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# A Critical Judgement of the Applicability of 'New New Trade Theory' to Agriculture: Structural Change, Productivity, and Trade

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# A Critical Judgement of the Applicability of 'New New Trade Theory' to Agriculture: Structural Change, Productivity, and Trade*

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**Abstract**

The emergence of 'New New Trade Theory' fundamentally changed the thinking of international trade, and it is now at the heart of science. Here, we are going to take up the discussion of Golpinath et al. [2007], looking at whether 'New New Trade Theory' is applicable to agriculture. Revisiting the recent literature, we can find new theoretical and methodological evidence for its importance: the concepts of 'New New Trade Theory' will impact the modelling of structural change in agriculture and of agricultural trade. Farm productivity and agricultural trade cannot be seen anymore as detached from one another; both concepts are interrelated. We claim that 'New New Trade Theory' and its concepts will become standard for agriculture, too.

**Keywords:** Agriculture Economics, New New Trade Theory, Farm Heterogeneity, Elasticity of Trade Flows, Estimation Methods

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# 1 Introduction

With the emergence of the 'New Trade Theory' [Helpman and Krugman, 1985], the discussion started with the question of whether the concepts of product differentiation, scale economies, and monopolistic competition are appropriate to model agri-food trade and agricultural trade. Where the discussion on agri-food trade is univocal [Sheldon, 2006], the discussion on agricultural trade is ambiguous [Sarker and Surry, 2006]. The main critical points regarding the latter are that agricultural commodities are rather homogenous than heterogenous at least from a technical viewpoint, and that agricultural markets are rather perfectly competitive than imperfectly competitive.

Although theoretically convincing, there is empirical evidence suggesting that even homogenous agricultural commodities are often regarded by consumers as heterogenous, the perceived quality often deviates from the true quality [Sarker and Surry, 2006], and that agricultural markets are often faced with imperfect competition either via the downstream sector or via the upstream sector with its implications for market equilibria [McCorriston, 2011, 2002]. In the literature there is now agreement that agricultural commodities are modelled as differentiated, the Armington assumption underlies nearly all trade models, and monopolistic competition is often assumed when modelling imperfect competition along the supply chain [Sarker and Surry, 2006].

The 'New Trade Theory', however, has one major drawback: it is based on the assumption of a representative firm [Krugman, 1980], which generally contradicts with the observed reality. Usually, firms are rather heterogenous than homogenous; i.e., firms differ in their productivities. Melitz [2003] is the first in analyzing the consequences of firm heterogeneity for international trade. He shows that firm heterogeneity is an additional source of comparative advantage: although on average no firm of a specific sector might be productive enough to export, given the dispersion of firm productivities, there still might be some firms left which are productive enough to export. This insight is important as it yields an explanation for why countries even export (import) in sectors where they have seemingly a comparative disadvantage (advantage). The other major insight of Melitz is that trade liberalization does not only lead to resource reallocations between sectors but also within sectors; resources are reallocated from lower productive firms to higher productive firms. Melitz's work lays the foundation for what is now known as 'New New Trade Theory'.

As with 'New Trade Theory' there is now a discussion of the applicability of 'New New Trade Theory' to agriculture, too. Golpinath et al. [2007] are the first trying to address this topic in a more general context. The authors thereby argue in favour of 'New New Trade Theory'. Following Golpinath et al. there might not be a direct export decision in agriculture as there is in manufacturing industries, but still there might be an underlying export decision in agriculture. Farmers are aware of the net export positions of their own country and consider this information - among other things - when they decide on

producing a more or less export-intensive agricultural commodity.

Golpinath et al. [2007] are in favour of 'New New Trade Theory' as the corresponding models yield a very flexible modelling structure within which not only firm entry and exit decisions are to be modelled, but also firm export and non-export decisions. Both properties are important as they allow a closer consideration of the dynamics of trade liberalization on structural change.[1] The latter property is also important for some other reason. It introduces a new source for changes in trade flows: not only the volumes of already existing exporters change in response to a change in the trading environment (i.e. changes along the intensive margin of trade), but also new exporters can enter the market or existing exporters can exit it (i.e. changes along the extensive margin of trade). A non-consideration of the extensive margin of trade could lead to an underestimation of trade and thus of welfare effects of a trade policy change; the expansion of exports along the intensive margin worsens the terms of trade, whereas additional exports through the extensive margin (at least in part) materialize the former effect [Liapis, 2009].

The work of Golpinath et al., however, has one major drawback, it motivates the topic just intuitively, as hard facts are missing. The authors just mention one empirical work of Echeverria [2006]. Other work is not mentioned since, up to that point, no theoretical work on intermediated trade nor any other empirical application to agriculture was done. The authors could only intuitively motivate their position.

In this paper, we are going to take up the discussion of Golpinath et al. [2007] of whether 'New New Trade Theory' is applicable to agriculture, too. Recent trade literature is revisited with a focus on both theoretical and methodological aspects. Among others, research on intermediated trade [Ahn et al., 2011] has shown the expandability of Melitz's insights to intermediated trade and research on trade elasticities [Chaney, 2008] has highlighted the importance of the extensive margin of trade for the specification of elasticities of trade flows. The former insights are important as they will impact the modelling of structural change in agriculture and the latter on the modelling of agricultural trade. Farm productivity and agricultural trade cannot be seen anymore as detached from one another as both concepts are directly interrelated. We claim that 'New New Trade Theory' and its concepts will become standard for agriculture, too.

This paper is organized as follows. In the next section we revisit recent theoretical work: further support for the assumption of farm heterogeneity is given, and the expandability of Melitz's Model to intermediated trade is illustrated. In the following section, methodological insights are reviewed: topics are the consistent estimation of elasticities of trade flows and the implications of a non-consideration of firm heterogeneity for parameter estimation. The last section concludes.

[1] This property is also invoked by Rau and van Tongeren [2009] to justify their use of an 'New New Trade Theory' model for the analysis of homogenised standards on polish meat trade.

## 2 Theoretical Aspects

As indicated above, the argumentation of Golpinath et al. [2007] is more intuitive. But in the meantime research has been going forward and now we can find even in the literature theoretical support for Golpinath et al.'s argumentation. Two questions are crucial for their argumentation: first, are the assumptions of farm heterogeneity and of fixed trade costs, the basic requirements to specify an agriculture trade model with farm heterogeneity, justified for agriculture? And secondly, how are the decisions of farmers to produce an export-intensive agricultural commodity linked to trade? Another question that is not any less important raised by Liapis [2009] is whether the extensive margin of trade (i.e. the variation in the set of exporters) even relevant for agricultural trade.

Here, we are going to revisit these questions again and to discuss their implications for agriculture: farm heterogeneity allows a better understanding of structural change in agriculture induced by changes in trade policy and the concept of an Intermediate Melitz Model [Ahn et al., 2011] will exemplify the complementarity between agricultural productivity policy and agricultural trade policy. In addition, the concept of the extensive margin of trade will reinforce the importance of agricultural trade liberalization. To keep things simple, we just motivate the topic either graphically and/or verbally. More details can be found in the corresponding literature.

*Farm Heterogeneity, Fixed Trade Costs, and Structural Change.* - Although farm heterogeneity is not even questioned in other branches (e.g. in agricultural production economics), yet it is questioned for agricultural trade analysis. It seems to be an unwritten law that for agriculture trade models farms are to be assumed homogenous. Nevertheless, even ex-ante identical firms can give rise to firm heterogeneity: if either different technologies are chosen [Yeaple, 2005] or a new technology is not implemented simultaneously [Ederington and McCalman, 2008], then theory shows that this gives rise to firm heterogeneity. As both situations are common for agriculture where neither farmers always choose the same technologies, nor do they implement a new technology simultaneously, the assumption of farm heterogeneity seems to be justified even theoretically. Likewise, the relevance of fixed trade costs for export market participation in agriculture is now proven; it is shown that fixed trade costs are important for all major agricultural commodities, without any exception [Kandilov and Zheng, 2011]. As neither farm heterogeneity in productivity nor fixed trade costs in agricultural exporting can be rejected, it conforms to theory at least to apply agriculture trade models with farm heterogeneity.

Proposition 1 (Agriculture Trade Model with Farm Heterogeneity): *Farm heterogeneity in productivity and fixed trade costs of exporting are the basic requirements to specify an agriculture trade model with farm heterogeneity. As long as farm heterogeneity and fixed trade costs cannot be rejected, it conforms to theory to apply an agriculture trade model with farm heterogeneity.*

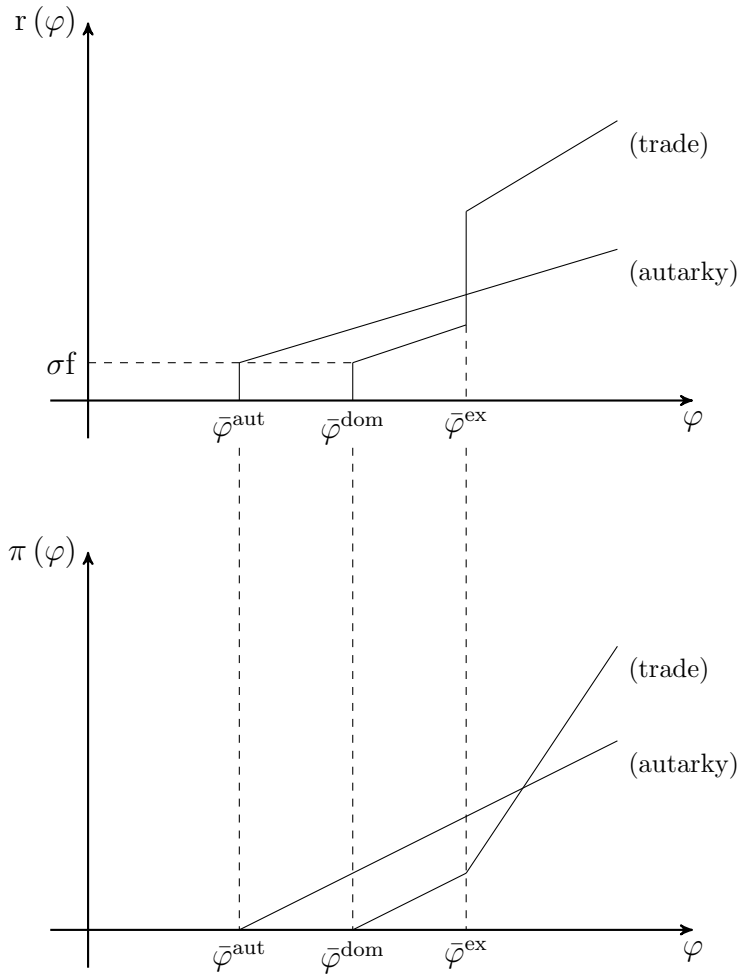



Figure 1: The Reallocation of Market Shares and Profits (Melitz [2003])

Yet, the real important point of why one should opt for an agriculture trade model with farm heterogeneity is raised by Melitz [2003] himself: if, ceteris paribus, the average productivity and the average profit under a Krugman Model [1980] with representative firms and under a Melitz Model [2003] with heterogenous firms are identical, then indeed aggregate variables (i.e. average productivity, average profit) of both models are identical too, but the impacts of shocks on average productivity and average profit can be analyzed only in the latter model. The explanation for this fact is that only in the latter model average productivity and average profit are endogenously defined, i.e., average variables can change even without a change in firm level technology, whereas in a Krugman Model average variables only can change with a change in firm level technology. Melitz shows resource reallocations between firms can be the cause of a change in average productivity too. This property of being able to model structural change without having to assume an exogenous shift in firm level technology allows for a far better illustration of real market behavior.

The basic idea of structural change in the framework of a Melitz Model [2003] is illustrated in Figure 1. In the upper panel firm revenue r $(\varphi)$ is depicted against productivity

$\varphi$, whereas in the lower panel firm profit $\pi(\varphi)$ is depicted against productivity $\varphi$. In both panels, the situation before opening to trade (autarky) is compared to the situation after opening to trade (trade).

As the Melitz Model is specified,[2] firm revenue $r(\varphi)$ and thus firm profit $\pi(\varphi)$ depends on firm productivity $\varphi$; the higher the productivity is, the higher is the firm revenue and the firm profit, respectively. In contrast to a standard monopolistic competition model, firms have to bear some additional fixed costs f to enter the domestic market. If firm profit is too low to cover also these additional fixed costs, a firm exits the domestic market. The marginal producer is that firm whose revenue is just high enough to bear all production costs, variable trade costs, and the additional fixed costs. Under autarky this just corresponds to a firm with productivity $\bar{\varphi}^{aut}$; all firms with a higher productivity $\varphi$, i.e. $\varphi > \bar{\varphi}^{aut}$, will make positive profits.

If a country now opens up to trade, market conditions change. Indeed, domestic firms have new access to foreign markets, but also competition on their home market increases either directly due to exports of foreign firms or indirectly due to increased factor demand of exporting firms.[3] The latter will disfavor all domestic firms; their domestic sales will decrease and thus their firm revenues and firm profits realized on this market will too. The cut-off point for the marginal domestic producer will shift from $\bar{\varphi}^{aut}$ to $\bar{\varphi}^{dom}$.

However, whether a firm really suffers from opening to trade depends on its productivity. A firm will only suffer if first, it is not productive enough to become an exporter, i.e. if its productivity $\varphi$ is lower than that of the marginal exporter $\bar{\varphi}^{ex}$, i.e. $\varphi < \bar{\varphi}^{ex}$; the marginal exporter is that firm whose revenue from exporting is just high enough to cover costs besides all normal costs of exporting (i.e. production costs, variable trade costs) and also some additional fixed trade costs charged for exporting. And second, a firm would suffer if its loss realized on the domestic market is greater than its additional profits from exporting. Otherwise the firm will profit from trade.

What should become obvious is that trade policy induced structural change will force least productive firms to exit the domestic market, pure domestic producers as well as small exporters will lose, while only larger exporters will win; resources will be reallocated from lower productive firms to higher productive firms. Accordingly, as the average productivity increases as a result of resource reallocations total welfare will increase too; hence opening to trade is welfare-improving.

[2] In the Melitz Model firm profit $\pi(\varphi)$ be defined as $\pi(\varphi) = \frac{r(\varphi)}{\sigma} - f$, where $r(\varphi)$ is firm revenue, $\frac{r(\varphi)}{\sigma}$ variable profit, and f fixed trade costs. The marginal producer is that firm whose profit equals zero, i.e. $\pi(\varphi) = 0 \Leftrightarrow 0 = \frac{r(\varphi)}{\sigma} - f \Leftrightarrow r(\varphi) = \sigma f$.

[3] Both sources for an increase in competition are mentioned by Melitz [2003]. However, Melitz points out that only factor demand competition conforms with a constant elasticity of substitution (CES) preference structure. To model the consequence of an increase in the number of product varieties would require a variable elasticity of substitution (VES) preference structure.

PROPOSITION 2 (Implications for Agricultural Structural Change): *Within the framework of an agriculture trade model with farm heterogeneity average productivity and average profit are endogenously defined, giving new insights into structural change in agriuculture: Trade liberalization will force the least productive farms to exit the domestic market and only higher productive farms will profit. As the average productivity increases total welfare also increases.*

*Intermediate Melitz Model, Trade and Productivity.* - The other crucial question of Golpinath et al.'s argumentation is: how are the decisions of farmers to produce an export-intensive agricultural commodity linked to trade? The authors argue in favour of an underlying export decision; usually, farmers are aware of the net export positions of their own country and consider this information - among other factors - when they decide on producing a more or less export-intensive agricultural commodity.

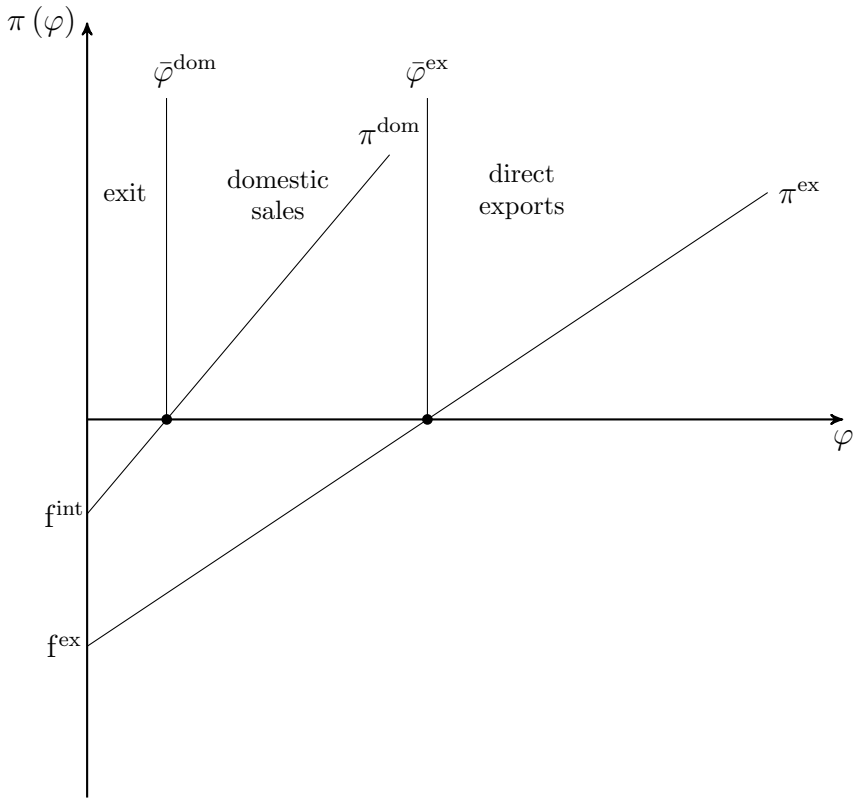
However, the authors miss an explicit definition for 'underlying'. They solely mention that the standard Melitz Model would not conform to agriculture; in agriculture, farms would usually export via marketing firms, and not by themselves [Bernard et al., 2010]. Although this problem is not unique to agriculture, here it is most immanent.

Recently, Ahn et al. [2011] extended the Melitz Model for an intermediary sector. Based on productivity, firms either select for non-export or export, and if they have selected to export, then they select either for indirect or direct export. For agriculture, this model means that there is not even an underlying production decision, but rather that the decisions of farmers to produce an export-intensive agricultural commodity are directly linked to trade as they are linked for direct exports, too.

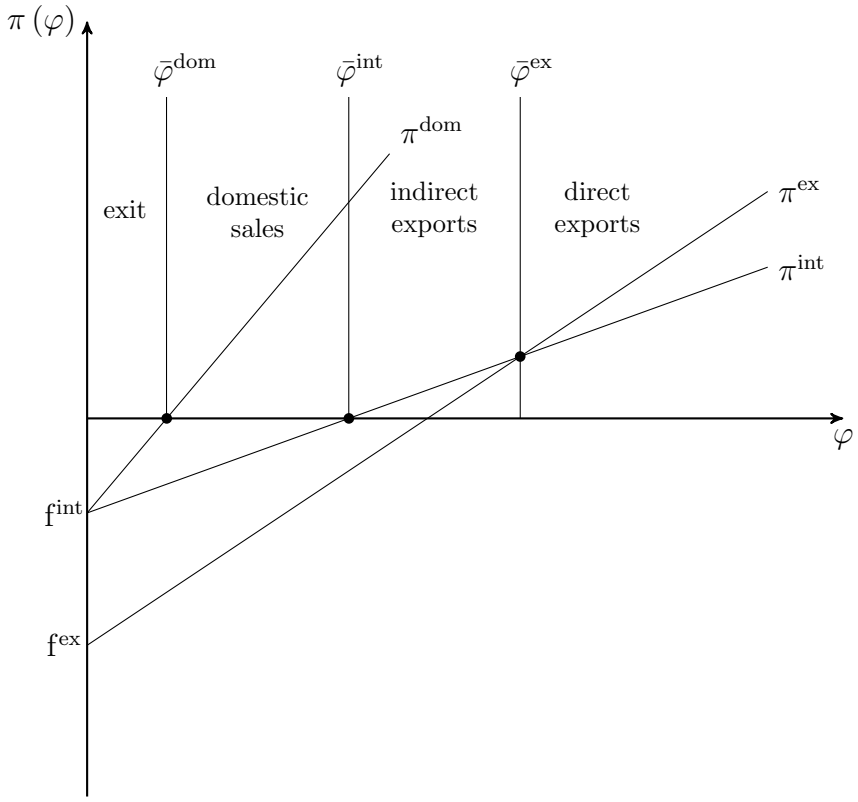
In Figure 3 both Melitz models are represented: in the upper Subfigure 2(a) the Melitz Model is represented, and in the lower Subfigure 2(b) is the Intermediate Melitz Model. In both subfigures, firm profit $\pi(\varphi)$ is depicted against productivity $\varphi$. The lines always correspond to profit lines; where 'dom' indicates domestic profits, 'int' profits from indirect exports, and 'ex' profits from direct exports.

In principle, the construction of the profit lines is the same as before, only now net profits and not positive profits are depicted. The net profit lines start in f and $f^{ex}$, respectively, as firms have to pay either some fixed costs to enter the market or some fixed trade costs to export. Likewise, the cut-off point for domestic production $\bar{\varphi}^{dom}$ is defined as before (Subfigure 2(a)).

Some differences, however, exist with regard to the Intermediate Melitz Model (Subfigure 2(b)). As the model is constructed, a firm can either export indirectly via an intermediary or directly. The former has the advantage, that no own trading network has to be established and maintained; one can utilize the service of an intermediary. This will lower fixed trade costs $f^{int}$, i.e. $f^{int} < f^{ex}$, but in return the intermediary will incur some additional marginal costs for his service. On the other hand, for direct exports these costs are not incurred; therefore one has to establish and maintain an own trading network,




(a) Melitz Model




(b) Intermediate Melitz Model

Figure 2: Graphical Illustration of the (Intermediate) Melitz Model (Felbermayr and Jung [2011])

which implies higher fixed trade costs again. Accordingly, the profit line for indirect exports $\pi^{\text{int}}$ will be flatter as higher marginal variable trade costs have to be beared, whereas the profit line for direct exports $\pi^{\text{ex}}$ will be steeper but with a lower origin as higher fixed trade costs have to be borne.

As depicted in Subfigure 2(b) first indirect exports break even; for all firms with a productivity $\varphi$ higher than the cut-off point for indirect exports $\varphi^{\text{int}}$, it is at least profitable to export indirectly. The advantageousness of direct exports is not reached until a productivity $\varphi^{\text{ex}}$; from here, it is more profitable to export directly rather than indirectly.

Melitz's results are not changed fundamentally by the inclusion of intermediaries but the results are adjusted in some way or other: firms become earlier exporters, but then under an indirect export mode, and the are only later direct exporters. In addition, the inclusion of intermediaries reveals that there is a direct link between the production decisions of farmers and the productivities of their farms: the higher the productivity of a farm is the higher is its chance first to produce for the domestic market and then for export.

PROPOSITION 3 (Agriculture & Intermediated Trade Structure): *Agriculture trade models with farm heterogeneity can be nested into an intermediated trade structure. Within this framework, it can be shown that first, that trade intermediation increases the total number of exporting farms; second, that there is a direct link between the production decisions of farmers and their farm productivities.*

*Trade Liberalization, Extensive Margin, and Trade Flow Elasticities.* - The Melitz Model not only yields new insights into the dynamics of structural change, but also into the developments of trade. As indicated above, the decisions of exporters to enter an export market or to exit it can be modelled within the framework of the Melitz Model. The corresponding variation in the set of exporters and its implications for trade has not been considered so far; in the literature, these variations are now referred to as the extensive margin of trade, whereas changes in the export volumes of existing exporters are referred to as the intensive margin of trade [Helpman et al., 2008].

For trade, the extensive margin of trade is insofar important: first, the extensive margin of trade acts in opposition to the intensive margin of trade with regard to terms of trade, i.e., whereas trade liberalization implies an export expansion at the intensive margin, it implies the export of more goods to more markets at the extensive margin. While the former worsens the terms of trade, the latter (at least in part) materializes the former effect [Liapis, 2009]. And second, the extensive margin of trade is an additional source for an increase in trade; trade increases at both margins of trade at the intensive, as well as at the extensive margin of trade. A non-consideration of the extensive margin of trade would bias the estimates of elasticities of trade flows; the corresponding estimates of elasticities of trade flows would be downward biased, and thus welfare effects are underestimated

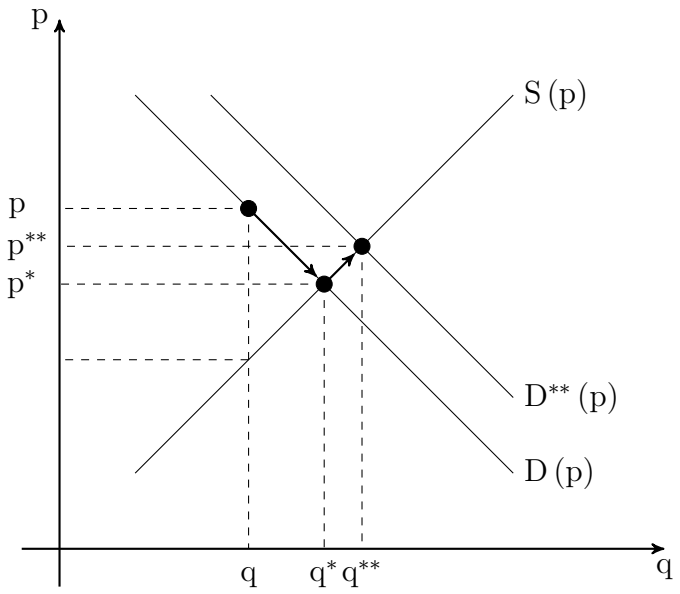



Figure 3: The Importance of Extensive Margin of Trade

[Chaney, 2008].

The issue can also be graphically represented. As represented in Figure 3, trade liberalization not only means sliding down the demand curve $D(p)$ (i.e. a change in the intensive margin of trade), but also an outward shift in demand $D^{**}(p)$ (i.e. a change in the extensive margin of trade). The former decreases the market equilibrium price from $p$ to $p^*$, whereas the latter again increases the market equilibrium price from $p^*$ to $p^{**}$ and thus the terms of trade. Trade increases under both margins the intensive as well as the extensive margin of trade, i.e. $q \Rightarrow q^* \Rightarrow q^{**}$ [Liapis, 2009].

Proposition 4 (Implications for Agricultural Trade): *A non-consideration of the extensive margin of trade, i.e. the variation in the set of exporters, will overestimate the terms of trade effect of agricultural trade liberalization and underestimate the trade effects of agricultural trade liberalization. Further, a non-consideration of these two effects will bias the estimates of elasticities of agricultural trade flows and thus of welfare changes.*

*Synthesis of Previous Theoretical Findings.* - To summarize our previous findings, where Golpinath et al. could only intuitively motivate their position, our revision of the recent literature reveals that there is even theoretical evidence for the applicability of 'New New Trade Theory' to agriculture. Farm heterogeneity is not only an empirical fact, but it is also theoretical to verify, and the importance of fixed trade costs for export market participation in agriculture is proven. There is also theoretical evidence that the insights of Melitz are equally applicable to intermediated trade, which is the common trade form in agriculture. The synthesis of all three items lays in principle the foundation for the application of 'New New Trade Theory' to agriculture.

Proposition 5 ('New New Agricultural Trade Theory'): *A synthesis of Proposition 1 and Proposition 3 lays in principle the theoretical foundation for the specification of a 'New New Trade Theory' Model for agriculture.*

These new insights have important policy implications: first, farm productivity and agricultural trade cannot be seen anymore as detached from one another. Where the Krugman Model would imply that farm productivity can only change with an exogenous shift in farm level technology, 'New New Trade Theory' models clearly show that farm productivity can also change for endogenous reasons. The choice of trade policy instruments has a direct effect on farm productivity: where tariffs have a decreasing effect on farm productivity, export subsidies have a contrary effect. Tariffs lead to lower farm productivities, as through tariffs, foreign competition softens especially what favors lower productive farms that only have a domestic focus. For higher productive farms the survival of lower productive farms means a tougher competition for domestic resources, which in turn aggravates especially exports. For export subsidies, the situation is reversed: now higher productive farms are favored rather than lower productive farms. Through the subsidization of exports, farms that produce for exports are especially favored; usually, this corresponds to higher productive farms, which have an additional comparative advantage in the competition for domestic resources through subsidization [Demidova and Rodríguez-Clare, 2009]. Resources are reallocated from higher productive farms to lower productive farms in the former case, whereas in the situation is reversed in the latter case. However, trade policies not only have an effect on farm productivity, but also the reallocation of resources involves structural change in agriculture; some farms might not only reallocate some of their resources, but they also might exit the domestic market. Hence, trade policies also have a direct effect on structural change, e.g. tariffs would lower structural change, and export subsidies would increase structural change. Policies aiming at farm productivity or intended to accompany structural change in agriculture should take into account the interlations with trade policies. Second, the importance of agricultural trade liberalization is once more reinforced. The insights that trade liberalization weakens the terms of trade by far less and increases trade by far more than originally expected give a reason to expect larger gains from free trade. These larger gains should be once more an incentive to take up the WTO negotiations again and further to develop new free trade agreements.

Proposition 6 (Implications for Agricultural Policy): *If 'New New Trade Theory' applies for agriculture, this will have implications for agricultural policy too: farm productivity and agricultural trade are interrelated concepts, where policies geared towards one will also affect the other. In addition, agricultural trade liberalization should be reinforced because expected gains from trade are much higher than originally expected.*

## 3 Methodological Aspects

Furthermore, in the recent literature one can also find methodological and statistical support for Golpinath et al.'s argumentation. There are important reasons why one should apply 'New New Trade Theory' models to agriculture even though one may not be totally convinced of their theoretical underpinnings. Among others, the heterogenous micro-level structure of 'New New Trade Theory' models allows a better estimation of elasticities of trade flows [Simonovska and Waugh, 2011b], and a non-consideration of firm heterogeneity could bias parameter estimates [Larch et al., 2010].

*Consistent Estimation of Trade Elasticities.* - The first point that the heterogenous micro-level structure of 'New New Trade Theory' models allows a better estimation of elasticities of trade flows is probably the most important point why one should opt for 'New New Trade Theory' models in practice. The problem one faces is that in standard trade models, small trade flows can be either rationalized by large trade frictions and small elasticities of trade flows or small trade frictions and large elasticities of trade flows [Simonovska and Waugh, 2011b]. Additional information is required to identify the elasticities of trade flows separately. The heterogenous micro-level structure of 'New New Trade Theory' is useful here, where elasticities of trade flows can be better estimated Simonovska and Waugh [2011a]. In the standard trade model, the elasticities of trade flows estimated would be too low [Chaney, 2008].

A precise estimation of the elasticities of trade flows is important, as the magnitudes of welfare gains directly depends on it. Besides the shares of expenditure on domestic goods, only elasticities of trade flows are necessary to calculate the welfare gains of common trade models [Arkolakis et al., 2011]. Welfare gains, however, are the revelant policy variables.

*Firm Heterogeneity and Consistency of Estimation.* - Another statistical reason why one should opt for 'New New Trade Theory' models in practice is raised by Larch et al. [2010]. The authors show in a comparative analysis that the newly developed Helpman et al. [2008] estimator is preferable to the standard Heckman [1979] estimator; there is both statistical and empirical evidence indicating that the Heckman estimator could be biased by an omitted variable problem. The problem is related to the way measures for sample selection and for firm heterogeneity are constructed.

The basic idea of Heckman's sample selection correction and Helpman et al.'s firm heterogeneity correction is illustrated in Figure 4. As shown, the Heckman estimator corrects for an upward bias in theory and the Helpman et al. estimator additionally corrects for a downward bias, too. Both biases could be relevant for trade: A sample selection bias can be assumed as bilateral trade flows are usually measured in logarithm and thus zero trade flows turn into missing values, which in turn yields a sample selection problem. If there are unobservable bilateral trade costs, then there is a risk that only those further distant trading partners with unusually low unobservable bilateral trade cost will remain. As a result, the error term should be positively correlated with distance, causing

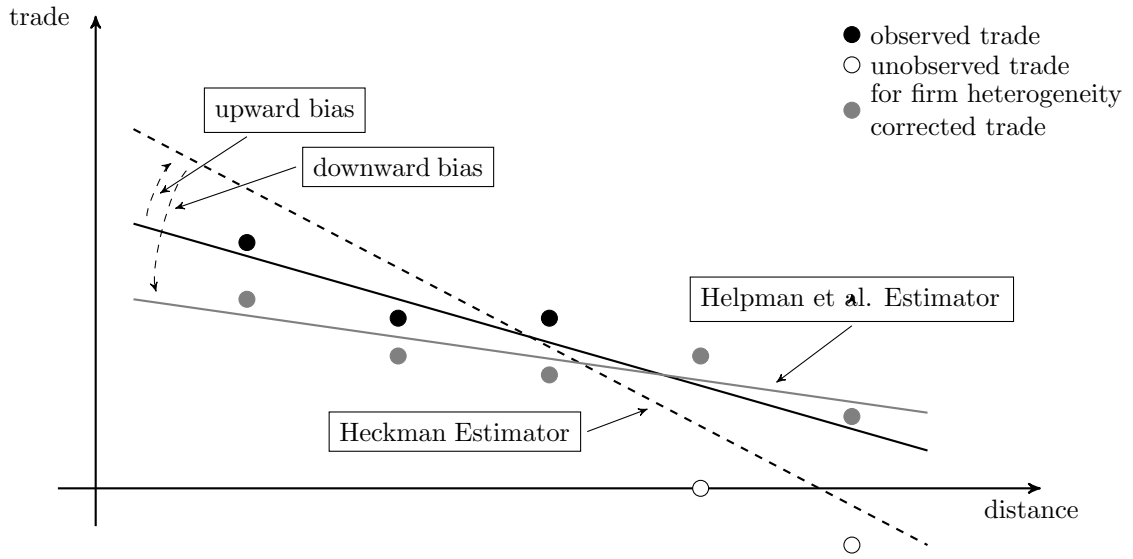



Figure 4: A Comparison of the Heckman and the Helpman et al. Estimator (Larch et al. [2010])

an upward bias. Likewise, a firm heterogeneity bias can be assumed. The more distant a trading partner is, the higher the chance is for a firm not be productive enough anymore to export profitably to the corresponding trading partner. If one does not account for this decrease in the number of exporters, then there should be a negative correlation between the error term and distance, causing a downward bias.

In practice, however, the problem with the Heckman estimator is that both correction factors (one for sample selection and the other for firm heterogeneity) are based on the same probit score variable; for sample selection there is a monotonic decreasing relation, whereas for firm heterogeneity, there is non-monotonic u-shaped relation. The problem is that if most of the observed firm heterogeneity corrections are concentrated only along one leg, then it could be statistically difficult to separate the sample selection effect from the firm heterogeneity effect; in the end, the standard Heckman estimator would be biased, capturing misleadingly the firm heterogeneity effect, too. Only with the Helpman et al. estimator one would be able to single out the sample selection effect and the firm heterogeneity effect.

What should become obvious is that in practice, the Heckman estimator should only be applied with caution; it should only be applied if one can exclude the presence of firm heterogeneity otherwise one should always prefer the Helpman et al. estimator.

## 4 Conclusions

In this paper we have taken up the discussion of Golpinath et al. [2007] of whether 'New New Trade Theory' is applicable to agriculture, too. Like the authors, we share the same conviction that 'New New Trade Theory' and its related concepts will become standard for agricultural economics. We are convinced that the new concepts will impact the modelling

of structural change in agriculture as well as the estimation of elasticities of agricultural trade flows, and thus the specification of agriculture trade models. Farm productivity and agricultural trade are directly interrelated concepts. The insight that firm heterogeneity introduces a new source of comparative advantage, viz., that changes in the trading environment also induce resource reallocations within sectors, will shift research interest also in agriculture from a sector perspective to a farm perspective. We expect that this shift in perspective will also affect agricultural trade policy. As for manufacturing, we expect the emergence of a 'New New Agricultural Trade Policy' [Ciuriak et al., 2011].

To further support Golpinath et al.'s and our position, we have revisited the recent trade literature with the result that both theory and methodology support our position.

Theory has made important progress. Farm heterogeneity seems to conform even to identical firms: even in the presence of ex-ante identical firms, the choice of different technologies [Yeaple, 2005] or the non-contemporaneous implementation of a new technology [Ederington and McCalman, 2008] gives rise to firm heterogeneity and thus to farm heterogeneity also. The importance of fixed trade costs for export market participation in agriculture is now proven [Kandilov and Zheng, 2011]. And, it is confirmed that the Melitz Model is equally applicable to intermediated trade [Ahn et al., 2011]; the chance to export indirectly or directly depends directly on farm productivity, i.e., the higher the productivity of a farm is, the higher its chance is to become first an indirect exporter and then a direct exporter.

The insights from theory are important in that the former two aspects allow the specification of an agriculture trade model with farm heterogeneity and the latter aspect allows to nest the corresponding model into an intermediated trade structure. The synthesis of these three aspects lays in principle the theoretical foundation for the specification of a 'New New Trade Theory' Model for agriculture.

Besides this, there are also some plain methodological and statistical reasons why one should opt for 'New New Trade Theory' models. One important reason is raised by Simonovska and Waugh [2011b]: the heterogenous micro-level structure of 'New New Trade Theory' models allows for a better estimation of elasticities of trade flows; a more precise estimation is here elementary as the magnitude of welfare changes crucially depends on the size of the elasticity of trade flows. A non-consideration of the heterogenous micro-level structure could significantly lower the estimates of elasticities of trade flows, and thus the estimates of welfare changes [Chaney, 2008]. Larch et al. [2010] hint to another important statistical reason: they show the omission of a firm heterogeneity factor in the estimation of a trade model can lead to an omitted variable bias, so standard Heckman estimators could be biased and should therefore only be applied with caution.

Nevertheless, until now just the basic principles of a 'New New Agricultural Trade Theory' have been defined and the theory is by far not closed. Future research should focus on the explicit modelling of farm heterogeneity, as in what the determinants of farm heterogeneity are and how changes in the latter affect farm structure and thus

agricultural trade. Other research should focus on intermediated agricultural trade, so far the intermediate sector is just implicitly modelled in 'New New Trade Theory' models, but previous research [McCorriston, 2011, 2002] has already shown the importance of imperfect competition along the supply chain for agricultural trade. In the future the Intermediate Melitz Model should be extended in this direction.

There is also much preliminary work left to be done: agriculture trade models with heterogenous farms would require the development of appropriate databases that not only encompass aggregate trade data, but also farm data.

All in all, the first steps in the direction of the development of a 'New New Agricultural Trade Theory' have already been done but many further steps will have to follow. Agricultural trade research is just at the beginning of a new era.

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1969/70 wurde durch Zusammenschluss mehrerer bis dahin selbständiger Institute das **Institut für Agrarökonomie** gegründet. Im Jahr 2006 wurden das Institut für Agrarökonomie und das Institut für Rurale Entwicklung zum heutigen **Department für Agrarökonomie und Rurale Entwicklung** zusammengeführt.

Das Department für Agrarökonomie und Rurale Entwicklung besteht aus insgesamt neun Professuren mit folgenden Themenschwerpunkten:

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- Landwirtschaftliche Betriebslehre
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- Umwelt- und Ressourcenökonomik
- Welternährung und rurale Entwicklung

In der Lehre ist das Department für Agrarökonomie und Rurale Entwicklung führend für die Studienrichtung Wirtschafts- und Sozialwissenschaften des Landbaus sowie maßgeblich eingebunden in die Studienrichtungen Agribusiness und Ressourcenmanagement. Das Forschungsspektrum des Departments ist breit gefächert. Schwerpunkte liegen sowohl in der Grundlagenforschung als auch in angewandten Forschungsbereichen. Das Department bildet heute eine schlagkräftige Einheit mit international beachteten Forschungsleistungen.

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