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Heterogeneous firms and dynamic gains from trade

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Abstract

This paper extends the heterogeneous firms model by Melitz (2003), as it combines a two factor/two country neoclassical Ramsey growth model with Melitz' intra-industry trade model. Heterogeneity across firms refers here to the capital intensity in production at given relative factor prices. This paper demonstrates that central results of Melitz (2003) are not robust against endogenizing the countries' capital endowments. Depending on the magnitude of variable and fixed export costs, opening a country up to international trade may change the average firm's capital intensity in either direction. The subsequent increase (decrease) in the country's total capital endowment increases (decreases) total welfare. Consequently, exposure to trade may reduce welfare *due to* heterogeneity across firms. In contrast to Melitz (2003), this model is therefore able to provide a rationale for an import tariff.

JEL classification: F12, L11

Keywords: Intra-industry trade, firm heterogeneity, firm dynamics, neoclassical growth model

Non-technical summary

International trade theory has been extended recently by the 'new new' trade theory (cf. Baldwin/Forslid (2004) for this labeling). The 'new new' trade theory allows for heterogeneity across firms and is formalized by, among others, Melitz (2003), Falvey et al. (2004) and Baldwin/Forslid (2004). The results of these 'new new' models share one central feature: opening up a country to international trade leads to an overall welfare gain due to a factor reallocation towards the more productive firms. Previous trade models without firm heterogeneity therefore underestimated the potential gains from trade. However, these 'new new' models are static in the sense of neglecting the special features that arise from an endogenous factor accumulation in a neoclassical growth model. Therefore, the present paper extends the Melitz (2003) intra-industry trade model to a two-country Ramsey growth model with capital and labor as factors of production. Heterogeneity across firms refers here to the capital intensity in production. As in Melitz (2003), countries are symmetric.

This paper starts with demonstrating that, first, in this dynamic model the total capital endowment of a country always adjusts to the capital intensity of the average firm. Second, that an increase (decrease) in the average capital intensity increases (decreases) total welfare of a country. Third, that the relative price of labor is larger than unity for a "small" time discount rate and capital depreciation rate, i. e., for a capital rich country. Consequently, firms that entered the market start to produce only, if the capital intensity, which is a random variable, exceeds a threshold value. If, additionally, exporting is more costly than serving the home market, a firm exports only if its capital intensity exceeds a second and higher threshold value.

The main part analyzes the consequences of the exposure to trade. The capital intensity of the average firm in either country is determined via its free entry and exit condition: the present value of expected variable profits minus expected fixed costs in future periods has to equal the one-time market entry costs. Exposure to trade influences this free entry and exit condition via two channels: first, additional demand from abroad raises the expected variable profits in future periods. Second, serving the foreign market increases the expected fixed costs of the average firm in future periods. The relative magnitude of both channels depends on the variable and fixed export costs. Higher variable export costs reduce the additional variable profits from exporting and

higher fixed export costs increase the entire fixed costs in future periods. Given that both the variable and fixed export costs are large, so that the second channel dominates the first, exposure to trade reduces the expected total profits of the average firm. The probability of a successful market entry therefore must increase, so that the expected total profits of the market entry exactly equal the one-time market entry costs again. This result is synonymous to a decrease in the average capital intensity. Both countries therefore loose in welfare. This outcome is in sharp contrast to previous models. In Melitz (2003) the welfare gains result from an endogenous firm selection due to competition for scarce resources: the productivity of the average firm always adjusts according to the labor endowment constraint. This selection mechanism is excluded in the present model with endogenous capital accumulation. In contrast, it is the capital endowment that always adjusts according to the capital intensity of the average firm. The average capital intensity itself is determined via the free entry and exit condition of the average firm.

However, if both the variable and fixed export costs are small, the first channel dominates the second: exposure to trade increases the expected total profits of the average firm. The previously mentioned line of argument simply turns around and both countries gain in welfare. This result is in line with Melitz (2003).

Nevertheless, this paper shows that a positive import tariff may exist *due to* heterogeneity across firms.