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Policy Note

Structural Estimation of Gravity Models with Path-Dependent Market Entry

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Abstract

This paper develops a structural empirical general equilibrium model of aggregate bilateral trade with path dependence of country-pair level exporter status. Such path dependence is motivated through informational costs about serving a foreign market for first-time entry of (firms in) an export market versus continued export services to that market. We embed the theoretical model into a structural dynamic stochastic econometric model of bilateral selection into import markets and apply it to a data-set of aggregate bilateral exports among 120 countries over the period 1995-2004. In particular, we disentangle the role of changes in trade costs, in labor endowments, and in total factor productivity for trade, bilateral market entry, numbers of firms active, and welfare. Dynamic gains from trade differ significantly from static ones, and path-dependence in market entry cushions effects of impulses in fundamental variables that are detrimental to bilateral trade.

Keywords: Bilateral trade flows; Gravity equation; Dynamic random effects model; Sample selection

JEL-codes: F10; F12; F17

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FIW-Projekt: Structural Estimation of Gravity Models with Path-Dependent Market Entry

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Even in recent years a substantial share of possible bilateral trade relations is inactive and the corresponding aggregate bilateral trade flows are zero. Empirical evidence suggests that the probability of two countries to trade at all with each other is related systematically to fundamental drivers of trade such as market size, productivity, and trade liberalization. Moreover, the state of whether two countries trade with each other is persistent both conditional and unconditional on contemporaneous fundamentals. Reasons for that may be learning or other forms of information exchange, establishing a public good character for knowledge about bilateral market access.

Between 1992 and 2004 nominal trade flows of the economically most important 120 countries included in our analysis increased by 10 percent per year on average, and an important contribution to this increase come from newly established trade flows. On average, we observe positive trade flows only for 71.5 percent of all the country pairs with an average increase by 2.1 percent per annum. 27 % of the trade flows that were observed in 2004 did not exist in 1992. We provide estimation results which illustrate the importance of state dependence as the existence of a trade relationship significantly increases the probability to observe it in the future. With estimates of a structural model of bilateral trade at hand, we are able to analyze counterfactuals that are relevant for economic policy. Specifically, we investigate how the nominal value of bilateral trade would have evolved if the increase in labor productivity, the growth in population, and the decline in trade costs since 1995 had not occurred. In this way it is possible to isolate short-run and long-run impacts of the respective

change in economic fundamentals. In addition, we can estimate the implied aggregate welfare effects as measured by real income.

The increase in labor productivity is found as the quantitatively most important determinant of bilateral exports. Without the observed improvement in labor productivity, trade flows would have been 22.2 percent lower and real income by 18.1 percent by the end of the sample period. In the group of the new Eastern European EU-member countries (Eastern Enlargement 2004) the implied increase in trade flows due to growth in labor productivity is even higher as these countries faced above-average increases in labor productivity in the course of their catching-up process (29.4 and 32.9 percent, respectively). Population growth induced an increase of 7.5 percent in trade flows and of 13.4 percent with respect to real income. Between 1995 and 2004 the estimated decrease in trade costs amounts to 8.3% on average. This generated an overall increase in nominal trade flows of 8.3% on average. The estimated accumulated impact of the observed state dependence of bilateral trade flows amounts to 2 percent within the sample period.

For economic policy several conclusions can be drawn. First, the evidence of this study indicates that policies aiming at establishing new trade relations between countries induce positive long-run welfare effects and dynamic gains from trade. At this point, a further liberalization of tariffs should not be expected to trigger big average effects on economic outcome, neither in the short run nor the long run. The reason is that tariffs are already relatively low so that big effects will more likely flow from policies which address technological progress.

Second, due to the large differences in the driving forces across countries, for example in bilateral and multilateral trade costs, market size, and labor productivity as well as changes thereof, there is a large heterogeneity not only in the impulses but also in the responses across countries and country-pairs. This suggests that specific scenarios relevant for economic policy on a case by case basis to derive comparative static effects that are theory consistent and account for both the impact on existing bilateral

trade relationships, the establishment of new ones, and direct versus indirect effects. There is limited scope for generalization due to heterogeneity.

Third, it is not enough to analyze the impact of economic policies on bilateral trade flows based on an empirical model that only looks at bilateral relations as myriads of studies informing economic policy did so far. Due to interdependence and general equilibrium effects, changes in fundamental drivers of trade trigger multilateral effects.

The present study provides the tool for an analysis which accounts for heterogeneity, general equilibrium effects, and dynamic responses of trade and GDP to shocks in fundamental economic factors such as labor productivity, the size of the labor force, and trade costs.