The snowball effect in a globalized economy. The contribution of different sources of inflation

Topic: Inflation and Supply Chain Adaptation in Dynamic Interindustry Modelling
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Whereas usually either neglected by the rising literature on global value chains (e.g., Koopman et al., 2014), or narrowly focused on the economic impact of disasters highly concentrated in space (Okuyama et al. 2004, Avelino and Hewings, 2019; Koks and Thissen, 2016; Inoue & Todo, 2019), the investigation of the generalized effects of bottlenecks in production networks due to supply shocks has blossomed in the very last years.

Such a renewed interest has been spurred by the global impact of recent events which have been threatening the functioning of international production networks. First, the unfolding of the COVID-19 crisis since 2020 through 2021 and 2022 has contributed to globally impair production (Reissl et al., 2022 a,b; Meier and Pinto, 2020; Inoue and Todo, 2020; Pichler et al., 2020), as documented by the Global Supply Pressure Index estimated by Benigno et al. (2022). Second, the energy crisis fuelled by the Ukraine crisis, complemented by the sharp increase in the demand of goods in the United States in the wake of the COVID-19 crisis, gave rise to sharp increase of inflation in most of the world economies (Weber et al., 2022; OECD, 2022). Finally, the spread and the intensity of climate change induced disasters have sharply increased over time (Coronese et al., 2019), threatening the production of the goods most vulnerable to climate change at the global level.

To explore this issue empirically, we use a Bilateral Trade Model (BTM) developed at INFORUM (Interindustry Forecasting at the University of Maryland) and a system of national models. We have built an original dataset of bilateral trade flows built using UN Comtrade data combined with national accounts and sectoral data for all economies included in the system. As described in Bardazzi and Ghezzi (2018, 2022), this modelling approach also considers the effects through the relative prices of commodities while in most of the literature the demand side is the main channel to evaluate the economic consequences of a shock. This effect is endogenized in estimating and forecasting bilateral trade shares: the latter are not assumed constant as a change in international demand generates pressures on prices and affects the relative competitiveness between countries. Moreover, our model allows a change in the global demand as countries adjust to international prices through changes in output, input and import substitution, and export diversion. A high level of disaggregation of trade flows is particularly useful to fully capture the complex interrelations between economies. In this linking system, both the flows of commodities produced in country i and consumed in country j and also domestic prices in country j are affected by (i) changes in the import-to-domestic-purchase ratio in country j; (ii) changes in the share of country i in country jâ€™s imports; (iii) changes in the level of output of both countries.

We run the international system of models under different scenarios to calculate the impact of different sources of inflation. Considering the main features of this model, the overall linking system of BTM and the national multisectoral models allow to estimate direct and indirect feedbacks between the economies through international trade flows.

The novelty of our approach is twofold. On the one hand, integrating data and models from different sources, it allows to geographically pin down shocks to the production of goods, which are then transmitted to industries from all around the world, taking into account of the peculiarities of the production systems of different countries. Secondly, adopting a simulation methodology able to disentangle supply and demand effects, it allows to assess the intensity of different factors at work

in pushing the inflation dynamics. Each national economy possibly adjusts to the variation in relative prices through a change in demand, an import substitution from other sources or with domestic production depending on the relative price competitiveness on domestic and international markets. These adjustments are modelled with the simultaneous solution of the real and nominal sides of the models, taking into account the feedback from trade substitution on IO linkages directly in the dual IO equations which include also the endogenous estimation of several final demand and value added components. These feedbacks represent a way to factor in resilience in the simulation of a shock which propagates through international markets and itâ€™s an outstanding feature of this modelling approach.