

Extended multisectoral and price-quantity models: two non Walrasian models for Spain.

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In multisectoral models based on Input-Output (I-O) tables or Social Accounting Matrices (SAM), three main groups emerge: linear models (such as Leontief's classic open (1944) and closed (1941) models, and Miyazawa's (1968) model, and those utilizing SAM (Stone 1947, Stone 1954, Pyatt e Thorbecke 1976, Pyatt e Round 1979). Since the 1970s, these models have been crucial for policymakers to assess the effects of national and regional policies. They provide detailed analysis of the circular flow of income (Leontief 1991) and the interdependence of sectors. Based on Leontief's work, they assume fixed input-output relationships and constant prices, resulting in quantity-driven economic changes.

Second, Computable general equilibrium (CGE) models analyse agent behaviour to capture price changes, feedback effects, and budget constraints in economies. Based on principles such as Walrasian equilibrium and Arrow-Debreu's theorem (1954), construction of Scarf (1967, 1960), and the Pioneering Work of Johansen (Johansen 1960), however, these models can be classified as "non-pure Walrasian" or "structuralist," focusing on income distribution (Robinson 2006, Taylor 1990). For instance, Lusting and Taylor created a structuralist model for Mexico, while Robinson (2006) compared structuralist, Keynesian, and neoclassical CGE models. While CGE models offer a flexible framework for sectoral and industry feedback, they also require more assumptions and careful calibration, especially regarding elasticities and agent behaviour.

However, there are a third type of model which are closer to non-Walrasian approach, the Nonlinear Input-Output models (NIO) (Sandberg (1973); Chander (1983); Fujimoto (1986), Szidarovsky (1989)). For example, Steenge et al. (2020), endogenize final consumption and de-linearize Miyazawa's approach. Recently Cardenete et al. (2024) have recently proposed a third approach based on Leontefian-inspired models where, as mentioned above, the standard model consists of two distinct and independent modules that describe the underlying factors governing quantities and prices. However, The modules operate independently, limiting the standard model's ability to analyze simultaneous changes in price and quantity. To address this, the authors propose a Price-Quantity (PQ) model calibrated on a SAM. This model combines a Leontiefian cost structure with a neo-Ricardian distributive approach. They introduce a simultaneous equation algorithm to connect both modules, avoiding the strong assumptions typical in classic CGE models.

On the other hand, the Extended Multisectoral Model (EMM) can be regarded as an extension of the Miyazawa model, as it aims to address its limitations in endogenizing income distribution and redistribution by adopting an alternative approach to modelling the circular flow of income. Under a whole SAM framework, Ciaschini and Socci (2006) proposed to model the circular flow of income in every single phase: the generation, the allocation, the distribution and the use of income. In other words, while this model lacks the interaction between the two modules found in the PQ model, it incorporates income redistribution. In other words, it captures disposable income and uses this to model final demand.

This article compares two multisectoral models, like the Leontief approach, but with endogenous induced effects. The first model is a neo-Ricardian framework (PQ model) incorporating price and quantity interactions. The second is the EMM, aligning with national accounting practices and the income distribution theories of Kalecki (1954) and Kaldor (1955). This comparison explores how models with different equilibrium assumptions handle nonlinearities, avoiding more distant theoretical frameworks such as the Walrasian or CGE models. We compare two models that we can categorize as partial equilibrium in the Arrow's sense (Arrow and Hahn 1971).

The models will be calibrated on a SAM for SAM 2016, which includes 30 activities, 2 institutional

sectors – private institutional sectors and government- and the Rest of the World (RoW), and capital formation. The SAM was constructed based on information of the Spain national institute of Statistics (INE). After the models have been calibrated, a comparative analysis of both will be carried out, based on their multiplier effects. To do this, two approaches will be used: the classic multiplier analysis (Miller and Blair 2022) approach and the “Macro Multipliers” approach (Ciaschini 1993). The idea is to analyse the differences that each assumption and linearities or non-linearities contribute to the analysis of the multiplier effects.

This article compares two multisectoral models using a SAM, structured in six sections. It begins with a discussion on nonlinear input-output models and the role of income distribution in economic analysis. The second section reviews the Price-Quantity (PQ) model based on neo-Ricardian principles and contrasts it