On the Simultaneous Estimation of Physical and Monetary Commodity Flows

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Large-scale databases mapping commodity flows measured in various units such as currency, tons or caloric values build the base for many recent environmental-economic studies. Their construction typically requires combining large amounts of partial information in a series of successive steps. These include the estimation of unobserved flows, their transformation from one unit into another, harmonizing differing levels of aggregation and mismatching classifications and, finally, reconciling estimates with mass-, financial- and/or energy-balances. This paper proposes a maximum entropy model that allows for the simultaneous estimation of unobserved commodity flows measured in physical and monetary units from limited information. The model assembles compound commodity flows from products at high resolution and diverse prices such that data constraints in various units of measurement, levels of aggregation and possibly mismatching classifications are simultaneously satisfied. Its capability is demonstrated in terms of a real-sized application to the estimation of interregional trade flows in Germany.