

## **Black-Box Firms**

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The GEM Project generalizes rational exchange from the marketplace to highly specialized workplaces that are restricted by costly asymmetric employer-employee information. Economists know that in such circumstances markets cannot efficiently price labor. That is why large complex establishments price labor inside the firm rather than relying on external markets. It is why those wages are downward inflexible over stationary business cycles and reflect chronic labor rent. The Project has demonstrated that rigorous general-equilibrium modeling of that second venue solves the chronic stabilization-irrelevancy problem of mainstream market-centric macro theory.

The crucial roadblock to micro-coherent, stabilization-relevant macroeconomics is resistance to looking inside bureaucratic firms. Mainstream macro theorists proactively suppress the consequential nature of large firms engaged in specialized production. Suppression was originally inspired by Walras, Jevons, Menger, and other authors of the marginalist revolution, who conceptualized economies as market systems in search of general equilibrium. To focus and simplify their analysis, they posited a single (marketplace) venue of economic exchange. The Continental-tradition economists worked during, but were able to contain their interest in, the onset of the global economic transformation to large-scale, specialized production.

Today, the rigorous analysis that occupies the economic mainstream remains proudly coterminous with the study of market exchange. Modern consensus preference for restricting coherent analysis to the marketplace is proudly illustrated by the otherwise admirable micro textbook by Mas-Colell, Whinston, and Green (1995, p.127): "Many aspects enter a full description of a firm: Who owns it? Who manages it? How is it managed? How is it organized? What can it do? Of all these questions, we concentrate on the last one. Our justification is not that the other questions are not interesting (indeed, they are), but that we want to arrive as quickly as possible at a minimal conceptual apparatus that allows us to analyze market behavior. Thus, our model of production possibilities is going to be very parsimonious: The firm is viewed merely as a 'black box', able to transform inputs into outputs."

Here is a rule that I have found useful in a long career using and maintaining macroeconomic models. Find a black box and you have likely found a robust source of mischief in the effort to be policy-relevant. If your model is providing bad advice, a good strategy is to bring all the black boxes in for questioning. The opaque, dismissive treatment of corporations and highly specialized production in consensus market-centric general equilibrium theory is certainly suspicious, especially after Coase, Simon, Williamson, Kerr, Dunlop, and their colleagues have already richly modeled optimizing behavior that occurs in large, specialized enterprises.

Once mainstream macro thinking restricts optimizing economic exchange wholly to the market-place, firms that populate textbooks can be no more than a production set, specifying at its most complicated a date- and state-contingent recipe of the feasible actions. The most efficient use of resources at any array of market prices, agent preferences, and technological possibilities must be assumed. Macro model coherence also requires that the production set demonstrates convexity (no scale economies allowed), that firms are always market-price takers, and that each household owns a portion of each firm. Modern consensus macroeconomics is constructed on a large number of identical perilously simplistic black-box firms.

Generalized-exchange modeling shows how to escape the troubling black box, introducing tractable firm heterogeneity via a bimodal separation of firms into large (LEV) and small (SEV) establishments. The latter are market-price takers that are functionally the same as familiar mainstream firms. The former, however, are understood to be constrained by costly, asymmetric intra-firm information and specialization-related routinized jobs. As a result, the two classes of enterprises differ fundamentally with respect to relevant objective functions, constraints, and mechanisms of exchange. In particular, LEV labor input that demonstrates 1:1 correspondence to production cannot be priced in the marketplace. Firms must construct their own workplace mechanisms of exchange. More generally, the heterogeneity of LEV and SEV firms prevents effective aggregation. After the Second Industrial Revolution, with its necessary large-scale new corporate forms, macroeconomics must be constructed on at least two venues of optimizing exchange. Once black-box production sets stop masquerading as firms and rational exchange is generalized to complex corporations, macro modeling can become both coherent and stabilization-relevant.

Exceptions to mainstream black-box modeling, of course, abound. Especially notable for its remarkable detail is Alfred Marshall's *Principles of Economics*, first published in the late 19<sup>th</sup> century. But nobody uses Marshall's text anymore. Among modern heretics, most notable is Michael Jensen's *A Theory of the Firm* (2000). Graduate macro programs do not use Jensen either, but they should. Jensen's work on the nature of the modern corporation fits seamlessly with generalized-exchange macroeconomics, right down to providing a central role for Chandler's model of the Second Industrial Revolution and its new corporate forms. The difference is scope. The GEM Project focuses on optimal labor management in large-scale, highly specialized firms in order to microfound both meaningful wage rigidity and discretionary interventions in aggregate nominal demand. By contrast, Jensen models the range of managerial responsibilities in the modern corporation, including the rational treatment of residual claims that has received attention in an earlier blog. He has produced a wonderful body of work that should be required reading in economics graduate schools.

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