The Costs and Benefits of Free Trade in the EU's Sugar Market
Shaun Heelan & Matthew O'Connor- Senior Sophister

Basic economic theory tells us that free competition is preferable to tariffs and protection. Nonetheless, many markets are marked by intervention and high tariffs, for example, the EU's market for sugar. Shaun Heelan and Matt O'Connor examine this market and use their model to analyse just how better off consumers and taxpayers would be, if liberalization of the market occurred.

Introduction

This Paper examines the price, quantity and welfare effects for Ireland and the European Union of moving from protected to liberalised trade in the sugar market. The exercise enables us to ascertain the benefits and drawbacks that inevitably occur with trade liberalisation. The phenomenon that is trade liberalisation is especially pertinent to our world today. It is currently topical to today's economics student as further WTO trade liberalisation negotiations are building on the groundbreaking work undertaken in the Uruguay Round Agreement.

However, free trade and its benefits can be quite ambiguous. Politicians need to be aware of the full implications and results of a move to free trade. Economists can provide valuable insight into this potential minefield of policy formulation by matching economic theory to a computer model to test various scenarios and their likely outcomes. This particular project, with the aid of a spreadsheet model, illustrates the effects of an imaginary liberalisation of trade on the sugar market in Ireland and the E.U. for the year 1997 (using real world data) with several given assumptions.

Although the analysis was carried out to find the effects on both Ireland and Europe, we will only present our analysis on the effect for Europe for the sake of brevity. The Irish case is very interesting, and our approach was very much the same but for one difference explained in the footnote of our second section, 'Procedure and Methodology.'

The present regime for sugar in the EU

The EU sugar regime features specific rules on prices, quotas, and trade with third countries. The present sugar regime is applicable until 1 July 2001. Community support for the sector involves a minimum price for sugar beet, which Sugar manufacturers must pay to Community farmers, and an intervention price for

sugar, at which the intervention agencies buy in all sugar offered to them by EU producers. The European Council, based on the proposals of the European Commission, annually fixes the intervention prices, which have remained frozen since 1984/85. The rules on trade with third countries entail the application of import duties to sugar from third countries and the payment of refunds on sugar exported by the EU to these countries. This system takes account of the price differences on the international and Community markets, which in our sample year (and on average) were quite large. The sugar market is characterized by tight control over production, with Producers benefiting from guaranteed prices by way of quotas, which are fixed for each country. These quotas (A and B quotas) correspond in principle to the Demand on the internal market, and to the export of excess quota sugar with the aid of export refunds, respectively. If producers wish to produce more than the amount they are allowed to under the A and B quota system, this must be exported out of the EU without refund. This excess sugar is classified as the C quota. Ireland, as a member of the EU is subject to these regulations.[1]

Procedure & Methodology

We collected our prices, elasticities and trade figures from various national, international and European sources[2]. Before advancing further, one must highlight the fact that upon trade liberalisation, we assumed the following:

> **That changes in the E.U. policy did not affect world sugar prices:** This assumption is quite unrealistic because the likelihood exists that the world price of sugar would eventually rise. To predict how much would add considerably to the complexity of the analysis. However, currently it is sufficient just be aware of the implausibility of the assumption.

> **Only policy in the sugar market was altered:** This is unlikely, as

---

[1] Source: The European Commission website (http://europa.eu.int/eur-lex/en/com/pdf/2000/en_500PC0604.pdf)

[2] Prices were taken from: IMF Commodity prices; http://www.imf.org/external/np/res/commod/table3.pdf

Quantities demanded and supplied for our sample year were obtained from FAO Statistical Databases:

http://apps1.fao.org/servlet/

Elasticities were taken from Tylers and Anderson "Dissaray in world food markets" p.375 table A4. & P.362 table A3.

international trade agreements usually cover an array of goods. However for simplicity and clarity this assumption is needed.

No compensation is paid to producers: This is also highly unlikely. Given the power and influence of the sugar lobby and other vested interests, there would no doubt be a hefty compensation payment to producers. This is an historical and political fact. Nonetheless for simplicity, we assume this will not take place.

The Marketing margin on sugar is zero:[3] This is also assumed for reasons of simplicity and clarity in results. In addition, reliable data on marketing margins were unforthcoming for both the Irish and EU case.

The Sugar market is homogenous: Contrary to the quota regime outlined above, we will assume that there is only one single sugar regime with a single price in the entire E.U. for reasons of simplicity.

These assumptions, while slightly unrealistic, are nonetheless necessary in order to build a representative and effective model. As is often said about models: "the more unrealistic the assumptions, the more valuable the results".

Our *methodology* was simple. Firstly we decided on what action would be taken. That is, full liberalisation. We then decided on our assumptions and the framework of the model. The next stage was information gathering. Information was needed on EU production and consumption of sugar, EU and world sugar prices and EU demand and supply elasticities. We gathered information from a variety of sources that are given in Table 1.

Table 1: Information Sources For Model

Data Required	
EU Production	Agricultural situation in the European Union 1998, *Page T/222; table: 4.3.4.1*
EU Consumption	Agricultural situation in the European Union 1998, *Page T/222; table: 4.3.4.1*
EU price	IMF Commodity prices; Taken from the IMF Website.

---

[3] The difference between the price paid by the consumer and the amount received by the farmer

	http://www.imf.org/external/np/res/commod/table3.pdf
World price	IMF Commodity prices; Taken from the IMF Website. *http://www.imf.org/external/np/res/commod/table3.pdf*
Demand and Supply elasticities for the EU	Taken from: Tylers and Anderson "Disarray in world food markets" *p.375 table A4, & p.362 table A3*

We constructed the model in Microsoft Excel. We entered equations for calculating the changes in
- Consumer Surplus,
- Producer Surplus, and the
- Change in government Revenue. (These are listed below in Table2.)

We then entered our research data and computed our findings.

This report comments on our results, both their implications and the limitations. The authors hope this shall serve as an instruction manual to those engaged in simple economic modelling in their sophister years, or as a simple guide to cost benefit analysis in policy to those in their freshman years.

Table 2: Calculation Equations Used in model.

EU 15 Countries (000's of ECU's)	Formula's Used in Model
Changes in Consumer Surplus	(EU Price – World Price)*(original EU Demand) + .5(EU price-world price)*(New world Demand – original EU Demand)
Changes in Producer Surplus	(EU Price – World Price)*(original EU Supply) .5(EU price – world price)*(Original EU Supply – New world Supply)
Change in Government (Taxpayer) Revenue	(EU Price – World Price)*(original EU Supply - Original EU Demand)
Overall Welfare Change	Sum of all three equations above.

Summary of Results

Table 3: Results Table in the EU 15 Countries

Prices as found in IMF table	(CTS/LB)
Original price (cts/lb)	28.4

Liberal price (cts/lb)	11.4
Conversion factor (cts/lb) to ($/ton)	22
Conversion Factor Dollar to ECU	0.800640512
EU Production (000's of tonnes)	14617
EU Consumption (000's of tonnes)	12700
Welfare Changes	(000's of ECU's)
Changes in Consumer Surplus	6024568.998
Changes in Producer Surplus	-6121753.024
Change in Government Revenue	574025.6
Overall Welfare Change	**381778.7**

In this section we outline and explain the different results we obtained with the above assumptions. Sum up the principal effects of the policy and indicate what we believe the merits or drawbacks of such a move are. We will also illustrate how one would analyse the result in a graphical format.

The effect of liberalisation in the sugar market for the EU

The figures we calculated in relation to the EU are the following:

- The percentage change in price was –59.86%
- The percentage change in quantity demanded was 67.04%
- The percentage change in quantity supplied was 29.93%

The price of sugar dropped by under three-fifths. The amount of sugar demanded by the E.U. market increased by nearly two-thirds exactly and the quantity supplied to this market increased by nearly thirty percent. Here the position of the EU, being a net exporter of sugar before the transition to free trade, is reversed due to the severe drop in price. Demand expands by nearly 70% whilst supply contracts by nearly 30%. These two opposing moves, demonstrated on Figure 1 motivate the EU to a new position as a massive net importer, as EU Demand so far outstrips EU Supply. For EU suppliers, it has become relatively less profitable to produce sugar. This is so, perhaps because some foreign countries may have a comparative advantage in producing sugar as compared to the EU countries.

It is probable that the cost structure in a foreign economy may be significantly lower, endowing their industry with lower marginal costs thereby allowing them to price their products significantly lower than EU products.

This competitive advantage may be too strong for EU producers forcing them to leave the industry.[4] Naturally, switching to the production of other outputs may become more attractive for many sugar producers, hence, supply decreases and EU consumers are forced to become an even bigger net importer. It may also allude to the malignant effects protectionism conveys to native industry insofar as it cannot compete successfully at lower prices with foreign industry that has already adapted to some type of trade liberalisation. So the amount of foreign sugar entering EU increases significantly, which carries implications for the EU balance of trade, making the EU a net importer of sugar as we have alluded to.

The change in consumer surplus (thousands of ECUs) is:
- 6,024,569.00

The change in producer surplus (thousands of ECUs) is:
- - 6,121,753.02

The changes of taxpayer revenue (thousands of ECUs) is:
- 574,025.62

The European taxpayer is no longer carrying the burden of supporting artificially high prices. The lower world price enables the consumer to consume more sugar at a given price. Again the producers bear the brunt of the liberalisation. Overall there is a net benefit to EU society. The combined gain in consumer surplus and taxpayer revenue outweighs the loss of producer surplus.

The transfer efficiency at EU level is 92.77%

In terms of welfare analysis, transfer efficiency measures the income gain to farmers or producers relative to the consumer and taxpayer costs. It is the change in producer surplus divided by the change in consumer surplus plus the change in government revenue. Effectively, whilst the protection was in place, 92.77% of the planned benefit was getting to the intended group of producers. This means over 7% of the planned transfer is lost, or a 'Deadweight Loss.'

Of course, it may be conceptually more digest-able to look at the effect of

---

[4] In reality this may indeed be the case especially with an industry like sugar. Major sugar exporting countries like Brazil and Cuba for example have a much lower standard of living than the EU. Resources there may be much better suited to sugar production than here allowing them to price European firms out of their own markets.

this move in a traditional graphical analysis, using the standard Supply and Demand Framework. We shall now explain the implications of the Liberalisation of trade using a graphical example. The analysis' results of the change in consumer surplus, Producer surplus and government revenue are detailed in Table 4. Figure 1 shows the picture of the move to free trade.

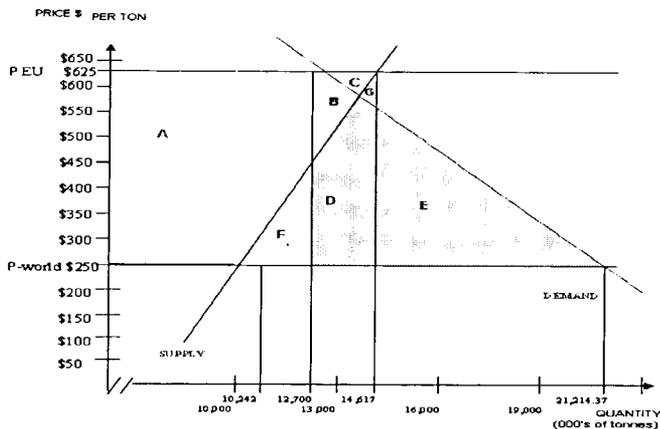**Figure 1:** Welfare Analysis of EU Sugar market liberalisation in 1997

Table 4: Diagram Analysis Described

Welfare Changes	
Changes in Consumer Surplus	A+B+D+E+F
Changes in Producer Surplus	-(A+B+C)
Change in Government (Taxpayer) Revenue	B+C+D+G
Overall Welfare Change	B+2D+E+F+G

The change in consumer surplus is measured in the area underneath the demand curve between the two prices. In this case it is the sum of the areas A+B+D+E+F.

The change in Producer surplus is the area above the supply curve between the two price ranges. Here it has diminished and is a negative amount, the size of the area -(A+B+C).

The Change in government revenue is the taxpayer gain through not having to support the artificially high price on exports. Thus it is the difference in demand and supply at the original price multiplied by the difference in the two prices. This is shown as the area B+C+D+G.

In order for this to be a sound economic change, we would want to find a strong positive overall Welfare change. This happens, as the overall benefit or welfare change is shown by the area B+2D+E+F+G. According to our estimates from our model, the overall welfare benefit to European union citizens would be 381,778,700 ECUs. Thus a change towards liberalisation in this year, given our assumptions, would have been beneficial to European Citizens.

The figures above clearly illustrate that EU consumers do indeed benefit from the trade liberalisation. The welfare of our producers however drops dramatically. This illustrates why there exists such fierce resistance to any change or reform to the CAP today. Farmers are clearly aware of their fate if free trade was to be introduced.

Various lobbying bodies representing producers (including sugar lobby bodies) are constantly battling to keep their protected situation in place. "It should be no surprise that sugar producers are very effectively mobilized in defence of their protection" (Krugman & Obstfeld, 1997: 202). There exist therefore serious equity questions as to the morality of maintaining such protectionism in the EU today at the expense of the consumer and taxpayer.[5]

Limitations to our argument

All model results are based upon a number of assumptions. Assumptions must be tested for robustness in case of research error. Researchers have a habit of picking the best-case scenario to suit their hypotheses. This is known as the 'Ricardian vice' and can destroy the viability of one's results. In order to avoid this trap, one should always engage in sensitivity analysis. It acts as evidence that your results can be trusted, or, proves that hypotheses are practically void despite their theoretical merit.

However our model is based on a set of assumptions that remove the

---

[5] Due to the nature of financing the European Agriculture budget, the Irish government is not a net contributor. Therefore a change of this kind has no real effect on government revenue.

possibility of a negative welfare effect by moving to free trade. Regardless of this we carried out a sensitivity analysis to see how much variance occurred in the level of overall welfare change. We do this by testing our assumptions regarding the

elasticities of Demand and Supply. Our results still demonstrated a very sizeable positive overall welfare change, supporting our original results.

Conclusion

Before analysing the results of a move from protectionism to free trade on the citizens of the EU and Ireland one must consider the following; if protectionism is of benefit to society one could logically assume that a move away from protectionism should be detrimental to society. This would be illustrated as a negative welfare change in economic analysis. Our model debunked this claim. In the Irish example, the overall welfare of society increased with the gain in consumer surplus far exceeding the loss producer surplus.

In the EU case, the results were quite similar; the gain in consumer surplus and government revenue surpassed the loss in producer surplus. Our results suggest that it is in the interests of both the EU and Ireland to embrace the outside world and engage in further dismantling the barriers to free trade that in the Sugar market that exist today.

Practically speaking this is much easier said than done. The existence and continued influence that vested interests, such as the sugar lobby, wield upon policy and policy-makers are both formidable and morally questionable. Whoever chooses to champion the rights of the consumer faces an arduous and uphill struggle. As students of economics and consumers we wish them luck, as they will most likely need all the luck they can get.

Bibliography

Ellis, F. (1992) *Agricultural Policies in developing Countries.* Cambridge: Cambridge University Press.

EU Commission. 1998 Agricultural Situation in the European Union.

Krugman, P., & M, Obstfeld.(1997) *International Economics: Theory and Policy.* London: Harper Collins.

Tyers, R., & K. Anderson. (1992) *Disarray in World food markets.* Cambridge: Cambridge University Press.

Other Sources

Prof. Alan Matthews' Homepage.
http://www.economics.tcd.ie/amtthews/FoodCourse/LectureTopics/PricePolicy/Frameset13.htm

IMF Commodity prices.
http://www.imf.org/external/np/res/commod/table3.pdf

FAO Statistical Databases.
http://apps1.fao.org/servlet/Production

Department of Agriculture & Food.
http://www.irlgov.ie/daff

Central Statistics Office.
http://www.cso.ie