Pareto Gains from Trade

Giovanni Facchini and Gerald Willmann*
Department of Economics
Stanford University

September 24, 1999

Abstract

In this paper we review the literature on Pareto gains from trade. We start by discussing the distributional implications of trade which arise in the general heterogeneous agents case. We present the proof of Pareto gains from trade using lump-sum redistribution, followed by the same result with commodity taxation. Newer results involving non-linear taxation, in particular the special case of a duty free zone, are also discussed. Finally, we address the distributional effects of trade in the presence of increasing returns to scale and love of variety.
JEL Classification: F10, F11.

*We would like to thank Maria Luigia Segnana, Hans Joachim Voth, and an anonymous referee for useful comments on an earlier draft of this paper. The usual caveat applies.

1 Introduction

Krugman (1987) writes "If there were an Economist's Creed, it would surely contain the affirmations 'I understand the principle of comparative advantage' and 'I advocate Free Trade'." While the principle receives almost religious respect from academic economists, it has gained much less support from the general public. Perhaps the principle is not easily understood but the logic behind economic integration is one of arbitrage and the idea of being arbitraged in the world economy does not necessarily appeal to everyone. The Stolper-Samuelson theorem suggests a direct relation between trade and income distribution. The export sector will usually benefit from increased trade, while people in import-competing industries may be left worse off. Although technological change might share some of the blame, there is little doubt that globalization has contributed to increasing wage differentials in the United States and to rising unemployment in Europe.[1] It follows then that the benefits from free trade are politically attainable in a democratic society only if income is redistributed from gainers to losers. However, as

[1]Cf. the recent contributions by Wood (1994), Leamer (1995), and Rodrik (1997), while for a different perspective, where technological change plays the dominant role, see Krugman (1995) and Slaughter (1998). Abrego and Whalley (1999) cast doubts on the possibility of distinguishing these two effects.

Feenstra (1998) recently pointed out, "We know surprisingly little about redistribution schemes, other than that they often fail."

The purpose of this paper is to review the theoretical literature on the distributional effects of trade liberalization. The idea of aggregate gains from trade is, of course, well established, dating back to Ricardo (1817). Once we consider the more interesting heterogeneous agents case, however, the issue arises whether some agents might lose even in the presence of such aggregate gains. In order to attain a Pareto improvement, one has to envisage some form of redistribution. We discuss the existence of Pareto gains from trade with lump-sum redistribution and with commodity taxation. We then analyze newer results involving non-linear taxation and in particular the special case of a duty free zone. This literature has been developed within the neoclassical framework. With the arrival of the new trade literature it is natural to address the same question in the context of increasing returns to scale and of love of variety.

The outline of the paper is as follows. In section 2, we discuss the distributional effects of trade liberalization. We then present the proof of Pareto gains from trade with lump-sum redistribution in section 3 and with commodity taxation in section 4. In section 5, we introduce non-linear taxation

and, in section 6, we explore the distributional implications of trade in the context of the new trade literature. Final remarks and suggestions for further research conclude the paper.

2 Distributional Considerations

Trade will in general have an impact on income distribution. Already Viner (1937, page 531) points out that

> "The removal of duties tends to alter the distribution of national money income unfavorably for the owners of the services entering relatively more heavily into the production of the hitherto protected commodities than into the production of the export commodities."

In other words, losses might be experienced by individuals working in, owning, or managing uncompetitive industries that produce import substitutes. Gains, on the other hand, will be enjoyed by sectors whose output fetches higher prices on the world market than under autarky and by consumers who benefit from cheap imports. This intuition is formalized by the Stolper–Samuelson theorem in the context of the standard Heckscher–Ohlin model.

In this model the focus is on differences in factor income, assuming — implicitly or explicitly — identical preferences. Once we allow for heterogeneity in preferences the distributional impact of trade becomes more far reaching.

Given the differentiated impact of free trade on heterogeneous agents, the ordering of alternative allocations is non-trivial. One way out is to use a social welfare function, but we concentrate on Pareto comparisons to avoid the numerous difficulties involved (e.g. interpersonal comparisons and the choice of a specific functional form). This is obviously a very strong criterion: in fact one can show that Pareto superiority is sufficient but not necessary for any Bergson-Samuelson type welfare function to increase. On the other hand it is not immune to ethical criticism — a society where a dictator consumes everything is Pareto efficient, but makes us feel uncomfortable. Related to the criterion's strength is its incompleteness when some agents gain and others lose. [2]. To overcome this problem, we have to consider redistribution — either real or potential — in order to achieve Pareto gains.

[2]It is of course possible, although unlikely, that every single agent in the economy will gain but it is impossible for everyone to lose. The latter statement is intuitively compelling given that there are aggregate gains in the representative agent case. A formal argument can be made by considering free trade for the world as a whole. Standard theory suggests that this competitive equilibrium lies in the core (see Debreu and Scarf (1963)). But if every agent inside a country were better off under autarky than under free trade then the latter allocation would not belong to the core.

3 Pareto Gains with Lump-sum Transfers

After early graphical attempts by Kemp (1962) and Samuelson (1962), the formal proof of the Pareto dominance of free trade over autarky using lump-sum redistribution is provided by Grandmont and McFadden (1972), Kemp and Wan (1972), and Chipman and Moore (1972). The latter establish Pareto gains using a social welfare function while Grandmont and McFadden (1972) are more concerned with the existence of a free trade equilibrium. Kemp and Wan (1972) focus their attention on gains from trade establishing not only that free trade is Pareto superior to autarky but also that any restricted trade equilibrium involving positive import tariffs Pareto dominates autarky. The idea behind their proof is simple. Lump-sum redistribution is used by the government to keep all but one agent at the autarkic utility levels. This special consumer, the *princeps*, claims all the surplus (or has to pay the deficit) resulting from the operation of the redistribution scheme. Kemp and Wan (1972) then show that there is in fact a weakly positive surplus due to aggregate gains on both the production and consumption sides therefore establishing the result. The proof of the analogous result for restricted trade versus autarky proceeds along similar lines.

These three papers represent a milestone for this literature. One hundred

and fifty years after Ricardo first wrote about the benefits from trade, his early intuition has been formally confirmed in a very general framework and the relevance of this result is such that some authors go as far as calling it the third welfare theorem. To understand this point of view, let us compare the Pareto gains from trade result to the second welfare theorem. To begin with, consider a world allocation which is Pareto optimal and at least as satisfactory as autarky for every consumer on earth. The second welfare theorem then tells us that there is a price vector supporting this allocation as a competitive equilibrium, i.e. as free trade. But remember that the second welfare theorem in general requires transfers which here, since we are considering a competitive equilibrium for the world as a whole, will include *international* transfers. Against this background, the gains from trade theorem certainly is a result in its own right — it does not require politically problematic international transfers but only domestic compensation. Yet herein already lies its limitation. The standard lump-sum compensation — relevant as it may be for the proof outlined above, where it reduces the problem to the representative agent case — is largely irrelevant for actual policy and prone to theoretical criticism. To operate this redistribution mechanism, the government would need to have knowledge of every single agent's preferences

and endowment. But as Hammond (1979) points out, agents have no incentive to truthfully reveal that information, so the government, deprived of omniscience, will never be able to implement such a scheme.

4 Dixit Norman Compensation

In their seminal contribution, Dixit and Norman (1980) use the dual approach to revisit most of the neoclassical theory of international trade. Of particular interest for our discussion is the redistribution scheme they devise to establish Pareto gains from trade. As already pointed out, the main theoretical argument against lump-sum redistribution is its incentive incompatibility. The commodity tax scheme proposed by Dixit and Norman does not suffer from this problem. The taxes (and subsidies) are "carefully" chosen to freeze the prices faced by consumers at their autarkic levels. Facing the same prices under free trade as they did under autarky, consumers will stay with their original consumption bundles and thus enjoy the same utility level as before. The production side, on the other hand, is exposed to world market prices. Due to the efficiency gains realized on the supply side, Dixit and Norman are able to show that the government's budget resulting from the operation

of this redistribution scheme is weakly positive. This potential surplus can then be passed on to consumers, thus establishing the result. Prompted by the criticism in Kemp and Wan (1986), Dixit and Norman (1986) identify more specifically the condition under which the redistribution of the budget surplus will actually lead to strict Pareto gains. This so-called Weymark condition is satisfied if there is at least one market where all consumers are on the same side, i.e. all are either buyers or sellers. This way, changing the tax or subsidy for the commodity traded on this market will indeed give rise to positive utility gains without violating incentive compatibility. Another strategy to redistribute the government surplus arising from the Dixit Norman scheme in an incentive compatible way is the use of a poll subsidy as suggested in Hammond and Sempere (1995).

Although this line of argument strengthens the gains from trade theorem, problems remain. Implementation of this specific tax scheme requires bureaucrats to freeze consumer prices through carefully chosen taxes. This will not only be extremely demanding in terms of information and resources, but different tax rates will invite rent-seeking. In addition, it is hard to imagine how different production and consumption prices can be enforced for production units such as farms which also consume part of their output.

Furthermore, if we take the assumption of constant returns to scale to stand for decreasing returns plus specific entrepreneurial factors, different tax rates for these factors imply varying tax rates for pure profits, which is impossible even conceptually. Finally, as Kemp and Wan (1986) point out, the Dixit and Norman compensation scheme is not even second best. Using non-linear redistribution schemes, it is possible to Pareto improve on this result while preserving incentive compatibility.

5 Non-linear Taxation

The Dixit Norman compensation scheme is not second best because consumers are by construction kept at their initial allocation and although they receive the efficiency gains through distribution of the budget surplus they cannot take advantage of any gains from substitution on the demand side. Aware of this limitation, Feenstra and Lewis (1991) derive the optimal non-linear tax satisfying the incentive compatibility constraint for a stylized pure exchange economy. They point out that a duty free zone can be regarded as a special case of non-linear taxation. Note, however, that this is a rather specific form of duty free zone since the entire production side of the econ-

omy is exposed to international competition. In another paper, now within a general equilibrium framework, Feenstra and Lewis (1994) claim, without providing a formal proof, the Pareto superiority of such a duty free zone over autarky. In Facchini and Willmann (1998), we address the same question and formally establish this result. The underlying idea is that some consumers decide to pay a fee for being allowed into the duty free zone and can then trade at international prices thus realizing gains from substitution. Clearly, it is the potential winners who decide to enter while the rest of the population prefers to stay out and is kept at autarkic utility levels by means of Dixit Norman taxation. We also prove that this arrangement is Pareto superior to the standard Dixit and Norman approach provided that the budget surplus there is redistributed in an attempt to mimic the duty free zone outcome. This is noteworthy since the duty free zone is incentive compatible and does not require any additional information. The government only has to set the entrance fee at a level so as to achieve a balanced budget.

This line of research represents a further theoretical strengthening of the gains from trade result but still suffers from several drawbacks. First of all, we have to exclude the possibility of items purchased in the duty free zone being resold to outsiders or vice versa. In addition, since Dixit and Norman

taxes are used to keep outsiders at their autarkic utility levels, the same criticisms mentioned above apply. Finally, although the establishment of the duty free zone constitutes a Pareto improvement, it still fails to achieve a second best outcome because in general the optimal non-linear tax will be more involved.

6 New Trade and Distribution

So far the discussion has been developed within the neoclassical framework. In this section we are going to consider the distributional implications of trade liberalization in the presence of increasing returns to scale. The rich variety of models constituting the new trade literature is at the same time source of excitement and disillusion. On the one hand, we have better tools to understand how market structure and international trade interact; on the other, the implications from this strand of literature are often ambiguous from a normative perspective. In particular, there are several well known examples where free trade is actually detrimental for a given country. Following Krugman (1987), however, we refer to the difficulties of implementing a "sophisticated" intervention scheme in practice, to conclude that free trade

should be the rule of thumb.

One of the few papers which — to the best of our knowledge — has addressed the distributional effects of trade liberalization is Krugman (1981). The main idea is that in the presence of economies of scale and love of variety Pareto gains are more likely to emerge without any need for redistribution. The set-up is based on the Dixit–Stiglitz model of monopolistic competition which is the workhorse of this literature. The framework is fully symmetric: in both sectors production takes place under increasing returns to scale and uses one sector specific input. The rest of the world is modeled along the same lines, with the only difference being opposite relative factor endowments. The main result of the paper is that if products are perceived as sufficiently differentiated and/or if factor endowments are sufficiently similar Pareto gains from trade will arise even without redistribution. This result suggests that the distributional problem is less severe once we consider increasing returns and love of variety. Note, however, that this model focuses on functional income distribution and does not allow for heterogeneity of tastes. This obviously simplifies the analysis and facilitates the result.

7 Conclusion

In this paper we have surveyed the literature on Pareto gains from trade. The results presented confirm the possibility of such gains if trade liberalization is accompanied by redistribution. For those of us who believe in the benefits of trade and are also concerned with social fairness, this is a very comforting finding. The literature reviewed here provides rigorous support for the intuitions of those early economists who made the case for gains from trade. Following the first formal proofs presented in 1972, several papers have strengthened these results by proposing incentive compatible redistribution schemes. Of course, Pareto comparison is a very strong criterion and the political process will usually settle for less, allowing us some leeway when it comes to interpreting the necessary assumptions. These results show that scaling back free trade is not a first best policy to deal with the detrimental side effects of liberalization, an important message to the protectionist opposition that has recently gained momentum as a result of globalization.

It is not our intention to deny the theoretical nature of the results and the practical difficulties when it comes to implementing trade adjustment programs. Lump-sum redistribution as well as the theoretically incentive compatible alternatives are far removed from real world policy making. They

definitely suggest, however, that compensation is needed when implementing free trade policies and identify the direction those measures should take. In developed countries where effective welfare programs and progressive income taxation are firmly in place, this is less of a concern. For developing countries, on the other hand, many of which must follow the free trade prescriptions of international organizations, this aspect deserves more attention. Liberalization should go hand in hand with redistribution to avoid socially disturbing inequalities and, in the extreme, to prevent anyone from falling below the subsistence level.

With regards to further theoretical work, two possible generalizations come to mind. As we have already pointed out, the second best non-linear taxation scheme has not yet been found for the general case. Furthermore, the literature surveyed here is static. Although the renewed attention to (endogenous) growth has sparked interest in the dynamic implications of free trade, very little has been said with regards to income distribution.[3] We believe that the dynamic aspects of gains from free trade are of fundamental relevance and deserve further attention.[4]

[3]The only brief discussion of this aspect we could find is Aghion and Howitt (1998, page 371).

[4]A first attempt on our part is Willmann (1999) where redistribution in the wake of trade liberalization provokes strategic reactions which can prevent Pareto gains from trade.

References

Abrego, L. and J. Whalley (1999). The choice of structural model in trade-wages decompositions. CSGR Working Paper No. 34/99.

Aghion, P. and P. Howitt (1998). *Endogeneous Growth Theory*. Cambridge MA: MIT Press.

Chipman, J. S. and J. C. Moore (1972). Social utility and the gains from trade. *Journal of International Economics 2*, 157–72.

Debreu, G. and H. Scarf (1963). A limit theorem on the core of an economy. *International Economic Review 4*, 235–246.

Dixit, A. and V. Norman (1986). Gains from trade without lump-sum compensation. *Journal of International Economics 21*, 111–122.

Dixit, A. K. and V. Norman (1980). *Theory of International Trade*. Cambridge: Cambridge University Press.

Facchini, G. and G. Willmann (1998). The gains from duty free zones. *Journal of International Economics*. forthcoming.

Feenstra, R. C. (1998). Integration of trade and disintegration of production in the global economy. *Journal of Economic Perspectives 12*, 31–50.

Feenstra, R. C. and T. R. Lewis (1991). Distributing the gains from trade without lump-sum compensation. *Economics and Politics 3*, 21–40.

Feenstra, R. C. and T. R. Lewis (1994). Trade adjustment assistance and pareto gains from trade. *Journal of International Economics 36*, 201–222.

Grandmont, J. M. and D. McFadden (1972). A technical note on classical gains from trade. *Journal of International Economics 2*, 109–125.

Hammond, P. J. (1979). Straightforward individual incentive compatibility in large economies. *Review of Economic Studies 46*, 263–282.

Hammond, P. J. and J. Sempere (1995). Limits to the potential gains from economic integration and other supply side policies. *Economic Journal 105*, 1180–1204.

Kemp, M. C. (1962). The gains from international trade. *Economic Journal 72*, 803–819.

Kemp, M. C. and H. Y. Wan (1972). The gains from free trade. *International Economic Review 13*, 509–522.

Kemp, M. C. and H. Y. Wan (1986). Gains from trade with and without lump-sum compensation. *Journal of International Economics 21*, 99–

110.

Krugman, P. (1995). Technology, trade, and factor prices. *NBER WP 5355*.

Krugman, P. R. (1981). Intraindustry specialization and the gains from trade. *Journal of Political Economy*, 959–973.

Krugman, P. R. (1987). Is free trade passé? *Journal of Economic Perspectives 1*, 131–144.

Leamer, E. (1995). A trade economist's view of U.S. wages and globalization. In S. Collins (Ed.), *Imports, Exports and the American Worker*. Brookings.

Ricardo, D. (1817). *Principles of Political Economy and Taxation*. reprinted by Prometheus Books in 1996.

Rodrik, D. (1997). *Has Globalization gone too far?* Washington DC: Institute for International Economics.

Samuelson, P. A. (1962). The gains from international trade once again. *Economic Journal 72*, 820–829.

Slaughter, M. J. (1998). International trade and labor-market outcomes: Results, questions, and policy options. *Economic Journal 108*, 1452–

1462.

Viner, J. (1937). *Studies in the Theory of International Trade*. New York, London: Harper & Brothers.

Willmann, G. (1999). Redistribution in the wake of trade liberalization — help or hindrance? Mimeo, Stanford University.

Wood, A. (1994). *North-South Trade, Employment and Inequality*. Oxford: Clarendon Press.