

Towards an evolutionary interpretation of aggregate labor market regularities^{*}

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Abstract. In this paper, we present an agent-based, evolutionary, model which formalizes from the bottom up individual behaviors and interactions in both product and labor markets. We describe vacancy and wage setting, matching and bargaining, demand and price formation as endogenous processes. Firms enjoy labor productivity improvements and are selected in the product market. Simulations show that: (i) the model is able robustly to reproduce Beveridge, Wage and Okun curves; (ii) Okun coefficients greater than one emerge even if individual firms employ linear technologies; (iii) changes in institutional, behavioral, and technological parameters induce statistically detectable shifts in Okun and Beveridge curves.

Key words: Labor Markets – Dynamics – Aggregate Regularities – Beveridge Curve – Okun Curve – Wage Curve – Matching Models

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1 Introduction

Over the last couple of decades, a quite large literature has been trying to investigate the process through which firms and workers meet in the labor market, how

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this matching process affects wage setting and (un)employment dynamics, and the extent to which unemployment and output interact over the business cycle¹.

Three well-known empirical aggregate regularities seem to provide a quite complete picture of the interplay between the forces at work. First, the Beveridge curve predicts a negative relationship between rates of vacancies and rates of unemployment. Second, the Phillips curve suggests that changes in wage rates are negatively related to unemployment rates. Alternatively, the Wage curve predicts a negative correlation between levels of real wages and unemployment. Third, the Okun curve posits a more than proportional increase in real GDP for every one percentage point reduction in the unemployment rate.

Most of the literature has tried so far to explain these phenomena on the grounds of a standard “toolbox” based on micro-foundations which postulate hyper-rational firms and workers. The “representative individual hypothesis” is often employed to overcome difficulties entailed by aggregation of heterogeneous agents. Moreover, static equilibrium conditions are largely used to interpret macroeconomic dynamics.

Despite their formal sophistication, the degrees of success of this class of models is, at best, mixed. In particular, existing literature seems to lack a joint explanation of the foregoing three aggregate regularities.

In this paper, we propose a radically different interpretative strategy. The model that we present in the following might be taken as an exploratory attempt to provide a micro-foundation of the interactions between labor-market and output dynamics from an evolutionary perspective².

The underlying philosophy builds on the acknowledgement that both firms and workers live in complex systems which evolve through time and might be characterized by endogenous, persistent, novelty. Agents are heterogeneous in their endowments, wealth, and, possibly, in their behavioral rules and rationality skills. Given the complexity of the environment they have to cope with - which changes endogenously as the outcome of individual behaviors - agents can only be boundedly-rational and hold an imperfect understanding of the system (Dosi et al., 2004).

Expectations employed to revise control variables (e.g. demanded and offered wages, output produced, etc.) are typically assumed to be adaptive. Workers and firms interact directly and their choices are affected by those undertaken in the past by other agents. Interaction networks (e.g. matching rules in labor market) are themselves endogenous and may change across time. Firms interact both in the labor market and in the product market, wherein their revealed “competitiveness” is affected also by their hiring and wage-setting behaviors.

Macroeconomic dynamics is generated in the model via aggregation of individual behaviors. Typically, non-linearities induced by heterogeneity and far-from-equilibrium interactions induce a co-evolution between aggregate variables

¹ For a quite exhaustive overview of the state-of-the-art of both theoretical and empirical labor market literature, cf. Ashenfelter and Layard (1986), Ashenfelter and Card (1999) and Petrongolo and Pissarides (2001).

² More on the general *Weltanschauung* of the evolutionary approach is in Dosi and Nelson (1994) and Dosi and Winter (2002). The model we present has large overlappings with the “Agent-Based Computational Economics” (ACE) approach (Tesfatsion, 1997; Epstein and Axtell, 1996; Aoki, 2003), as well as with self-organization models of labor markets pioneered by Lesourne (1992).