A distributional extension of the input-output framework to study the impact of price shocks on household living standards

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The 2021â€“2023 inflation episode reignited interest in the unequal burden of rising prices across households and its connection to industry-level dynamics. While recent research has documented that the cost-push shocks of the post-pandemic period originated in a handful of sectors and propagated unevenly through supply chains, the empirical tools needed to trace this transmission directly from the interindustry structure to the personal distribution of real income remain underdeveloped. This paper addresses that gap by presenting a distributional extension of the input-output framework and applying it to the Spanish economy over the period 2010â€“2023.

Research question. How do industry-level price shocks â€” originating in changes to functional income distribution â€” transmit through the interindustry structure to affect household purchasing power across the income distribution? And can this transmission be characterized empirically using actual production network data, without relying on strong modelling assumptions? These questions respond directly to the G-20 Data Gaps Initiative III.8 recommendation, which calls for the development of timely distributional data on household income and consumption consistent with national accounts aggregates.

Method. The paper builds upon the Leontief price model to derive a synthetic consumer price index that is sensitive to the source and type of the initiating shock. By closing the input-output model with respect to the household sector â€” following Miyazawa's interrelational income multiplier framework â€” we introduce a partitioned technical coefficient matrix that maps both the expenditure (C matrix) and income (V matrix) connections between 64 NACE industries and households grouped by income decile. This dual linkage allows the paper to run first-order impact analyses and microsimulations tracing how profit or wage shocks to a single industry propagate through the production network and are absorbed differentially by households at different positions in the income distribution. Principal components analysis is then applied to identify clusters of 3-digit COICOP consumption items that move together across industry shocks, yielding an empirically-driven classification of inflationary transmission channels.

Data. The empirical application rests on a novel dataset integrating three statistical sources. First, Eurostat's FIGARO symmetric input-output tables for Spain (2010â€“2023) provide the interindustry transaction structure at 64-industry detail. Second, a synthetic microdata set is constructed by statistically matching the Spanish Household Budget Survey (ES-HBS) and the Survey on Income and Living Conditions (ES-SILC) using random hot-deck imputation with constrained replacement, with matching variables selected according to a Hellinger distance threshold below 0.15. Third, the synthetic microdata are grossed up to national accounts totals following the OECD/Eurostat distributional national accounts methodology, including conceptual harmonisation of survey variables with ESA 2010 accounts, population reweighting, and item-by-item gap allocation methods leveraging Engel's Law for necessities and progressive quantile scaling for non-necessities. The resulting 2010â€“2023 series of distributionally extended national input-output tables for Spain is provided as supplementary material to support replication and further research.

Novelty. The paper makes contributions along three dimensions. Methodologically, it presents a comprehensive blueprint for extending input-output tables distributionally from both the income and expenditure sides simultaneously, providing a step-by-step integration of household survey microdata with FIGARO symmetric IOTs. Empirically, using Spanish data, it documents substantial

heterogeneity in inflationary potential across industries and three distinct inflationary transmission channels â€” a broad general channel, an essentials channel, and a discretionary channel, which carry directly opposite distributional implications. Analytically, the paper contributes to the development of a mesoprudential monitoring perspective on inflation, complementing aggregate monetary policy analysis with industry-specific early warning indicators sensitive to distributional outcomes. The results show that even moderate profit shocks to food or energy industries impose visible real income losses on the bottom two deciles, while equivalent shocks to accommodation or creative industries can be inequality-reducing â€” a distinction invisible to standard aggregate CPI analysis. The paper thus advances the conference theme of policy resilience by providing a replicable, data-driven framework for assessing the distributional and living standard implications of price instability at the sectoral level.