



# Post-Keynesian Stock-Flow Consistent Modeling: A Survey

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## SYNOPSIS

A new family of macroeconomic models has come from the Post-Keynesian literature in recent years: stock-flow consistent (PK-SFC) models. The primary goal of this paper is to depict the state of the art of PK-SFC models. To reach our goal, we divide the main publications we gathered according to their subjects (Financialization, Open economies, Fiscal and monetary policies, theoretical debates) and methodology (theoretical models with either discursive or numerical resolution and empirical models).

## Introduction and Background

PK-SFC models are a specific kind of Post-Keynesian macro model that follows distinctive accounting rules, ensuring the consistent integration of the stocks and flows of all the sectors of the economy. The models have three important methodological innovations: first, the consistency of the overall economy is maintained, since one sector's outflows are always another sector's inflows just as one sector's liability is always another sector's asset; second, the integration of the real and the financial side of the economy; third, the construction of the long run as a chain of short run periods. Nothing is lost, neither in space nor in time. These constraints are crucial in modeling modern macroeconomies which are highly complex, integrated systems.

The roots of PK-SFC models can be identified in the work of Morris A. Copeland (1949), who, with his study on "money flows," is the father of the flow of funds approach. His intuition was to enlarge the social accounting perspective to the study of money flows. Copeland laid the foundations for an economic approach able to integrate real and financial flows of the economy. A concrete example of his legacy is represented by the quadruple-entry system: since someone's inflow is someone else's outflow, the standard double-entry system of accounting is doubled in a quadruple-entry system.

Copeland's work certainly had a great influence on economics -mainly as a source of financial data- but its potential disruptive impact on the study and modeling of the interdependences between real and financial flows failed to

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occur. It was only in the 1980s, with the work of Nobel Laureate James Tobin, that these efforts culminated in the organizing theory advocated by Cohen. The article Tobin wrote with co-authors (Backus et al., 1980) perhaps best represents his path-breaking contribution in the foundation of PK-SFC models. Indeed, in developing an empirical model of the US economy in both its financial and non-financial sides, Backus et al combined the theoretical hypothesis on the behavior of the economy with a rigorous accounting framework based on the flow-of-funds social account developed by Copeland. The result is a stock-flow consistent model that includes some of the characteristics still peculiar in the literature, such as the matrices-based accounting approach and discrete time and other features, such as the stock-flow identity, which are fundamental in any model of this type.

Next to Tobin, the other scholar who played an essential role in the development of this family of models is Wynne Godley. Godley, head of the New Cambridge school in the 1980s, started developing models coherently integrating stocks and flows. His efforts culminated in the organized framework he developed in his more recent publications, with which he collected the legacy of Tobin. Godley's contribution probably finds its peak in the seminal book he wrote together with Marc Lavoie (Godley and Lavoie, 2007), which is still the main reference for current PK-SFC practitioners. This paper focuses on the tradition descending from the work of Wynne Godley, hence the choice of talking of PK-SFC models rather than just SFC models.

### Issues and Questions Considered

The main advantage of the social accounting approach to money flows is its possibility to integrate the real and the financial side of the economy. The accounting framework can be

adapted to reproduce virtually any level of complexity. Sources of financing, portfolio choices, consumption and investment decisions and so on, can all be included in the same model. Furthermore, the PK-SFC framework presents an interesting modeling feature in that it explicitly accounts for capital gains, which are essential in order to obtain the stock-flow consistency. All these features made PK-SFC modeling a valuable tool in the recent economic debate on financialization and in the analysis of the financial crisis, which started in the US in 2007.

The PK-SFC framework is also well known for Godley's analysis of world imbalances. It is thus natural that many PK-SFC models represent open economies and examine open economies' issues. We analyze the three phases to open economy modeling within the PK-SFC framework. The first phase corresponds to Godley's seminal whistle blowing of world imbalances at the turn of the century. The second one is composed of the papers constructing the formal representation of open economies within the PK-SFC literature. The last phase is made up of all the papers analyzing particular points of the real world, based on the formal representation described in the second phase. These analyses, as we will see, are based on two main arguments: (1) the European construction and its monetary union, and (2) financialization, world imbalances, exchange rate, and foreign reserve, among others.

The PK-SFC approach provides a potential for common ground for all heterodox schools. The economic debate can largely benefit from the development of such common ground, which may allow for easier comparison among theories and interpretations. The solid and comprehensive economic theory, which heterodox economists aim to build to challenge the current mainstream, might become a Babel

Tower without the support of a common language.

### Outcomes, Findings, and a Didactic Turn.

Our paper provides a structured overview of the literature but allows as well for some conjecture on the possible lines of development of this class of models:

- If one believes in the importance of micro foundations, the Agent Based version of PK-SFC models represents an alternative to DSGE, and is more solid since it does not include fallacies of composition.

- PK-SFC models can provide a useful tool in the consensus-making attempt within the Post-Keynesian tradition, since the theoretical discussion and the comparisons are based on a coherent, structured, and at the same time adaptable framework.

- Empirical and policy indications models, combined, can lead to an economy-specific analysis, which is more useful at the policy level.

- The possibility of modeling the financial side of the economy has represented an incentive in developing models including complex financial sectors. This has its counterpart in the real side, which we feel has been a bit overlooked and could be further investigated. Among others, a direct benefit would be a more complete understanding of the interdependences between the two sides of the economy.

We conclude with a personal consideration. We encourage a didactical use of PK-SFC models, since we believe that their completeness can ease the comprehension of economic dynamics and interdependencies. To this end, both more complete empirical and simulated models and simple theoretical models with analytic solutions (see Dos Santos and Macedo e Silva 2009), can represent useful tools.

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