



Intersectoral distortions and the welfare gains from trade



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ARTICLE INFO

Article history:

Received 29 July 2014

Received in revised form 28 October 2016

Accepted 31 October 2016

Available online 15 November 2016

JEL classification:

F11

F13

F16

F60

F62

Keywords:

Gains from trade

Labor distortions

Optimal tariffs

ABSTRACT

How large are the welfare gains from trade when factors are misallocated due to domestic distortions? In this paper I provide a theoretical and a quantitative answer to this question by incorporating distortions to the allocation of labor across sectors into a Ricardian trade model. Applying the model to data for a diverse set of countries I find that (1) gains from trade for net exporters in sectors with low marginal product of labor are overstated in models that abstract from intersectoral distortions since in those countries trade tends to exacerbate the effect of domestic frictions; (2) the gains from implementing optimal tariffs are substantial in the presence of domestic frictions because trade policy can offset some of their negative effect; and (3), mitigating domestic frictions has a much larger potential payoff for countries when they are open to international trade.

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1. Introduction

How large are the welfare gains from international trade? This classic topic in the international trade literature has recently received renewed interest following the findings of [Arkolakis et al. \(2012\)](#). These authors show the similarity of gains from trade predicted by a range of workhorse international trade models. One feature that all those standard models have in common is that they abstract from distortions on domestic markets. Yet we have ample evidence that domestic distortions are prevalent. That domestic frictions affect the benefits of engaging in international trade has been long recognized. Using highly stylized models, theoretical literature some fifty years ago showed that a country might even lose from international trade if trade exacerbates the effects of domestic distortions.¹ The goal of this paper is to go beyond such qualitative predictions and quantify the effects of intersectoral distortions on the welfare gains from trade for a broad range of countries using a modern multi-country general equilibrium model of international trade.

My point of departure is a multisector version of a Ricardian model of [Eaton and Kortum \(2002\)](#). As in [Caliendo and Parro \(2015\)](#), my model uses homogeneous labor as the only primary factor of production, features input–output linkages across sectors, incorporates import tariffs and allows for aggregate trade to be unbalanced. This otherwise standard setup is modified by the presence of distortions to the allocation of labor across sectors. Their introduction is motivated by studies by [Vollrath \(2009\)](#) and [Gollin et al. \(2014\)](#) who document that the value marginal products of labor are not equalized across sectors, suggesting labor misallocation. I do not take a stand on what the underlying sources of intersectoral distortions are and simply model the distortions as wedges between the value marginal product of labor across sectors. In the model these wedges correspond to differences in labor costs faced by producers in different sectors.² I treat the labor wedges as fixed and not affected by the trade regime.

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¹ See, e.g., [Hagen \(1958\)](#).

² [Hsieh and Klenow \(2009\)](#) use a similar approach to model misallocation of factors across firms. In this paper misallocation happens across sectors.

My theoretical contribution is to derive an intuitive relationship between the true size of the gains from trade and the gains from trade that would be calculated using a standard model that abstracts from intersectoral distortions. The standard measure of the gains from trade needs to be corrected by a distortions adjustment term that can be expressed in terms of wedges and easily observable trade and production data. The correction implies that the standard model overstates the gains for trade for countries that are net exporters in sectors in which the value marginal product of labor is low because of domestic distortions. The intuition for this result is simple. Opening to trade typically results in the reallocation of labor towards sectors in which a country becomes a net exporter. But if the value marginal product of workers in those sectors is low then such reallocation is inefficient. Consequently, the benefits of trade are not as large as would be predicted by a model abstracting from this allocative inefficiency.

To assess the quantitative importance of intersectoral distortions for the effects of trade I apply the model to data on 61 countries and 16 sectors in 2006. Since the available evidence suggests that intersectoral labor distortions are especially large in poor countries I strive to include as many major developing countries as possible by combining sector-level data from a number of sources. I identify the intersectoral labor distortions from the differences in labor compensation per worker across sectors. Given the wedges, I need exactly the same data as a standard frictionless model in order to evaluate the gains from trade and conduct other counterfactual calculations.

The calculated intersectoral labor distortions imply substantial variation in the value marginal product of labor across sectors. Marginal products tend to be low in sectors such as textiles and, especially, agriculture, and high in sectors such as mining and chemicals. The largest distortions are often found in poor countries, with the magnitude of distortions generally decreasing with income. These patterns of intersectoral distortions are important for understanding the key quantitative results of this paper.

My main finding is that taking into account intersectoral labor distortions changes the magnitude of the gains from trade in an important way for a number of countries. For example, the true gains from trade for Ethiopia with its large trade surplus in low-productivity agriculture are 6.4 p.p. lower than 28.1% gains that a standard model would predict. To rephrase the intuition behind this result, since domestic distortions effectively depress labor costs in agriculture in Ethiopia they would result in production and employment in that sector above an efficient level in a closed economy. As trade further increases agricultural employment to generate the observed trade surplus, it tends to exacerbate the initial domestic distortions. Thus the benefits of trade for Ethiopia are not as large as the frictionless models would predict. More systematically, consider an ordering of countries by the ratio of the trade deficit in their low (below median) value marginal product sectors relative to GDP. Then for countries in the first quartile of this ratio (i.e. countries most specialized in exports in sectors with a low value marginal product of labor) the true gains from trade are 4.6 p.p. lower than in a standard calculation. On the other hand, for the highest quartile of countries the standard calculation would overstate the true gains by 2.8 p.p. These adjustments are sizable relative to the absolute level of the gains from trade: the standard model overstates the gains by 28% for the first quartile and understates them by 21% for the fourth quartile, respectively.

Going beyond the issue of the gains from trade, I also study the implications of intersectoral distortions for trade policy. I find that unilaterally set optimal tariffs are quite dispersed across sectors, with high value marginal product of labor sectors protected by high tariffs. In a second-best world it might be optimal to introduce a distortion (tariff dispersion) to partially offset the effect of another

distortion (labor wedges).³ Because optimal tariffs bring the labor allocation closer to optimum, they have a first-order effect on welfare beyond the standard terms of trade improvement. Consequently, the welfare gains from unilaterally imposing optimal tariffs tend to be larger than in a frictionless model and can be substantial, especially for developing countries. For example, India could gain as much as 9.9% from pursuing unilaterally optimal trade policy in my model whereas the gain predicted by the frictionless framework would be a modest 0.5%. However, my general equilibrium analysis shows that unilaterally optimal tariffs are a beggar-thy-neighbor policy, in that the large gains can come at the expense of hurting other (and often poor) countries.

I also look at the complementary issue of how trade openness affects the welfare cost of intersectoral distortions. Removing the calculated labor distortions would lead to an average welfare gain of 33.2% in the open economy, but the positive effect would be only about half as large in a hypothetical closed economy. The reason why distortions have a larger negative impact on welfare in an open economy is that there is a larger scope for misallocation in that case. When distortions depress labor costs in a sector, that sector expands beyond the efficient level. In autarky, the inefficient expansion is limited by the domestic demand for the sector's output. In contrast, when a country is open to trade the expansion can go further because distortions-driven low labor costs become a source of comparative advantage.

1.1. Related literature

This paper is related to a few strands of the literature. It contributes to a voluminous body of research on the welfare gains from international trade by studying the impact of domestic distortions on those gains. Attempts to quantify the benefits of trade have for a long time been the domain of Computable General Equilibrium (CGE) models, in which trade arises due to the Armington assumption that goods are differentiated by country of origin.⁴ Measuring the gains due to the classic Ricardian comparative advantage channel lacked a solid theoretical foundation until the seminal contribution of [Eaton and Kortum \(2002\)](#). In an influential theoretical article, [Arkolakis et al. \(2012\)](#) show that in the absence of domestic distortions the gains from trade in the Armington model are the same as in the [Eaton and Kortum \(2002\)](#) model and similar as in the most popular implementation of the [Melitz \(2003\)](#) model.⁵ In this paper, I take one of those three workhorse quantitative trade models and demonstrate how the welfare gains from trade it predicts change, both analytically and quantitatively, when intersectoral allocation of labor is distorted due to domestic frictions.

The intersectoral labor distortions of this paper appear in the older theoretical trade literature as “wage differentials”. [Hagen \(1958\)](#) demonstrates in a simple two-sector model that a country might even lose from trade if the wage paid by the import-competing sector is higher than the wage paid by the export sector. I show analytically how wage differentials shape the gains from trade in a multi-country multi-sector general equilibrium framework. [Bhagwati and Ramaswami \(1963\)](#) rank various policies intended to ameliorate the effects of distortionary wage differentials in terms of their efficiency. While trade policy is never the first-best instrument, it can nevertheless increase welfare. [Katz and Summers \(1989a\)](#)

³ However, the principle of targeting suggests that there are instruments more efficient than tariffs for correcting intersectoral labor distortions.

⁴ See [Hertel \(1999\)](#) for an overview of CGE trade modeling.

⁵ See also [Costinot and Rodríguez-Clare \(2014\)](#) for an overview of results on the gains from trade in a world without domestic distortions.

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