



# Wage–price dynamics and income distribution in a semi-structural Keynes–Goodwin model<sup>☆</sup>

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## Abstract

The paper studies the role of income distribution within a medium-scale macrodynamic model built in a Keynesian and Goodwinian tradition. Combining a wage and price Phillips curve, adjustments of an inflation climate, an IS relationship determining output, Okun's law for employment and the Taylor rule for monetary policy, a semi-structural model is obtained that incorporates the most important macroeconomic channels in a closed economy. After assessing the reasonable time series variabilities in stochastic simulations, a deeper analysis is concerned with the stabilizing and destabilizing effects of the model's parameters, and with a structural shift in income distribution. In many details of these investigations, the distinction between a wage-led and profit-led regime becomes important.

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## 1. Introduction

While of secondary, if at all, importance in the current mainstream theoretical literature, the role of income distribution was a key issue in the work by Richard Goodwin and is still an important issue in times when advocates of higher downward wage flexibility (and sometimes also price flexibility) have gained ground, and when in many industrial countries the distribution of income has become increasingly unequal.

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<sup>☆</sup> A software to run the dynamic simulations under alternative numerical coefficients is available on request.

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The model to be discussed in this paper follows Goodwin by taking the wage and price dynamics and the resulting variations in income distribution into account. In other respects, it is related to current work on modern macroeconomic modelling in a, broadly speaking, Keynesian (but not New-Keynesian) tradition. It particularly draws on the so-called KMGT disequilibrium approach advanced in Chiarella et al. (2005), which refers to Keynes, Metzler, Goodwin and Taylor as its patron saints. ‘Goodwin’ indicates that income distribution plays a crucial role in the dynamics of nominal and real variables. It is determined by the interplay of a wage as well as a price Phillips curve, and in turn impacts positively on aggregate demand via workers’ consumption and negatively via profit-oriented investment. The Metzlerian part is a consequence of goods market disequilibrium which is absorbed by inventories, whose evolution in turn feeds back on planned inventory investment and thus aggregate supply. ‘Taylor’ takes account of monetary policy and complies with the general consensus reached over the last decade that the central bank adopts an interest rate rule, most often specified as a variant of the Taylor rule.

In order to simplify and to improve the scope for reliable econometric parameter estimates, the present model drops the Metzlerian feedbacks and the explicit distinction between workers’ and rentiers’ income. Besides a persistence effect, output is thus supposed to be directly dependent on the real interest rate and the wage share. For the changes of employment, a slightly augmented version of Okun’s law is employed. While these parts of the model are more akin to reduced-form relationships, the other equations have a more satisfactory structural underpinning. They comprise: (1) a wage and price Phillips curve, both enriched by the influence of an inflation climate and the wage share; (2) dynamic adjustments of the inflation climate; (3) the endogenous determination of labour productivity growth; (4) the Taylor rule for the nominal interest rate.

The paper consists of two main blocks: Section 2 introduces the single components of the model, and Section 3 considers them in their entirety by means of numerical simulations. The first part of Section 3 discusses the benchmark scenario and the dynamic properties to which it gives in the stochastic setting. The second part studies the impact of *ceteris paribus* parameter changes on the variabilities of the main state variables. The third part examines the deterministic adjustment paths in the wake of a stylized structural shift that amounts to a deterioration of the position of workers in the wage bargaining process. In the latter two parts, we emphasize as a special feature the distinction between a so-called wage-led and profit-led regime in the determination of output. Section 4 concludes.<sup>1</sup>

It should be mentioned that different from most heterodox Keynesian modelling, the first two parts of Section 3 employ the Frisch paradigm, which views the economy as basically shock-driven. Nevertheless, the paper demonstrates that also in this framework, despite the assumed (deterministic) stability of the steady state, meaningful questions for stabilizing and destabilizing parameter effects can be asked and answered. Hence, the ‘un-Keynesian’ paradigm does not necessarily preclude the investigation of such Keynesian themes as the impact of greater wage flexibility on economic ‘stability’.

## 2. Formulation of the model

In this section, our semi-structural Keynesian macroeconomic framework is formulated along the lines of Chiarella et al. (2005) and Asada et al. (2006). We directly set it up in discrete time as a

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<sup>1</sup> A more extensive version of the present paper is Franke et al. (2006). In particular, it discusses the econometric estimates and their implications in the full dynamic model, and it studies the stabilizing and destabilizing effects of parameter changes by undertaking an eigen-value analysis of a continuous-time version of the model.

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