, and consumption is hence diagrammatically equivalent.

⁴ Markusen, et al. International Trade: Theory and Evidence. McGraw Hill, 1995.

**What happens to a country's structure of production and pattern of trade as it accumulates capital?
What happens to wages?**

To determine the effect of capital accumulation on a country's structure of production and pattern of trade, we will analyze two different models – the Ricardo-Viner specific factors model and the Hecksher-Ohlin model. The Ricardo-Viner model assumes two goods and three factors – inter-sectorally mobile labor and then sector-specific capital for the production of each good. The production function of each sector can thus be represented by $G_i(k_i, L_i)$, assumed to have constant returns to scale. Hence, at a fixed amount of capital, labor exhibits diminishing returns. With competitive markets, the value marginal product of labor in each sector is equivalent to the wage, as represented by: $VMPL = p_1 \cdot dG_1/dL_1 = p_2 \cdot dG_2/dL_2 = \text{wage}$.



In the diagram above, the value of total output is represented by the area under the VMPL schedules, while the wage bills are the rectangles w^*L_i . An increase in capital accumulation in sector one shifts the VMPL upwards as labor in sector one becomes more valuable and productive with greater capital, thus increasing the real wage from w^* to w^1 in equilibrium. The real return to capital, represented by the triangular area below the VMPL curve and above the wage threshold, however, decreases for both sectors. At the new equilibrium B, more labor is employed in the production of good one and total value of output of good one increases. Correspondingly, the amount of labor employed in sector two decreases and the output of good two falls. In the case of two identical countries, if one country experiences an increase in capital accumulation in sector one, the country will export more of good one. In short, at constant commodity prices, any increase in the endowment of a specific factor will increase the real returns to the mobile factor and lower the real returns to both specific factors, as well as shifting production to the sector benefitting from capital accumulation.⁵

Unlike in the Hecksher-Ohlin model, the equalization of commodity prices in international trade does not equalize factor prices. In a small open economy, capital accumulation in sector one and an increase in exports of good one does not affect world commodity prices or world factor prices. Hence, the economy would have higher real wages and lower real returns to both specific factors than would otherwise exist in the short-run equilibrium.

Under the assumptions and framework of the Hecksher-Ohlin model, a country tends to export goods whose production is intensive in the factor of relative abundance in the country. The Rybczynski theorem states that at

⁵ Markusen, et al. International Trade: Theory and Evidence. McGraw Hill, 1995.

fixed world commodity prices, an increase in capital accumulation will raise the output of the good using that factor most intensively, while decreasing the output of other goods. As shown in the diagram below, assuming that production of good X is more capital intensive than the production of good Y, an increase in the endowment of capital benefits disproportionately the production of good one. In the case of more than two goods, however, the results may be ambiguous. Although capital accumulation will lead the country to increase its exports of bundles of capital-intensive goods, the overall level of each good exported may be ambiguous. In other words, although the bundle of commodities exported after capital accumulation will be more capital-intensive than the original bundle of exports, the composition of the new bundle is indeterminate. In the case of more factors than goods, then the Rybczynski theorem fails to provide generalizable insights.

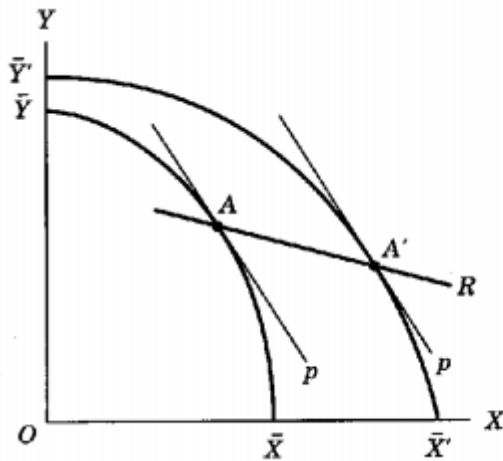


FIGURE 8.11
The Rybczynski line.

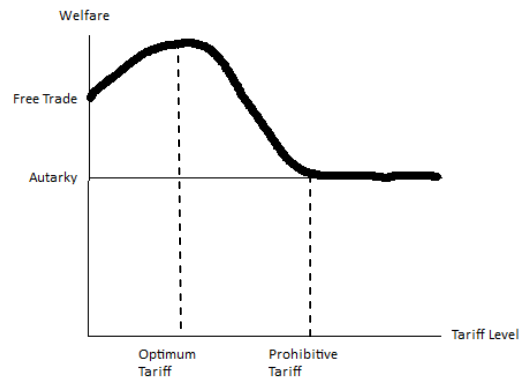
Holding relative commodity prices fixed, an increase in capital accumulation has no effect on real wages, assuming identical production technologies and constant returns to scale. Under the Heckscher-Ohlin framework, if endowment vectors lie in the cone of diversification, then trade, by equalizing the prices of goods, also equalizes factor prices. For a small open economy, since goods prices are unchanged despite capital accumulation and greater exports of capital-intensive goods, factor prices remain steady. The logic of factor price equalization is as follows. Since production functions are assumed to be identical for each good, if trade equalizes commodity prices, then the unit-value isoquants of both countries must be identical. If production lies in the cone of diversification, in which both goods are produced, then countries face the same wage-rental ratio, which must therefore be equalized.

In reality, factor price equalization clearly fails to hold for a variety of reasons, including trade restrictions, transport costs, numerous market distortions that sustain differences in international factor prices (monopolies, labor unions, etc.), failure of production functions to exhibit constant returns to scale, government policy distortions (production taxes, price supports, etc.), lack of homogeneity in worker skill, and the impossibility of the basic assumption that technologies are the same everywhere.

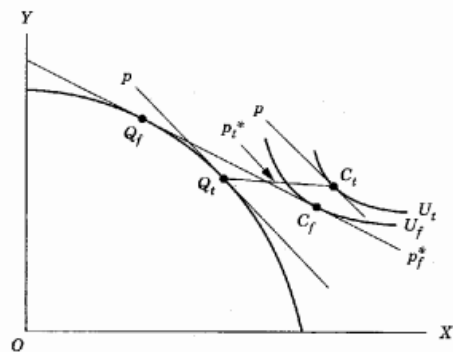
The Heckscher-Ohlin model provides useful insight in economic transition. In the case of a small open economy in which relative goods prices are determined by international markets, changes in factor accumulation will dictate growth in its outputs and trade patterns. As countries such as South Korea, which began as heavy exporters of labor-intensive goods, continue to accumulate capital, exports gradually shift to more capital-intensive commodities, such as consumer electronics. Escalating inter-industry trade between developed and developing countries tend to equalize real incomes of similar workers and capital owners – hence, trade can be a potent source of growth in aggregate real wages in developing countries relative to developed countries.

Outline the argument for an optimal (terms of trade) export tax. If exports of the good in question are supplied by a domestic monopolist (eg the national oil company) is an export tax needed?

Since small open economies can't affect world prices, the optimal policy is to avoid tariffs altogether because of the deadweight loss incurred. In large economies, however, a tariff can result in a terms of trade gain that exceeds societal loss, leading to a net gain in welfare, as shown graphically in the diagram to the right.



As discussed earlier, an export tax reduces the volume of exports supplied to the market. In a large open economy that affects world prices, not only does the export tax depress the domestic price of the taxed commodity and increase the international price, the country potentially experiences a terms of trade gain. In short, by reducing the amount of exports supplied, the world price of the exported good rises – in effect, government policy has induced the country to behave like a monopolist, restricting its output (exports) to move prices in its favor. Hence, despite the inefficiency incurred by the tariff as a result of reduced production and increased consumption domestically, societal loss may be fully offset by a favorable rise in relative prices, thereby allowing the country to import goods more cheaply to achieve a higher welfare.



As represented in the diagram to the left, in a case in which a country can affect world prices, an export tax on good Y shifts production from Q_f to Q_t because producers face the domestic price ratio p rather than the original world price ratio p_f^* . When production shifts to Q_t , however, the effect on world prices is so substantial such that the world price ratio changes to p_t^* . As a result of the terms of trade effect, the new consumption point C_t is on a higher indifference curve than the originally free-trade equilibrium of C_f , thus reflecting an increase in welfare.⁶

In general, the optimal tariff is equal to the inverse elasticity of foreign export supply – the more inelastic foreign excess supply, the larger the optimum tariff. As price p^* changes along foreign export supply curve $m_i^*(p_i^*)$, then $dm_i/dp_i^* = \epsilon^S m_i/dp_i^* \geq 0$, the definition of elasticity of the foreign supply curve. Plugging into the condition $dW = \sum (t_i dm_i - m_i dp_i^*)$ ⁷, then the optimal tariff would be set such that $t_i^*/p_i = 1/\epsilon^S \geq 0$.

If exports are supplied by a domestic monopolist which has fully internalized its pricing power, an export tax is no longer needed. In essence, as shown in the diagram above, the justification of the levy of an export tax is to induce domestic producers to collectively act as a monopolist externally, collectively restricting production to exploit a positive mark-up pricing effect. As discussed by Rodrik, the higher the concentration of market power in the domestic market, the lower the optimal export tax.⁸ Hence, a profit-maximizing domestic monopolist has already optimized production to capture the benefits of mark-up pricing without the need for government intervention. In contrast, if competition within the country is high, the government may need to levy an export tax to coordinate a collective decline in output in order to capture a terms-of-trade gain.

⁶ Sodersten, Bo; Reed, Geoffrey. *International Economics*. Macmillan Press, 1994.

⁷ This equation assumes additive separable utility, quasi-linear preferences, and concave utility functions. Taken from the Lecture Notes of Professor Venables.

⁸ Rodrik, Dani. "Optimal Trade Taxes for a Large Country with Non-Atomistic Firms." *Journal of International Economics*. Vol 26, 156-167, 1989.