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Sit down at the ball game: How trade barriers make the world less food secure

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ABSTRACT

This paper analyses the impacts of trade policy responses to rising world food prices by carrying out a series of stylised experiments in the wheat market using a world trade model, GTAP. The sequence of events that is modelled comprises a negative wheat supply shock and subsequent implementation of an export tax by a major net exporter and a reduction in import tariffs by a small importer. The effects of trade policy responses are contrasted with those of full liberalisation of the wheat market. At the core are the (opposite) effects on producers and consumers, as well as the terms of-trade and trade tax revenue effects. Food security is shown to depend crucially on changes in prices but also in incomes that are associated with changes in factor returns. The results reveal that major net exporters are generally better off when implementing export taxes for food security purposes. Large exporting countries export price instability causing world food prices to rise further. Net importing countries lose out and have limited leeway to reduce tariffs or subsidise imports. Liberalising wheat trade mitigates rising prices and contributes to food security, but to the detriment of production in Africa and Asia, making them more dependent on and vulnerable to changes in the world market. Concerted action at the WTO forum is required, notably clarifying and sharpening the rules regarding export measures.

Introduction

Sharp increases in food prices have taken place throughout history. In any market, rising prices serve to signal increasing scarcity, which, in an ideal world, induces producers to increase their supply (and consumers to reduce their demand) so as to restore equilibrium. The recent food price peaks of 2007–08 and 2010–11, however, are different in terms of their global reach and their degree of volatility. In contrast with the past, when low food prices were a concern to policy makers, food prices are expected to remain high in the near future (OECD-FAO, 2010). This poses a tremendous challenge to food security around the globe, especially for the poor and vulnerable.

The recent food price crises have prompted abundant research into the underlying causes, focusing primarily on short and long-run demand and supply side factors.[1] Only recently, has emphasis been placed on the role of trade shocks and policies (Anderson, 2009; DEFRA, 2010 Annex 3; Dollive, 2008; Headey, 2010; Karapinar and Häberli, 2010; Kim, 2010; Mitra and Josling, 2009; Valdés, 2010). During the food price crisis of 2007–08 many countries implemented trade measures to shield domestic markets from the sharp international price rises, including export taxation and/or quantitative restrictions on exports (in the extreme resulting in outright bans), and reductions in import tariffs. Of 81 developing countries covered in a recent survey, 25 were found to have implemented export restrictions or bans and 43 were found to have reduced import tariffs (Demeke et al., 2009). Although justifications for such trade measures are multiple (Bouët and Laborde Debucquet, 2010; Defra, 2010 Annex 3; Kim, 2010; Mitra and Josling, 2009), the dominant reason for resorting to trade measures in the food price crises of 2007–08 and more recently in 2010–11 seems to have been food security. Whilst such measures prevent domestic prices from rising further and so safeguard domestic food security, they do push world food prices to even higher levels and, like a domino effect, drive more countries to follow suit thereby perpetuating high food prices, reducing the impact of each country's initial action on its domestic price, and exacerbating food insecurity around the world (Martin and Anderson, 2010, 2011). The concern with respect to trade measures is not so much related to those taken on the import side as it is to those taken on the export side, since export taxes and/or quantitative restrictions, as opposed to reductions in import tariffs, restrict rather than promote trade and prevent international markets from carrying out their designated role of signalling changes in scarcity and market smoothing (Anderson, 2009). Importers' behaviour to offset food price rises is also constrained by the greater marginal costs imposed onto themselves, most importantly in the form of losses in import tariff revenues and potentially the requirement of introducing import subsidies, which is limited by fiscal constraints (Martin and Anderson, 2010, 2011).

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[1] See Abbott et al., 2008 for an overview of the literature, and Piesse and Thirtle (2009) for a review of recent food commodity price events.

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Some effort has been made to quantify the impact of trade policy and shocks in exacerbating the food price crisis. Specifically, Dollive (2008) presents quantitative evidence on the impact of export restrictions in the maize and wheat markets. Headey (2010) adds to this analysis by systematically tracking export volumes and prices in the world's largest grain markets. He finds that large surges in export demand precede the price surges which, together with back-of-the-envelope estimates of their price impacts, suggests that trade events played a much larger role than previously thought. Similarly, Martin and Anderson (2011) find that in the 2006–08 price spike, insulating policies in the rice (wheat) market explain 45% (30%) of the increase in the world price for rice (wheat).

We follow up on the suggestion made by Headey (2010, p. 11) that "economic modellers would do well to consider endogenizing trade shocks, or at least exploring how random shocks might affect their predictions". Specifically, we simulate impacts of an adverse supply event in the world market for wheat (in Oceania) and interrelated trade policy actions around the globe that are motivated by the wish to stabilise domestic wheat prices to pre-shock levels. With respect to the latter, we firstly introduce an export tax on wheat by a major net exporter (India) and subsequently a reduction in import tariffs on wheat by a small net importer (Tanzania). We implement the shock and policy responses in the context of a worldwide Computable General Equilibrium (CGE) model, Global Trade Analysis Project (GTAP).

Using the stylised experiments, we not only aim to quantify the contributions of trade policies in exacerbating food price rises, but more importantly also their consequences for producers, owners of factors of production, households and governments. The CGE approach allows us to do this and is our main motivation for choosing this approach over a Partial Equilibrium method that, by nature, misses out on important interactions between the various actors and markets. The incremental fashion in which we implement the scenarios allows for an assessment of the relative contributions of each policy action. Moreover, the decomposition of welfare impacts over the various actors in the economy and countries and/or regions in the world makes visible the trade-offs inherent to the measures taken, notably between producers and consumers and between net wheat exporters and importers, who have an interest in, respectively, higher and lower wheat prices. The analysis is also able to elucidate the mechanisms that determine overall food security, notably price effects and income effects that are related to changes in underlying factor returns. Our analysis forms a substantial improvement over more aggregative econometric analyses of welfare and price impacts, such as that by Mitra and Josling (2009) and Martin and Anderson (2011), that do not provide this level of detail. A second objective of this paper is to inform the debate on whether or not liberalising agricultural trade will mitigate or worsen food price volatility and food security.[2] We do this by contrasting aforementioned scenarios with a scenario in which worldwide trade in wheat is liberalised. Our analysis adds to the paper by Bouët and Laborde Debucquet (2010) which incorporates similar shock and trade policy response scenarios in a global CGE setting but does not present a full liberalisation scenario and does not offer the same amount of detail. The latter is also true for Ivanic et al., 2011 preliminary analysis of impacts of price insulation policies on food price volatility, welfare and poverty, which uses a combined econometric-structural approach. As we are able to show, the resulting shifts in global production and consumption of wheat bear important consequences for the objectives of food security, food sovereignty and the aim of some countries to be self-sufficient in wheat.

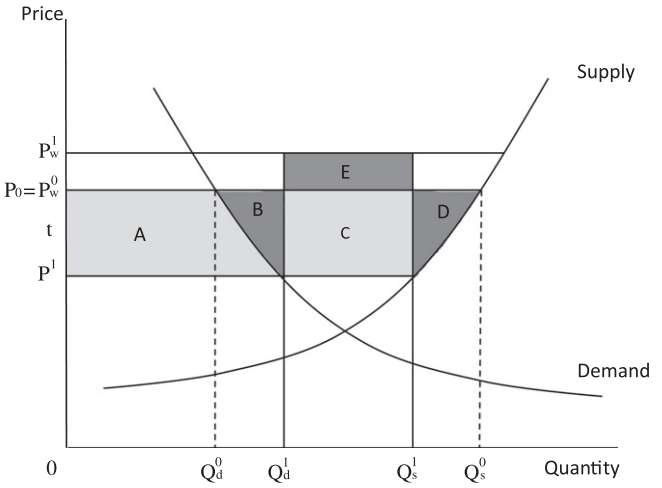

Fig. 1. The economic impacts of export taxes in a small and a large exporting country.

The contribution of our paper to existing literature thus lies especially in the empirical application of a well-established global CGE model to quantify the relative contribution of trade policy actions in exacerbating food price rises, and to trace their impacts across various countries and/or regions in the world, and the various actors within these countries and/or regions, which has not been done before at this level of detail.

This paper is organised as follows. The next section presents the theoretical underpinnings of the economic impacts of export taxes and reductions in import tariffs using a partial equilibrium graphical analysis. The GTAP model, data and scenario setup used in the applied general equilibrium analysis is described in Section 3. Section 4 presents the results of the scenarios. The final two sections discuss the main findings and present conclusions and policy implications.

The economic impacts of trade measures: a graphical exposition

In this section we examine the economic impacts of export taxes and (reductions in) import tariffs in a low-dimension partial equilibrium analysis. The basic partial equilibrium analysis of trade policy is formulated in terms of one good being traded between one country and the rest of the world, and can be illustrated graphically (Södersten and Reed, 2010 Chapter 10). It enables the understanding of the basic impacts of the trade measures and guides the interpretation of the outcomes of the more complex applied general equilibrium analysis.

Fig. 1 shows what happens when either a small exporter that is a price taker or a large exporter that can influence world prices impose an *ad valorem* export tax.[3] In the case of a small country, the initial domestic price is p^0, which in an open economy is equal to the world price. At this price domestic demand equals Q_d^0, domestic supply equals Q_s^0 and the difference $(Q_s^0 - Q_d^0)$ is exported. When exports are taxed by t, the domestic price falls to p^1, with the world price remaining at p^0. At p^1, domestic supply falls to Q_s^1, while domestic demand increases to Q_d^1. As a consequence, less is exported

[2] Other quantitative studies in this area include, for example, the study by Hertel et al. (2001) which finds that world-wide trade liberalisation leads to the lowest levels of grain price volatility, with little impact on poverty. Single country studies include Pyakuryal et al. (2010), which finds that trade liberalisation has improved overall food security in Nepal, but with unequal impacts across regions, and Tanaka and Hosoe (2011), which finds little evidence to support the contention that trade liberalisation threatens Japan's national food security.

[3] The treatment of export taxes closely follows that of Bouët and Laborde Debucquet (2010).