

## Estimating Trade in a Regional Input-Output Table

Topic: 814A Regional IO Modelling (3)

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This paper provides a new hands-on recipe for regionalizing national Input-Output (I-O) tables. While the theoretical grounds of existing non-survey regionalization methods are questionable, we develop a method which is both, theoretically well-founded and consistent with national accounting principles. We derive a regional trade equation that estimates sectoral internal trade and thereby sectoral exports and imports. The trade equation is derived as the equilibrium solution of a 2-regions (small region and rest of world) trade model with CES preferences and symmetric trade barriers. It shows how internal trade depends on the region's output and use as well as on its internal trade barrier. The latter is approximated by combining known national data with easily accessible information of the region's geographical size. We call the method "Gravity Regionalization of Trade Approach" (GRETA). Unlike other non-survey methods, GRETA's trade equation fulfills the constraint that internal trade is non-negative and does not exceed either the region's domestic output or use. We show that, according to the formula, internal trade is increasing in both, domestic output and domestic use, and that it increases more than proportionally if output and use increase *pari passu*. Furthermore, trade is decreasing in the internal barrier. At the extremes, it goes to zero if the barrier goes to infinity and to the minimum of output and use if the internal trade barrier goes to zero. After providing GRETA's easy to use regionalization recipe, we take our approach to the data and test it with regional I-O survey data for Finland, China and Japan. We find that GRETA generally performs well in estimating sectoral trade, although the performance differs across sectors and regions. Finally, we also compare our estimation results with commonly used methods like the "Cross-Hauling Adjusted Regionalization Method" (CHARM) by Kronenberg (2009) and find that GRETA generally outperforms its competitors. Like other methods, GRETA also tends to overestimating regional output multipliers, but less so than other regionalization methods. The empirical application also shows that CHARM produces negative sectoral trade values in certain cases, which cannot happen with GRETA.