



## Chapter One

# INTRODUCTION TO GENERALIZED EXCHANGE MACROECONOMICS



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Macroeconomic stability has for a long time been a cornerstone of the social compact. Our capacity to understand, and design policies to beneficially influence, the aggregate behavior of employment, output, wage income, profits, and inflation is entrusted to macroeconomists. It is a responsibility for which modern theorists have become surprisingly negligent, implicitly colluding to ignore essential parts of the overall story. In the analysis that follows, that neglect is corrected by extending rational price-mediated exchange from the marketplace to the workplace, surely an intuitive innovation. Generalizing exchange in coherent macro modeling *uniquely* motivates both meaningful wage rigidity (MWR) and the involuntary job loss that results from adverse disturbances in nominal demand. Stabilization relevance is greatly enhanced absent any diminution of analytic rigor.

Relevance and rigor are both worthy objectives. Stabilization-policy guidance has been *sine qua non* for macro modeling since its emergence as a separate branch of economics in the 1930s global depression. Meanwhile, the unique power of economic theory, with its special status supporting government, business, and investor decision-making, is inextricably rooted in the formal economic method of optimizing, price-mediated exchange organized by continuous general equilibrium. Most in the profession are justifiably pleased with their coherent methodology. Clarity and persuasive power are significant virtues, as is the capacity to systematically interpret empirical evidence, to distinguish among competing theories, and to predict important economic phenomena. Macroeconomists, however, should be less pleased that their mainstream modeling, rooted in market-centric dynamic general equilibrium, is today mired in a crisis of stabilization irrelevancy unmatched since the 1930s and the ascent of Keynes.

The hard fact is that mainstream macro modeling and the theorists who construct and maintain it did not play a significant advisory role during the 2007-09 Great Recession, which was the most challenging instability crisis of their professional careers. The massive policy response to the sharp rise in involuntary job and income loss was grounded in *ad hoc* Keynesianism. Especially in the United States where the macro disruption originated and was most acute, monetary and fiscal tools were aggressively used to halt and reverse the contraction in total spending that began in earnest during the second half of 2008. Policymakers accepted, without debate, that reductions in nominal demand necessarily translate into lost jobs, output, wage income, and profit, implying the existence of meaningful wage rigidity that cannot be coherently accommodated in modern consensus macroeconomics.

Early Keynesians, who simply assumed a keystone role for wage rigidity, would have been comfortable with stabilization policymaking in 2008-09; and that's the rub. The Keynesian modeling constructed by the founders of macroeconomics as a separate discipline has been repudiated, in harsh and unforgiving terms, in the academy and today has little place in consensus thinking.<sup>1</sup> Given that history, it is not surprising that prominent scholars are reluctant to emphasize the monetary management of unemployment and instead focus on real disturbances rooted in technology, tastes, or public spending to complement their core emphasis on the control of price inflation. Related confusion about the propriety of the modern use of Keynesian free parameters to suppress wage recontracting, the mechanism by which nominal wages are reduced, is also unsurprising. The analytic muddle associated with the proper design of monetary policy, a bold-relief characteristic of mainstream macro modeling during the post-2007 instability and subsequent sluggish recovery, is not acceptable.

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<sup>1</sup> From Woodford (2009, p.268): "... there has been considerable convergence of opinion among macroeconomists over the past 10 or 15 years.... The cessation of methodological struggle within macroeconomics is due largely to the development of a new synthesis by Marvin Goodfriend and Robert G. King, called 'the New Neoclassical Synthesis [NNS],' that incorporates important elements of each of the apparently irreconcilable traditions of macroeconomic thought." The foremost element of the synthesis is that New Keynesians accept the necessity of coherent dynamic stochastic general-market-equilibrium (DSGE), aka single-venue general equilibrium (SVGE), microfoundations in modeling, while New Classical/RBC theorists accept the use of SVGE-consistent market frictions. Both should eschew replicating the Early-Keynesian reliance on model-inconsistent free parameters.

### **BOX 1.1: LISTENING TO KOCHERLAKOTA AND TRICHET**

*Narayana Kocherlakota is the President of the Federal Reserve Bank of Minneapolis, the organization that has famously been home to the many of the innovations in market-centric dynamic stochastic general-market-equilibrium (DSGE) theory that helped restore the venerable Walrasian model to consensus status among macro theorists in the academy. Jean-Claude Trichet was Governor of the European Central Bank when he complained that mainstream macroeconomic models were providing stabilization authorities little guidance on how to respond to the macro turmoil in Europe that closely followed the 2008-09 extreme instability in the United States.*

From Kocherlakota (2010, p.1): “I believe that during the last financial crisis, macroeconomists (and I include myself among them) failed the country, and indeed the world. In September 2008, central bankers were in desperate need of a playbook that offered a systematic plan of attack to deal with the fast-evolving circumstances. Macroeconomics should have been able to provide that playbook. It could not.”

Kocherlakota (p.11) goes on to direct remedial research efforts in the direction he believes will eventually support stabilization relevancy: “To a large extent, the progress in macro in the past 25 years has been about being able to solve models that incorporate more realistic versions of the exchange process.” He cites examples of progress on breaking mainstream theory away from requiring that all mutually beneficial market trades occur absent delay by introducing endogenous market frictions. But he overlooks, as do almost all macroeconomists, the innovation that most powerfully pushes rigorous modeling toward more realistic exchange, i.e., the generalization of the exchange process from the marketplace to the workplace. Eliminating arbitrary restrictions on the scope of optimizing exchange permits the crucial reconciliation of the formal economic method and persisting failures of markets to clear. In what follows, generalized exchange will be demonstrated to powerfully, and uniquely, support stabilization policymaking.

From Trichet (November 2010): “When the crisis came, the serious limitations of existing economic and financial models immediately became apparent. Macro models failed to predict the crisis and seemed incapable of explaining what was happening to the economy in a convincing manner. As a policymaker during the crisis, I found the available models of limited help. In fact, I would go further: in the face of the crisis, we felt abandoned by conventional tools.”

## **I. TWO-VENUE THEOREM**

Involuntary job loss is at the heart of the monetary-stabilization muddle. For policymakers, the socioeconomic problems of employment and income loss are central to business-cycle pathology. It will be shown, as promised and contrary to many critics of modern thinking, that

limitations on the mainstream capacity to accommodate actual joblessness do not result from consensus rules of engagement that mandate model coherence. The germane problem is much less profound, grounded instead in the arbitrary restriction of rational exchange to the marketplace, and is more readily corrected. Solving that basic problem microfounds intuitive stabilization policy while preserving the venerable formal economic method.<sup>2</sup>

*The bedrock theorem.* The organizing proposition for rethinking macro theory and its implications for stabilization policymaking is named the *Two-Venue Theorem*:

The coexistence of continuous optimizing economic equilibrium, providing analytic coherence, and wage rigidity, sufficient to support involuntary job loss, implies the existence of a nonmarket equilibrium governing a dominant subset of labor pricing.<sup>3</sup>

The cards are now on the table. Venues of price-mediated exchange are defined by fundamental heterogeneities in optimizing decision rules, constraints, and exchange mechanisms that impose boundaries on meaningful aggregation. The venue concept will be elaborated upon and used to construct the two-venue general-equilibrium (TVGE) model, an exercise that culminates in Chapter 5. Until then, the theorem is best understood in conjunction with Barro's well-known wage-recontracting critique. It is offered, not modestly, as the most consequential labor theorem in macroeconomics; and its exploration will produce the first modern theory of wage determination. Pulling the profession's understanding of labor pricing out of the 19<sup>th</sup> century, where it is universally understood by practitioners to no longer belong, is itself a good thing.

Limits to aggregation help build the case that modeling restricted to single-venue (marketplace) exchange inadequately supports stabilization-relevant macro theory. Even early in the analysis, the argument rings true. The fact of forced layoffs implies the existence of wage rigidity, which

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<sup>2</sup> The critic of the formal economic method with the biggest megaphone is Paul Krugman (2009, p.37): "... economists will have to learn to live with messiness. That is, they will have to acknowledge the importance of irrational and often unpredictable behavior, face up to the often idiosyncratic imperfections of markets and accept that an elegant economic 'theory of everything' is a long way off." Akerlof and Shiller (2009) and Caballero (2010) also notably illustrate powerful post-crisis critiques of the keystone role of economic rationality.

<sup>3</sup> The modern interpretation of economic equilibrium as a rest period in the space of optimizing decision rules will be used throughout the analysis.

in turn implies the existence of wage rents and job rationing, suppression of work-leisure substitution, nominal non-neutralities, and spillover effects that disturb other markets. Such a macro environment, surely more Keynesian than Walrasian, is an uncomfortable fit with the single-venue general market equilibrium that dominates macro thinking in the academy.

*Missing venue.* The intuitive location for the Two-Venue Theorem's nonmarket class of equilibrium exchange is the large, specialized workplace. Big bureaucratic firms are broadly understood to pay close attention to nonmarket factors in their wage policymaking. Employers learned early in the past century that, in circumstances of imperfect contracting and supervision, labor prices embody information that influences workplace, distinct from marketplace, incentives.

Workplace knowledge, in vast amounts, has been accumulated since "Speedy" Taylor's (1911) time-and-motion studies and the famous 1924-32 Hawthorne experiments conducted at a Chicago factory. (See below.) The literature provides a well-documented, detailed description of intra-establishment behavior and practices that conflict fundamentally with the single-venue general-equilibrium (SVGE) modeling of the macro mainstream.<sup>4</sup> Modern theorists' stubborn belief that labor pricing and use can be adequately understood wholly as market phenomena reflects a collective hubris that has deeply damaged their stabilization relevance.

The remainder of this chapter elaborates on themes embedded in the Two-Venue Theorem and is divided into five parts. First, the large-establishment workplace, proposed as the missing (nonmarket) venue of dominant, continuous-equilibrium labor pricing, is provided historic and analytic contexts. Next, involuntary job loss and its associated wage rigidity are considered more closely, an exercise that affirms their mutual nonexistence within coherent SVGE modeling. Third, the 100-year evolution of macro theory is assessed from the perspective provided by the Two-Venue Theorem. In the fourth section, the case for the construction and rapid dissemination

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<sup>4</sup> Single-venue general equilibrium (SVGE), dynamic stochastic general market equilibrium (DSGME), and the New Neoclassical Synthesis (NNS) are synonymous names for the mainstream macro analytical framework. Taken literally, dynamic stochastic general equilibrium (DSGE), absent its omnipresent restriction to marketplace exchange, is more broadly inclusive. In order to reflect actual practice in the academy and clear up any naming confusion, this book will treat DSGE as equivalent both to DSGME and to SVGE.

of TVGE theory is previewed. Finally, the fifth section recognizes important antecedents of TVGE macroeconomics, followed by an outline of the remaining chapters.

## **II. WORKPLACE PRICE-MEDIATED EXCHANGE**

### Context: Second Industrial Revolution

It is remarkably easy to chart a plausible timepath of global living standards (output per capita) over tens of thousands of years. The evidence indicates that it took some 12,000 years (ending around 1000 BC, the time of the Ancient Greeks) for living standards experienced by hunter-gatherers to roughly double. Moreover, near-zero annual progress must have persisted for most of the next three millennia.<sup>5</sup> Around the middle 19<sup>th</sup> century, however, living standards began rising rapidly and, in the 20<sup>th</sup> century, exploded upward. A remarkable thirty-fold increase was recorded in five generations. Economic activity during the past century and a half, the tiny tip of human experience, became profoundly different from what it had been for thousands of years.

That nearly all global progress in living standards has occurred in a single burst that began in the middle-nineteenth century has been named the “Great Fact”.<sup>6</sup> The evidence becomes especially compelling when coupled with Alfred Chandler’s (1977, 1992, 1996) insightful economic narrative. He persuasively argued that trend productivity growth was transformed by specialization-based increasing returns associated with the spread of large, hierarchical firms, beginning in North America and Europe, that also dates from the middle of the 19<sup>th</sup> century. The organization of that now-ubiquitous class of enterprises was triggered by the development of

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<sup>5</sup> In early nineteenth-century Britain, the time of Jane Austen’s enduring stories of English manners, the typical Englishman was a farm laborer who consumed some 1500 calories a day – less than modern hunter-gatherer tribes in New Guinea. His material standard of living was little better than earlier experienced by a Roman slave, and the threat of starvation was a fact of life. See Nasar (2011), p. xii.

<sup>6</sup> The Great Fact must be correct. From Jones (2002, p.12): “Suppose we guess that the world, or even a particular country, has grown at the rate of 2 percent per year forever. This means that per capita income must have been doubling every 35 years. Over the last 250 years, income would have grown by a factor of  $2^7$ , or 128. In this case, an economy with a per capita GDP of \$20,000 today would have had a per capita GDP of just over \$150 in 1750, measured at today’s prices – less than half the per capita GDP of the poorest countries in the world today. It is virtually impossible to live on 50 cents per day, and so we know that a growth rate of 2 percent a year could not have been sustained even for 250 years.” Maddison (1995), Easterlin (2000), and Bradford DeLong (cited in Beinhocker (2006)) derive equivalent conclusions about the time-concentration of economic progress.

railroad, steamship, telegraph and cable systems which decreased delivery times and uncertainties for large flows of goods through national and international economies. The wave of relatively uncomplex technological innovations exploiting the increased potential for high-volume, high-speed production has been named the Second Industrial Revolution. From Chandler *et al.* (1997, pp.12-13, italics added): “Entrepreneurs and firms in these nations [United States, Britain, Germany] pioneered in the commercialization of new capital-intensive technologies by making the investments and creating the *new corporate forms* required to fully exploit their profit-making potential.”<sup>7</sup>

That, over the past two centuries, an increasing and now dominating share of global GDP has been produced in large, bureaucratic firms – the “new corporate forms” nonexistent prior to the 19<sup>th</sup> century – is an essential piece of the “Great Fact”. Macro theorists, to their detriment, never got the message that large establishments are home to optimizing activities that are fundamentally different from what occurs in small firms, making size distribution a necessary part of any model tasked to explain modern economies. The reorganization associated with the Second Industrial Revolution produced a new landscape of technological heterogeneities that had to be accommodated by market economies. Production processes that intensively exploit input specificities, creating complex combinations of scale, high productivity, market rents, workplace information asymmetries, routinization, and the greatly enhanced value of voluntary labor cooperation, have had to coexist in the population of firms with enterprises that are much more simply organized.

Technological differences are especially consequential when interacting with the only conscious production factor. Employees are the input class capable of recognizing the latitude imperfect information provides for advancing their interests inside the firm. The formal economic method, by extending its focus to rational exchange in the workplace, helps explicate the consequent market complications that reduce SVGE modeling, on its own, to a badly incomplete description of worker pricing and use. In short, much of the transformational economic behavior of the Second Industrial Revolution occurred inside large establishments, requiring close attention to

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<sup>7</sup> Chandler (1996) asserts that, as late as 1840, there were no middle managers in the United States. The Chandler narrative is consistent with a wide variety of growth environments, including accumulating knowledge, structural shifts in saving, and the ascent of market-friendly political and regulatory ideologies.

### BOX 1.2: ADVENT OF MANAGERIAL CAPITALISM

*Alfred Chandler argued that American business history can be separated into two distinct phases: pre-1850 (prior to the Second Industrial Revolution) and post-1850 (the revolution and its aftermath). His great insight is that the huge technological shift required the fundamental reorganization of the firm. His “new corporate forms” necessitated the creation of modern management, eventually tasked to assume a significant share of the allocating and pricing of scarce resources in highly-specialized economies. Mainstream macro theorists’ choice to ignore the widespread redesign of production turns out to be a consequential mistake.*

From Chandler’s *Visible Hand* (1977, p.455): “The development of top management methods and procedures in the early managerial firms marked the culmination of an organizational revolution that had its beginnings in the 1850s with the railroads. The processes of production and distribution, the methods by which they were managed, the enterprises that administered them, and the resulting structure of industries and the economy itself – all were, by World War I, much closer to the ways of the 1970s than they were to those of the 1850s or even of the 1870s. A businessman of today would find himself at home in the business world of 1910, but the business world of 1840 would be a strange, archaic, and arcane place. So, too, the American businessman of 1840 would find the environment of fifteenth-century Italy more familiar than that of his own nation seventy years later.”\*

Chandler further identifies the post-WWI period as developing the innovative, complex processes and procedures that, on a best-practices learning curve, provided near-universal content to large-establishment behavior. The range of those systems, often replacing marketplace exchange, is unsurprisingly broad. Most significant for macroeconomic theorists is what has become known as human-resource systems, a remarkably coherent set of administrative principles used globally to substitute for reliance on market pricing and allocation of labor services by large, specialized firms. Human-resources management is the economic process that original efficiency-wage theorists attempted, eventually successfully, to formally model. (See below.)

\*The remarkable information processing and distribution revolution motivated by computer-chip development has again transformed efficient business practices sufficiently to challenge the comprehension of managers of one or two generations ago. The modern revolution, however, has done little to compromise the significant substitution of managerial decision-making for competitive market exchange. Especially relevant, it has not pushed large-firm wage determination back to the marketplace. For elaboration, see Chapter 8.

Chandler’s “new corporate forms” and creating a companion activity set (workplace exchange) that must be modeled and integrated into the mainstream corpus of macro thinking. Generalized-

exchange modeling accommodates critical disparities between large and small production establishments, providing macroeconomics an additional class of equilibrium: a rest period in the space of optimizing workplace decision rules.

### Context: Labor in the New Corporate Forms

*Workplace research.* Serious academic research on large-establishment employee behavior can be roughly dated from the celebrated 1924-32 Hawthorne experiments. Conducted at the Hawthorne plant of the Western Electric Company, the study was originally designed to be technical in nature: to determine the relation between conditions of work and the incidence of fatigue and monotony among workers. As the study progressed, however, the technical factors – rest pauses, lighting, work scheduling, and so on – fared poorly as explanations for productivity variation. Much more important were worker attitudes and the role of informal work groups. The central issue changed from the design of the work environment to inducing employees' acceptance of the firm's objectives. (For elaboration, see Annable (1984).)

The impact of the Hawthorne experiments, others like it, and ongoing management learning-by-doing was substantial.<sup>8</sup> Practitioner understanding of labor productivity shifted from a simple to a more complex view of worker conduct. An critical branch of the growing research, using a neoclassical economic perspective to expand and, where needed, modify early interpretations of the Hawthorne results, was soon forthcoming from a loose collection of American and British scholars, including Clark Kerr, John Dunlop, Frederick Harbison, Charles Myers, Richard Lester, Lloyd Reynolds, Arthur Ross, Albert Rees, George Schultz, Henry Phelps Brown, and J.A.C. Brown. Writing largely from the 1930s into the 1990s, they drew descriptions of employee on-the-job behavior (OJB) mostly from experience with war labor boards, government adventures into wage controls, and as arbitrators and researchers with broad access to the internal workings of large firms. They carefully investigated employee preferences and produced a remarkably detailed picture of what occurs in the specialized, large-establishment workplace.<sup>9</sup>

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<sup>8</sup> An interesting example of management learning-by-doing is Henry Ford and his innovative \$5-a-day wage. See Raff and Summers (1987). The general reference here is Alfred Sloan's *My Life at General Motors* (1964).

<sup>9</sup> For informative histories of the early economic modeling of workplace behavior, see Kerr (1988, 1994).

*Reference standards.* Many interrelated insights were forthcoming from the labor economists' on-site observations and analysis, including market balkanization, internal labor markets, bounded mobility, the purpose and consequences of long-tenured employment, the repeal of the law of the single wage (i.e., large establishments paying more than small firms for market-equivalent labor), the ubiquitous practice of wage imitation and pattern setting, spontaneous and intentional industry labor-cost cartelization, the modeling of labor-union objectives, and the nature and organization of collective worker action. Of all the contributions of Kerr, Dunlop, Harbison, Myers, *et al.*, formal economic theory would most benefit from incorporating their finding that positional concerns, especially interpersonal and intertemporal wage comparisons, play a crucial role in employee satisfaction.<sup>10</sup>

John Dunlop (1957) emphasized the power and ubiquity of intra-firm reference standards in the determination of labor compensation, naming them “wage clusters”. Arthur Ross (1948), focusing on external and intertemporal standards in the context of collective behavior, coined the more colorful “orbits of coercive comparison”. The extensive literature documenting worker preferences and behavior identifies the interpersonal and intertemporal comparison of wages as centrally influencing employee utility. (See Chapter 2.)

The 20<sup>th</sup> century, hands-on labor economists were close to providing an early solution to what has become a persistent, debilitating class of labor-related deficiencies in contemporary macro theory. They uncovered the facts but ultimately failed to construct a coherent theory of rational workplace behavior. As a result, they worked increasingly outside the economic mainstream. Kerr (1988, p.21) recognized the difficulty: “Perhaps the most serious problem ... was that the revisionists dealt bit by bit with pieces of the puzzle and never assembled them into an integrated statement, let alone into a model or a consistent theory; and it takes a new theory to replace or

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<sup>10</sup> The hands-on labor economists understood they were not discovering something new about human nature. It was then and continues to be a fundamental tenet of psychology that standards of comparison are central in the determination of individual satisfaction. Behavioral economists have notably rediscovered and emphasized the role of reference standards in determining satisfaction from economic exchange, providing guidance for the proper specification of axiomatic preferences. See Camerer, *et al.* (2004). See also Frank (1985, 2005) and Solnick and Hemenway (2005) for other modern examples of economic applications of positional concerns and their effect on utility specifications. Deserving special mention here is Akerlof's (2007) forceful argument for the wider use of reference standards to motivate rational behavior throughout many branches of macroeconomic theory.

change an orthodox theory.” Kerr’s assessment, which he strongly reiterated in private correspondence, provides inspiration for coherent workplace-equilibrium theory. The unequal division of labor is recognized. The important labor economists, by carefully documenting what actually goes on inside the firm, had already done most of the heavy lifting.<sup>11</sup>

### Context: Efficiency Wages

*Efficiency wage theory.* The workplace venue of price-mediated exchange was eventually introduced into formal macroeconomics by original efficiency-wage theorists. In particular, Solow (1979) and Annable (1977, 1980), working independently, identified relevant axiomatic employee preferences and derived employer optimization conditions in the circumstances of intra-firm information imperfections and consequent feedback between worker on-the-job behavior (OJB) and the nominal wage paid ( $W$ ).

Solow and I modeled morale-centric efficiency wage theory (EWT).<sup>12</sup> Our mutual objective was to make Keynesian nominal wage stickiness consistent with optimizing, continuous equilibrium. We understood that the analysis, if successful, would provide a formal model of employee-employer relations and, to be credible, must be informed by the huge practitioner and academic literature on workplace behavior. As a result, original EWT was constructed with an eye on the best-practices literature, especially the universal findings that employees once on the job do not inherently prefer to shirk but do strongly prefer fair treatment by their employers.

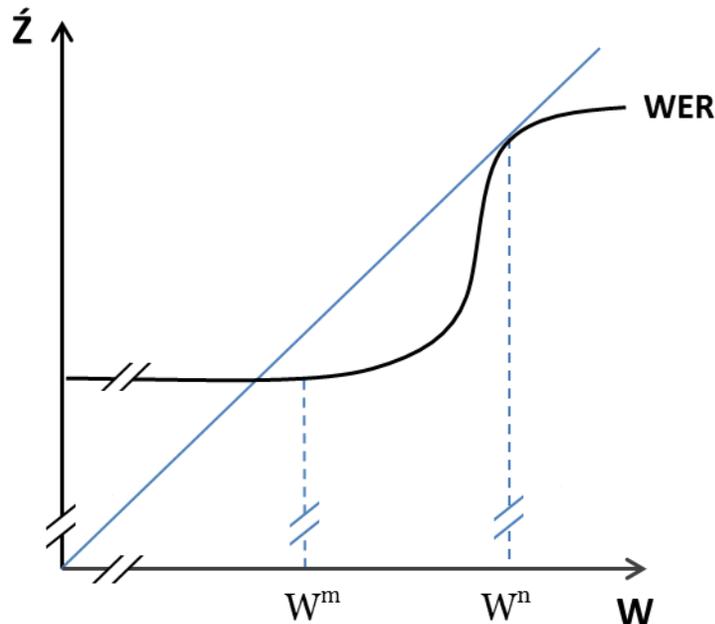
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<sup>11</sup> Especially notable is Kerr’s (1954) fundamental idea of distinct labor-management systems contingent on firm size. Work here has continued sporadically, typically contributing to the “internal labor-market” literature. An important contribution, which integrated much of the hands-on labor economists’ descriptive analysis, is Doeringer and Piore (1971). They mapped the rules and tradeoffs used to organize large-establishment workplaces, emphasizing the roles of closed job ladders and workplace ports of entry. The macro consequences of separate venues of rational labor-pricing decision rules and constraints were first modeled as a macro optimization problem by Annable (1980, 1984, 1988); see also Bulow and Summers (1986) and Saint-Paul (1996). For a useful summary of developments in the general approach inspired by Kerr and his colleagues, see Kaufman (1994).

<sup>12</sup> Subsequent EWT variants reverted to inherent shirking to motivate worker OJB (e.g., Shapiro and Stiglitz (1984)) or abandoned the formal economic method (e.g., Akerlof (1982)). Most of the broad literature gave up attempting to formally derive downward nominal wage rigidity, instead producing variants in the big-tent EWT that structurally differed from the original morale-centric version. Those variants constitute distinct model classes, designed to answer different questions. It is especially noteworthy that the best known of the subsequent variations (the Shapiro-Stiglitz shirking theory) derives wages that are downward flexible (falling as market unemployment rises), cannot generate involuntary job loss (producing instead discharge for cause, which plays an empirically trivial role in actual labor flows and is ignored in compact TVGE modeling), and fails to provide a channel through which nominal disturbances induce policy-relevant job loss. See Chapter 9.

This book is in the tradition of original efficiency-wage modeling. As represented in Figure 1.1, firms operating in a two-dimension space relating labor pricing (denoted by  $W$ ) and labor productivity ( $\acute{Z}$ ) minimize unit costs by paying the wage ( $W=W^n$ ) consistent with both the dominant radius vector and its labor-market constraint ( $W \geq W^m$ ).<sup>13</sup> The nonconvex representation of workplace exchange (more generally named the *workplace-exchange relation* (WER)) will be shown to support downward wage rigidity as well as chronic labor rents. The WER is at the heart of any economic theory of price-mediated workplace exchange.<sup>14</sup>

**FIGURE 1.1. EARLY GEOMETRY OF EFFICIENCY-WAGE OPTIMIZATION**



<sup>13</sup> In the Figure,  $W^m$  denotes the market-clearing wage,  $W^n$  is the efficiency wage, and  $\acute{Z}$  represents worker productivity. The implicit intersection of the  $\acute{Z}$  axis and the WER occurs at  $\acute{Z}^n$ . Powerfully explanatory diagrams are cool. See Blaug and Lloyd (2010) for an interesting account of the contribution of this important class of analytical tools to the development of economic theory.

<sup>14</sup> Close consideration of Figure 1.1 indicates that the cornerstone contribution to original EWT is Annable (1977). That paper informed the macroeconomics of nonmarket labor pricing by specifying axiomatic employee reference standards that, in particular circumstances, govern wage determination and thereby anchor the unbundled WER class illustrated in the Figure.

Figure 1.1 looks promising. It looked even more promising when I published it over three decades ago. (See Annable (1980).) It succinctly illustrates the then pioneering research that sought to explicate optimizing workplace exchange. Early researchers in the field understood that the derivation (from axiomatic preferences and technical constraints) of a WER that is sufficiently nonconvex to separate the firm's unit-cost minimizing wage ( $W^n$ ) from labor's market opportunity costs ( $W^m$ ) would endow formal macro thinking with meaningful wage rigidity. Proper microfoundations would have been provided for the (now defunct) Neoclassical Synthesis as well as the (still important) demand-management practices of central banks tasked to stabilize employment.<sup>15</sup> Many theorists became interested in efficiency wages, and expectations of a quick WER-derivation breakthrough were high.

There was no breakthrough. Efficiency wages disappointed early expectations largely because research agendas continued the Solow-Annable convenience of focusing on employer optimization, ignoring the more difficult worker-optimization problem posed by the derivation of meaningfully nonconvex WERs.<sup>16</sup> Almost everyone who understood the problem appeared to hope someone else (Arthur Okun?) would solve it. I admit that is what I wanted. In the existing literature including Solow (1979, 1980, 1990), Annable (1977, 1980, 1984, 1988), Akerlof (1982, 1984, 2002, 2007), Yellen (1984), Akerlof and Yellen (1985, 1990), Shapiro and Stiglitz (1984), Malcomson (1984), Bulow and Summers (1986), Weiss (1990), Akerlof and Kranton (2005), and everybody else, payment of nonmarket  $W^n$  (if even well identified) always depends on free parameters, reflecting the general failure to microfound wage rigidity that is the analytic keystone of Early Keynesian modeling.<sup>17</sup> Given that free parameters are not particularly interesting and that formally modeling employee behavior looked laborious at best, theorists' attention to the intra-firm class of labor-pricing waned and had until recently nearly disappeared.

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<sup>15</sup> The characteristic shape of my original WER, however analytically convenient, revealed an incomplete understanding of rational employee on-the-job behavior. (See Chapter 2.)

<sup>16</sup> In Chapter 2, the nonconvex WER is derived, given costly, asymmetric workplace information and routinized jobs, from axiomatic model primitives. It is the most important of the several fundamental economic laws the discovery of which was awaiting the generalization of exchange. The breakthrough laws greatly enhance the power, especially with respect to stabilization, of preexisting coherent theory.

<sup>17</sup> See Chapter 9. See also Ritter and Taylor (1997) and Blanchard (2007).

### BOX 1.3: OKUN'S CONTRIBUTION

*Arthur Okun did not shrink from hard problems. In Prices and Quantities (1981), he helped pioneer the identification of microfoundations rooted in optimizing workplace exchange, organizing his analysis around a class of implicit contracts he wonderfully named the "invisible handshake". Hindsight permits interpreting Okun's intra-firm application of the formal economic method as a path-breaking effort to model what efficiency-wage theorists were setting aside, i.e., the meaningfully nonconvex WER class illustrated in Figure 1.1.*

At the time of his death in 1980, Okun was generally writing about the nature of modern, specialized economies, explicitly working in the Keynesian tradition of market price-quantity disequilibrium. He (1981, p.9) identified the "big new element" in the *General Theory* to be "the assumption of downward inflexibility of wage rates". He understood that flexible pricing, allowing economies to adjust quickly to nominal and real shocks, eliminates most of the real-world problems that macroeconomists are asked to solve. He was most interested in what it is about modern economies that engenders downward labor-price rigidity, and his instinct was to look inside the firm for optimizing choices that would microfound nonmarket wage setting.

Okun got remarkably close to what was accomplished nearly three decades later by the completion of original efficiency-wage theory. He posited employee-satisfaction dependence on fair treatment and, in circumstances of costly, asymmetric workplace information, motivated agents to consider the distributional consequences of wage decisions.\* He separated career from casual employment and emphasized the role of trust in facilitating rational exchange among persons who transact repeatedly. He focused on the critical Early-Keynesian issue, implicitly asking why wage recontracting does not prevent involuntary job loss.

*Prices and Quantities* assembled his workplace analyses and made substantial progress toward policy-useful formal macroeconomics, while remaining an intermediate work that did not yet derive involuntary job loss consistent with optimizing, continuous equilibrium. Okun was clearly in the vanguard of the emerging research effort to generalize rational exchange. However, given that he was unable to extend and defend ideas that ran counter to mainstream theorists' deep partiality to macro modeling restricted to marketplace exchange, his work is today little taught or read. More generally, absent his insight, standing, and powers of persuasion, generalized exchange failed to win much acceptance in the aftermath of the book's posthumous publication and has endured a protracted period of inattention in the academy.

\*From Okun (1981, p. 81): "The world of employer-worker attachments creates a complex optimization problem for the firm's personnel management. The firm is not only required to minimize the wage costs of a given employment but also to develop effective mechanisms to promote and assess productivity, and to build a reputation that will both enhance the supply of willing applicants and hold down quit rates."

*Abundant evidence.* The enduring multiple-decade failure to complete the original EWT is made especially frustrating by the abundance of evidence that supports nonconvex WERs. Employers have long believed that dissatisfied workers, given the latitude, adversely alter their behavior on the job. An early Yankelovich poll of business leaders asked: Does job dissatisfaction lead to high turnover, tardiness, loafing on the job, poor workmanship, and indifference to customers and clients? Of the 563 respondents, 94 percent thought that such an association does exist.<sup>18</sup>

Getting closer to the critical economic question, Campbell and Kamlani (1997) surveyed 184 compensation executives from large firms, asking how much workplace productivity would decrease if wages were cut by 10 percent. The mean response was 20 percent. Nearly 7 out of 10 believed that the principal reason for the harmful effects was damaged worker loyalty. Moreover, most thought that labor cooperative input would be most impacted if employees believe that their employer is profitable and least affected if there are credible financial losses that threaten jobs. (See Chapter 3.)

The final example (until the much broader review of the evidence in Chapter 10) is an admirably careful survey conducted in the U.S. in the early 1990s, a period that includes the 1990-91 recession. Bewley (1999a) interviewed 104 business leaders, asking them why worker morale matters to them. The nature and incidence of their responses are noteworthy:

| <u>Reason</u>           | <u>Percentage of Businesses<br/>Citing the Reason</u> |
|-------------------------|---|
| Low worker productivity | 89%   |
| Poor customer service   | 14  |
| Turnover                | 13  |
| Recruiting              | 7   |
| Absenteeism             | 4   |
| Unionism                | 3   |

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<sup>18</sup> Katzell and Yankelovich (1975), p.114.

From Bewley (1999b, p.1): “Employers were reluctant to cut pay because they believed doing so would hurt employee morale, leading to lower productivity and current or future difficulties with hiring and retention. It was thought that these effects would in the end cost more than the savings from lower pay.” When asked about their labor-pricing practices, including possible wage cuts, employers describe (once translated into generalized-exchange terminology) the active management of nonconvex WERs that are at the heart of original efficiency-wage theory.<sup>19</sup>

The available evidence is both extensive, well beyond the three examples, and consistent. It plausibly indicates that, to be adequate to the task of explaining labor pricing in the context of costly, asymmetric workplace information, macro theorists must explicitly model employee optimization on the job. Furthermore, in order to microfound meaningful wage rigidity, OJB modeling must motivate the particular WER class illustrated in Figure 1.1. In the absence of that incremental progress, efficiency-wage modeling persisted in relying on free parameters to induce interesting results and eventually became, itself, uninteresting.

### III. TWO USEFUL PROPOSITIONS

Single-venue (marketplace) general equilibrium will be shown to be an inadequate platform for stabilization-relevant modeling of specialized economies. Consider, pursuant to that thesis, two interrelated propositions. In the first, a particular class of wage rigidities is both a necessary condition for the existence of involuntary job loss and inherently nonexistent in coherent SVGE theory. In the second, macroeconomics needs to accommodate involuntary job loss in order to be useful to stabilization policymakers

*First proposition.* In the single-venue general-equilibrium narrative, employees respond to wage reductions from their market opportunity costs by quitting, voluntarily moving to the alternative, now better-paying positions. Involuntary job loss plays no role. Moreover, if workers are

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<sup>19</sup> Particularly interesting is that Bewley (1999a, p.242) asked 62 firms that had recently laid-off employees whether the workers had been offered a choice between losing their job or accepting a wage cut. None had offered the choice. Lebow, Saks, and Wilson (1999, p.1), using the establishment-based microdata underlying the BLS Employment Cost Index, found “stronger evidence of downward nominal wage rigidity than did previous studies using panel data on individuals”, illustrating the broad empirical support for Bewley’s survey/interview conclusions.

receiving wage rents (for example, as a result of an adverse shift in aggregate nominal demand), they must rationally accept any pay cut, in lieu of job loss, that does not violate their opportunity costs. Forced job separation continues to play no role.

The introduction of involuntary job loss into coherent macro modeling requires the textbook labor-pricing story to be altered in two fundamental ways. First, for whatever reason, at least some employees rationally receive wage rents. Second, firms' capacity to offer wage reductions that reduce or eliminate those rents in lieu of job loss must be rationally suppressed, implying circumstances in which excess labor supply cannot induce labor-price cuts. The two-part wage rigidity is named "meaningful". The first proposition is: *Forced job separation implies the existence of meaningful wage rigidity (MWR)*.

The rational suppression of wage recontracting critically motivates a nonmarket channel through which adverse demand disturbances induce involuntary job and income loss.<sup>20</sup> The nominal-real linkage occupies a central place in stabilization-relevant monetary theory, earning a shortcut name: the MWR channel. The channel is associated with an important *meta-externality*. Meta-class externality exists when the overall costs of a continuous-equilibrium macro arrangement differ significantly from constituent micro-decision-maker costs, making a set of aggregate-market outcomes inefficient and invoking Pigou's famous justification for public intervention.<sup>21</sup>

For now, it is sufficient to understand the MWR channel in the context of Barro's recontracting critique. The critique's message is MWR nonexistence, absent incoherent free parameters, in the mainstream class of single-venue general-equilibrium modeling. Rational firms must offer workers wage cuts in lieu of losing their jobs, and rational employees must accept any cut that does not violate their opportunity costs. Consistent with SVGE microfoundations, market opportunity costs strictly govern labor-price recontracting, which then becomes a powerful

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<sup>20</sup> Clower's (1965) *minimum transactions rule* implies that total employment, once restricted by MWR, is determined by labor demand; the role of labor supply is suppressed. The rule, in which the short side of the market generally determines the quantity actually traded, follows from optimizing exchange. Given that no market participant is forced to trade more than desired, completed transactions are the minimum of demand and supply.

<sup>21</sup> Pigou (1920, Chapter 1) forcefully argued that economists have a moral responsibility to identify adverse externalities and design government interventions that ameliorate their effects. The gap between total and decision-maker costs is contingent on macro circumstances and can be extraordinarily large.

vehicle for exhausting available gains from trade and helps avoid “dollar bills left on the sidewalk”.<sup>22</sup>

The contemporary message is that MWR nonexistence in mainstream coherent market-centric modeling is not altered by any endogenous frictions that have been (or will be) variously identified by the New Keynesian branch of the modern macro consensus. Such SVGE-consistent frictions may create a wedge between the marginal labor product and the marginal value of worker time, perhaps inducing voluntary job separation. But coherent frictions cannot derail the overriding role of opportunity costs in the existence or timing of individual employee-employer recontracting in any way that motivates involuntary job loss. The point is important. The SVGE model class, no matter how creatively enriched with endogenous frictions, does not accommodate meaningful wage rigidity or involuntary job loss.<sup>23</sup>

Moreover, in a related issue, free parameters frequently used in New Keynesian empirical work to suppress wage recontracting are deeply troubling – a problem set that predates the New Neoclassical Synthesis. Throughout the macro-literature timeline, *ad hoc* specifications of the

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<sup>22</sup> Barro (1979), quoted in Snowdon and Vane (2005), p.231. Albert Rees (1951), one of the best labor economists of his generation, anticipated the completed EWT by asserting that labor-price rigidities must result from employer unwillingness to cut money wages. The basic idea, of course, has a long lineage that predates the Barro critique. In a notable example occurring during the postwar construction of Early-Keynesian macroeconomics, Patinkin (1948, 1956) argued that general market equilibrium, characteristically absent wage rigidities, cannot support involuntary unemployment. Theorists working on the pure theory of general market equilibrium separated from the Walrasian framework by focusing on market exchange as an equilibrium organized by agent capacity to recontract. Note also that modern theorists who attempt to avoid the difficulties of wage determination by focusing on menu costs and associated frictions that generate product-price stickiness are engaging in an ineffective dodge. If *wages* are not meaningfully rigid, recontracting implies that involuntary job loss (and modern business cycles) cannot exist. See Table 1.1 below.

<sup>23</sup> The will-o'-the-wisp friction that is both SVGE-coherent and capable of rationally suppressing wage recontracting is hereafter named the *Super Friction*. From Barro (1989, p.14): “As a theoretical matter, it has long been known that direct costs of adjustment could explain some stickiness in prices. However, the basic misgiving about menu [or recontracting] costs is that the direct costs of adjusting prices are typically trivial relative to the losses from choosing inappropriate quantities.” Herschel Grossman (1983, p.343) similarly argued that general market equilibrium and wage rigidity are inherently inconsistent: “If the predetermined wage implies a level of employment that is less than the quantity supplied, the provision of additional employment at some lower wage will produce a Pareto improvement.” The Barro critique (1977) was fundamental to the successful New-Classical challenge to Early Keynesian thinking and has been generally accepted as one of the “rules of the game” by New Keynesians. From Robert Gordon (1990, p.1137): “No new-Keynesian wants to build a model with agents that Barro could criticize as failing ‘to realize perceived gains from trade’.” Finally, from Blanchard and Fischer (1989, pp.373-374): “... nominal rigidities can only go so far. To take an example, if fluctuations in demand lead to unemployment and if being unemployed is much worse than being employed, it is hard to see why individual workers do not take a cut in their wages to gain employment.”

complex wage rigidity generated in specialized economies have been sufficiently inaccurate to eventually mislead policymakers. Early Keynesians were famously unable to anticipate the stagflation decade because their simple wage-inflexibility assumptions inadequately described labor pricing after the Second Industrial Revolution. The substance of the fierce New Classical attack on the 1970s Keynesian failure was little more than an attack on their admittedly simplistic specification of wage rigidity. (Chapter 4) Proper specification of labor-pricing, and consequently useful guidance to policymakers, is unreliably left to guesswork. As argued by thoughtful mainstream theorists, it requires careful derivation from true axioms governing agent preferences and technological constraints.

*Second proposition.* Policymakers understand that involuntary job loss, partly because of the reduced income resulting from the characteristic absence of alternative employment paying comparable wages, is a socioeconomic problem that is central to business-cycle pathology. In the second proposition, *axiomatic policymaker preferences cause them to reject, emphatically, the absence of endogenous forced job loss from models used to support their decision-making.* Government and business leaders generally refuse to ignore welfare-relevant facts produced in modern economies that are inconsistent with restricting job separation to be wholly voluntary, forcing theorists to choose between familiar, coherent SVGE thinking and policy usefulness.<sup>24</sup> In a related message to theorists aspiring to stabilization relevancy, the MWR Channel uniquely microfounds the demand-driven model class that motivates recognizable aggregate fluctuations.

A simplification will help shorten and focus this introductory analysis. Consideration of policy implications from the generalization of exchange will be limited to the design and implementation of central-bank interventions to stabilize the economy. The restricted scope is motivated by my particular interests as well as analytic convenience, implying no judgment about the use or effectiveness of fiscal policy.

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<sup>24</sup> That difficult choice is elaborated upon in the next two sections. Other evidence supports policymaker priors by demonstrating that involuntary job loss (without recall rights) produces lower lifetime earnings, significant subsequent employment instability, and broad welfare reductions in affected households. Throughout this book, relocation costs and dismissal for cause are ignored. The evidence indicates that being fired for shirking is a negligible cause of job separation, especially in large establishments.

#### IV. WAGE RIGIDITY VERSUS SVGE THEORY

The Walrasian revolution, focusing aggregate modeling on single-venue general equilibrium, and the Second Industrial Revolution, profoundly altering the means and organization of production, were roughly contemporaneous. It should not be surprising that subsequent analytic tension developed between, on the one hand, the empirical validity and power of meaningful wage rigidity generated in large, specialized workplaces and, on the other, the strong preference of macro theorists to ground their analysis in coherent intermarket equilibrium. The longstanding conflict has been consequential, centrally shaping the evolving nature and policy usefulness of macroeconomic theory.

*Brief history of pendulum swings.* The chronic tension between labor-price rigidity and coherent SVGE modeling informs an instructive partitioning of the last hundred years into four periods of consensus macro thinking. The first phase features the dominance of coherent market-centric analysis, critically manifest in the widely held belief that nominal wages were effectively downward flexible. Prominent economists, observing unemployment and attributing its existence to time-requirements of production or costs of market-price discovery, accepted the brief labor-market disruption needed for wages to adjust to shifting market conditions. Positing short adjustment lags preserves the essential features of the keystone SVGE labor-supply schedule and implies the nonexistence of persisting excess supply. Wage reductions occur with only transient damage to overall employment.<sup>25</sup>

The British Treasury debate associated with the 1925 restoration of the gold standard and the liquidation policy of the U.S. Treasury and Federal Reserve in confronting the onset of the 1930s Depression both turned on the conviction that labor pricing was sufficiently flexible to obviate

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<sup>25</sup> In contrast to this manuscript's focus on inconstant macro theorist attention to wage rigidity and the MWR Channel, King (1999, p.929) interprets the pendulum swings in business-cycle modeling from the perspective of theorists' enthusiasm for SVGE analysis: "Over the last century, exploration of real business cycles – the idea that economic fluctuations are caused primarily by real factors – has itself undergone periods of intense activity and relative dormancy. In the 1920s, real theories played a leading role: economists sought to use new microeconomic tools to learn about the aggregate consequences of shifts in demand and supply of goods and productive factors. However, the Great Depression of the 1930s had a dramatic effect on business cycle research.... Real factors came to be less stressed, with greater weight given to monetary conditions and the psychology of households and firms. Government management of the economy came to be seen as not only desirable but essential." King laments that "... it took half a century for a revival of interest in equilibrium business cycle models."

the need for public management of nominal demand.<sup>26</sup> In each country, however, more than a decade of unemployment greater than 10%, peaking above 20%, shattered the classical idea of effectively self-equilibrating markets. While the mechanics of the Great Depression remain controversial, there can be no doubt about the widespread failure of wage recontracting. Nominal labor pricing failed to adjust sufficiently to prevent rising real wages contemporaneously with huge involuntary job loss and persisting unemployment.

Global depression set the stage for the shift in dominant thinking toward accepting the Early Keynesian assumption of wage rigidity and the consequent macroanalytic centrality of aggregate demand. Along with the widespread post-depression conversion to Keynesianism, stabilization policymakers accepted the active management of total spending to ameliorate broad market failure signaled by a high incidence of involuntarily lost jobs and income.

The second period culminated in Paul Samuelson's cobbling together, and his effective textbook marketing of, the Neoclassical Synthesis. The makeshift construct combined the assumption of shorter-term wage stickiness sufficient to motivate recognizable business cycles with longer-term factor- and product-price flexibility sufficient to support neoclassical growth analysis.<sup>27</sup> Early Keynesians rejected the *General Theory's* wholesale dismissal of the competitive labor-supply schedule, assuming instead significantly greater duration in the lags required for labor pricing to adjust to disturbances in nominal demand. The appeal of Samuelson's reformulation of Keynes resulted from both its policy relevancy and its retention of much of the SVGE thinking rejected

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<sup>26</sup> Classical thinking featured the quantity theory of money ( $MV=PX$ ), the capacity of which to motivate use of the gold standard or any hands-off policy is ultimately rooted in its working wholly within single-venue general equilibrium with its flexible wages. For elaboration on the debate accompanying the British return to gold, see Clarke (1988). See Cooper (1992, p.2126) for more on the reluctance of the U.S. central bank to undertake demand stimulus at the onset of the Depression: "They felt that the speculative excesses of the late 1920s had to be wrung out of the system through 'liquidation', a process that on their interpretation had worked well, at acceptable cost, in 1920-21." The U.S. money supply ( $M1$ ) fell 6% during 1930 and another 12% during 1931. In Skidelsky (1992), Keynes who opposed the return to the prewar gold standard concludes he lost the debate because he lacked an adequate model.

<sup>27</sup> Early Keynesians, defined in this book as macro theorists who adhered to the Neoclassical Synthesis, worked within the SVGE framework. Coddington (1983) named their school "hydraulic Keynesianism". Besides Samuelson, early hydraulic Keynesians notably included Hicks, Modigliani, Hicks, Klein, Duesenberry, Hansen, Tobin, and Solow. A recurrent theme of the analysis that follows is Early Keynesians were greatly hampered by their acceptance of the general convention restricting rational exchange to the marketplace. As noted above, Patinkin (1956) carefully demonstrated that *The General Theory* cannot accommodate coherent SVGE thinking. From the single-venue perspective, Keynesian policy-relevant problems appear to require disequilibrium modeling.

by Keynes.<sup>28</sup> Indeed, the Neoclassical Synthesis reduced the *General Theory* to a special case of SVGE modeling, motivated by time-dependent wage inflexibility and (implicitly) organized by Clower's minimum transactions rule, that enables fluctuations in nominal spending to induce same-direction movement in employment and output. In the short-run, wage recontracting and, therefore, SVGE model coherence was sacrificed in order to introduce greater stabilization-policy relevancy into highly developed market-centric textbook theory.

Early Keynesian modeling provided insightful guidance for practical policymaking.<sup>29</sup> However, the associated rise of macroeconomists to unprecedented prominence in government and business did not calm the profession's itch to reestablish the analytic coherence that results from the foundational use of dynamic general equilibrium, with endogenous labor pricing, to explain both business cycles and underlying macro trends.

By the late 1970s, in the midst of the dishearteningly prolonged stagflation decade, a new generation of rigorous macro theorists exploited inconsistencies between SVGE modeling and Keynesian wage stickiness to broadly discredit the Neoclassical Synthesis, laying the groundwork for the third period.<sup>30</sup> This time, however, the mainstream pendulum swing back to rejecting labor-price rigidities, reinstating the equality of labor's marginal cost of time and marginal value product, was motivated not by the belief that wages were in fact downward flexible but instead by the failure of such inflexibility to be formally derived. Reestablished SVGE microfoundations relatively quickly drove Modigliani-Hicks-Samuelson macro thinking from graduate-school curriculums and cutting-edge journals. Seminal events in the banishment

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<sup>28</sup> In his 1937 *Econometrica* article, Hicks reformulated the goods and money markets in *The General Theory* to be consistent with a (incoherent) SVGE framework. Later, in his 1944 *Econometrica* article, Modigliani demonstrated that Keynes's signature labor-market failure required wage rigidity. Early Keynesian analysis was thereafter typically represented by IS-LM equilibrium restricted by significant (assumed) labor-price stickiness. The critical contribution of the Early Keynesians is their reorientation of business-cycle modeling to aggregate variables, especially aggregate nominal demand, organized around wage rigidity.

<sup>29</sup> Throughout this book, the Early Keynesian preference for fiscal, as opposed to monetary, intervention in real-side stabilization efforts is ignored. For modern analyses of fiscal multipliers, see Parker (2011) and Ramey (2011).

<sup>30</sup> Stagflation facilitated, but cannot justify, the pendulum swing from Early Keynesianism to New Classical (SVGE) thinking. The inability of coherent SVGE modeling to explain, or even accommodate, the persistence of simultaneously high wage inflation and involuntarily lost jobs is even more problematic than the Early Keynesian failure at the same task. Throughout the third-period dominance of coherent SVGE thinking, stagflation economics have remained at best sketchy. For elaboration, see Chapter 4.

included Lucas's adaptation of John Muth's rational expectations analysis to macro theory and Prescott's use of Solow residuals to empirically model business cycles absent money.<sup>31</sup>

The counter-revolution culminated in the late 1990s when New-Classical/RBC and New-Keynesian theorists smoothed over their differences in the single-venue New Neoclassical Synthesis, now well established as the academy's consensus macro framework. A fly in the ointment of general agreement is that the SVGE reworking of the Early-Keynesian Neoclassical Synthesis remains incapable of coherently accommodating forced job loss, producing highly stylized, unrecognizable business cycles. The mismatch between formal modeling and practical policy-maker concerns is vividly illustrated by the six million involuntarily lost jobs that occurred in the perilous 2007-09 Great Recession.

That mismatch helps set the stage for the (prospective) next phase. The fourth period is contingent upon theorists, who chafed at being marginalized during the greatest macroeconomic crisis of their professional careers, becoming more willing to think outside single-venue orthodoxy in order to regain stabilization relevancy. The Two-Venue Theorem provides guidance for resolving the unproductive conflict between the formal economic method and meaningful wage rigidity by identifying the core problem, i.e., arbitrarily restricting price-mediated exchange to the marketplace. TVGE modeling replaces Keynes's equally arbitrary elimination of the neoclassical labor-supply schedule with a microfounded workplace equilibrium that accommodates the rationing of good jobs, thereby constraining competitive labor supply. Patinkin's (1956) seminal demonstration of the inconsistency of involuntary unemployment and equilibrium becomes a special case of SVGE modeling. Reconciliation between the fact of forced job loss (temporary or permanent) and the compelling analytic advantages of continuous general equilibrium is uniquely enabled by the rigorous modeling of optimizing, price-mediated workplace exchange.

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<sup>31</sup> See Lucas (1972, 1976), Kydland and Prescott (1982), and Prescott (1986). The alacrity with which macro theorists reorganized mainstream modeling around the Lucas, Kydland, and Prescott innovations is indicative of the power of inherent urge of many macroeconomists to restore coherent SVGE thinking.

## V. GENERALIZED EXCHANGE MATTERS

*Theorist choice.* Robert Hall (2007, italics added), assuming the difficult role of mainstream macro theorist still actively working on wage determination, illustrates the modern tension between SVGE methodology and practical relevance in his restatement of Barro’s recontracting critique: “Sticky wages and prices are not a full explanation [for macro facts]... because they lack a deep rationalization. A sticky wage that keeps employment below a mutually desirable level creates an opportunity for a worker and an employer to make a Pareto improvement for themselves by adjusting employment upward – what matters here is the increase in employment. The same holds when a sticky price keeps the quantity of goods traded below its efficient level. The traditional sticky-price literature has not come to grips with the obvious tools that employers, workers, sellers, and customers possess to overcome inefficiently low employment or sales. The literature lacks a coherent theory of disequilibrium. Departures from equilibrium are an assertion, not a derived conclusion from fundamentals. *Traditional sticky-wage and sticky-price theory has a strong descriptive claim but not a strong theoretical underpinning.*” Hall’s message remains true to the central tenet of the New Classical revolution: Models lacking coherent microfoundations must be rejected even if they robustly fit the evidence. If SVGE theory is indeed constructed on rational behavior, Hall’s argument is not easily dismissed. It is, unsurprisingly, at the heart of the muddled state of modern macroeconomics.<sup>32</sup>

**TABLE 1.1. JOB-LOSS BEHAVIOR IN U.S. RECESSIONS**

|         | <u>Peak-to-Trough Change in:</u> |                             |                         |
|---------|----------------------------------|-----------------------------|-------------------------|
|         | <u>Unemployment Rate</u>         | <u>Job-Losers Incidence</u> | <u>Job Losers (000)</u> |
| 1969-70 | +2.4 points                      | +8.2 points                 | +1,230                  |
| 1973-75 | +3.8 points                      | +16.0 points                | +2,599                  |
| 1980    | +1.5 points                      | +7.4 points                 | +1,315                  |
| 1981-82 | +3.6 points                      | +11.2 points                | +3,433                  |
| 1990-91 | +1.3 points                      | +6.8 points                 | +1,373                  |
| 2001    | +1.2 points                      | +6.0 points                 | +1,423                  |
| 2007-09 | +4.8 points                      | +13.1 points                | +5,807                  |

<sup>32</sup> See, from a policymaker perspective, Kocherlakota (2009). See also footnote 23.

Notes: Current Population Survey, Bureau of Labor Statistics; job-loser data are seasonally adjusted and available only from 1967; job-loser incidence is the ratio of job losers to total unemployed. In the 2007-09 recession, involuntary job loss accounted for more than three-quarters of the overall increase in unemployment. The point-to-point evidence implies that total job loss during the recession exceeded six million, a startlingly large number.

Table 1.1 illustrates the “strong descriptive claim” of meaningful wage rigidity, which has been shown to be a necessary condition of involuntary job loss. The evidence indicates that forced job loss is always the central component of rising unemployment during recessions. If you lack an explanation of involuntary job separation, you cannot hope to construct a stabilization-relevant model. The message is especially robust with respect to the perilous 2007-09 cyclical contraction. Its six-million increase in involuntarily lost jobs accounted for more than three-quarters of the increase in total unemployment, pushing job-loss incidence up by 13 percentage points. Ohanian (2010) has properly identified the exceptional size and incidence of job loss as the distinguishing characteristic, inadequately understood, of the Great Recession.

Experienced macroeconomists know that meaningful wage rigidity enables intuitive aggregate modeling that closely corresponds to the available evidence, which notably includes large firms’ reluctance to cut nominal wages, and uniquely supports stabilization policymaking. Yet they also know that deriving a “strong theoretical underpinning” for such labor pricing has been the most elusive, unrewarding task in the history of macroeconomics.<sup>33</sup> Forced to choose between MWR power and the apparently compelling logic of coherent market-centric equilibrium, most modern theorists have ceased providing more than a black-box role for wages in their macro models, proactively marginalizing the role of involuntary job loss.

In his extensive explication of the New Neoclassical Synthesis from a New-Keynesian perspective, Woodford (2003, p.7) illustrates the artful substitution of black-box rationales for labor-price analysis. He rejects “mechanical models of wage and price adjustment of the kind that were at the heart of the Keynesian macroeconomic models of the 1960s. Rather than

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<sup>33</sup> Consistent with the inherent power of wage recontracting in SVGE modeling, Lucas famously advised macro theorists to give up attempting to reconcile involuntary job loss and optimizing behavior. (For elaboration, see Snowdon and Vane (2005, p.290).) The analysis will return to Lucas’s proscription.

postulating that prices or wages respond mechanically to some measure of market disequilibrium, they are set optimally, that is, so as to best serve the interests of the parties assumed to set them, according to the information available at the time they are set. The delays involved before the next time that prices are reconsidered (or perhaps before a newly chosen price takes effect) are taken here to be an institutional fact, just like the available production technology.”

Once having navigated the blind alleys created by dressing up free parameters in optimization rhetoric, Woodford’s wage stickiness is understood to differ little from the posited rigidity that Keynesians used a half-century earlier. In the coherent single-venue modeling that is the analytic core of the New Neoclassical Synthesis, labor-price stickiness capable of supporting forced job loss can be no more than the incoherent Early-Keynesian assumption that sometimes masquerades as an outcome of rational choice. The free-parameter guesswork mandated by the absence of MWR microfoundations has damaged mainstream NNS modeling, producing misleading descriptions of the role of money in specialized economies and ultimately dooming macroeconomists’ stabilization relevancy.

*Modern wage theory.* MWR derivation begins with the intuition that modeling labor pricing in large establishments, the “new corporate forms” that became ubiquitous during the past century, requires extending optimizing, price-mediated exchange from the marketplace to the workplace. The second venue captures important complications rooted in costly, asymmetric intra-firm information and routinized jobs, phenomena that are inseparable from the ongoing transformation of the global economy away from near-subsistence employment. Coherent generalized exchange uniquely accommodates, consistent with dynamic decision-rule equilibrium, recognizable macro market failure, providing a central role for the minimum-transactions rule. Meanwhile, and this is important, much of textbook SVGE analysis remains intact and comprises the lion’s share of the two-venue theory.

SVGE modeling is understood throughout this book as limited, not wrong. Its market-centric analysis of labor pricing and use powerfully explains the behavior of a substantial share of the workforce and its employers. The SVGE problem is its fundamental misalignment with large-

establishment employee-employer exchange that has developed globally over the past century and a half. During that time, the consensus single-venue approach has become progressively less adequate to the task of explaining economy-wide behavior, turning into a wellspring of misleading stabilization theorems. In a striking example, a leading voice of the New-Classical restoration famously concluded, albeit prior to the perilous 2008-09 instability, that business cycles had (since 1945) become a relatively “minor” problem.<sup>34</sup> Counsel not to worry much about business cycles, while consistent with mainstream coherent modeling, has been for more than a hundred years really bad stabilization-policy guidance.

## VI. ANALYTIC ROOTS AND THE PLAN OF THE BOOK

The fundamental argument has four parts. First, stabilization-relevant macro analysis requires meaningful wage rigidity. Second, continuous-equilibrium MWR requires the generalization of price-mediated exchange from the marketplace to the workplace. Third, as demonstrated in the next two chapters, generalized-exchange modeling coherently accommodates, in the aftermath of adverse nominal demand disturbances, rational involuntary job loss and continuous-equilibrium macro market failure. Fourth, mainstream SVGE (aka DSGE) modeling inadequately supports effective stabilization policymaking. Ultimately, it is being argued that the generalization of exchange is a necessary condition for the formal economic method to be stabilization relevant.<sup>35</sup> The practical and academic stakes are much too large to be ignored by serious macro theorists.

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<sup>34</sup> Robert Lucas, quoted in Snowdon and Vane (2005, p.296). In his presidential address to the American Economic Association in 2003, just 5 years before the greatest instability challenge since the 1930s Great Depression, Lucas (2003a, p.1) declared that the “central problem of depression-prevention has been solved, for all practical purposes.” It is not surprising that attacks on mainstream SVGE thinking increased sharply in the aftermath of the unanticipated 2008-09 crisis. For example, *The Economist* (July 18, 2009, p.65) featured a critique, sufficiently strident to recall the Lucas-Sargent (1978) condemnation of Early Keynesianism, entitled “Modern Economic Theory: Where It Went Wrong – and How the Crisis Is Changing It.” The article illustratively cited Willem Buiter’s conclusion that macroeconomics education in U.S. and British universities has been, over the past 30 years, a “costly waste of time”.

<sup>35</sup> It is usefully reiterated that the economic and emotional toll of the global economic crisis that began in earnest in 2008 has motivated fierce attack on the relevancy of mainstream macro theory. Critics are particularly scornful of the formal economic method. Two recent, illustrative assaults are from Schlefer (2012) and Orrell (2013). This book contends that, while there is much wrong with modern macro thinking, agent rationality and deductive reasoning are badly misunderstood as culprits. Tractable aggregate modeling can do no better than coherent self-interest as its guide to behavior; it is foolish to think otherwise. The macro-theory breakdown instead results from the consensus methodological choice to arbitrarily restrict optimizing price-mediated exchange to the marketplace

Generalized-exchange theory is best understood as incremental, reviving the Early-Keynesian analysis of Modigliani, Samuelson, and the other founders of postwar macroeconomics. They emphasized the centrality of wage rigidity in modern economies, rejected continuous market-clearing equilibrium, and organized stabilization policy around the discretionary management of aggregate nominal spending. The TVGE model class simply corrects their eventually fatal mistake, i.e., searching for microfoundations supporting the suppression of wage recontracting wholly within the consensus market-centric DSGE framework.

Inadequately microfounded labor pricing and use has trapped modern coherent macro thinking in a quagmire of high technique and limited relevance. Could the pendulum-swinging timeline of the development of macro thought have played out more efficiently? The most compelling alternative scenario is that the founders of Early Keynesianism, who believed their original Neoclassical Synthesis to be a stopgap on the way to proper wage-rigidity microfoundations, had turned to the substantial body of workplace research by middle 20<sup>th</sup>-century labor economists to complete their theoretical infrastructure. The alternative scenario unfortunately did not happen.<sup>36</sup>

### Future Direction of Macro Research

A half-century after the failure of Franco Modigliani and John Dunlop to have a working lunch, interest has revived in the capacity of dynamic workplace equilibrium, building on original efficiency-wage theory as well as Okun's *Prices and Quantities*, to formalize the analysis of Kerr *et al.* More rigorous modeling of workplace exchange has made the lost literature accessible to modern theorists. As part of the emerging research agenda, this book derives the existence, stability, uniqueness, meaningfulness, and aggregation properties of continuous workplace equilibrium. That analysis is then combined with the powerful, elegant multi-market general equilibrium that currently informs mainstream macroeconomics. The dominant nature of workplace equilibrium, as well as its superior tractability, motivates a robust, two-venue model class that is uniquely stabilization-relevant. It is the future of macroeconomics.

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<sup>36</sup> However, the Early Keynesians, notably Solow and Samuelson, got close. From the 13<sup>th</sup> edition of Samuelson's iconic textbook (1989, p.291): "Most firms administer their wages and salaries, setting fixed pay scales and hiring people at an entry level wage or salary. These wage scales are generally fixed for a year or so, and when they are adjusted, the pay for almost all categories goes up by the same percentage."

#### **BOX 1.4: COUNTERFACTUAL DEVELOPMENT OF MACRO THEORY**

*The alternative scenario for the timeline of formal macroeconomics is not that far-fetched. Indeed, it is rather surprising that it did not happen. As already noted, Clark Kerr, John Dunlop, and their colleagues ambitiously modeled, guided by their neoclassical economic training, employee-employer behavior in large, specialized workplaces. Kerr *et al.* never derived a formal theory of generalized exchange but did demonstrate that, in their intra-firm venue, agent decision rules, constraints, and mechanisms of exchange differ substantially from the rules, constraints, and transaction mechanisms that govern the marketplace.\* Workplace research yielded a range of powerful findings that were then, and remain today, central to macro theory.*

Kerr's (1950) foundational balkanization analysis that descriptively integrated workplace and market exchange appeared not long after Modigliani's (1944) reorganization of Keynes's aggregate-demand arguments around wage rigidity. By the early 1960s, when the Neoclassical Synthesis had been established as stabilization policymakers' model of choice, the "Neoclassical Revisionist" (Kerr's name) labor economists had assembled a powerful, albeit informal, analysis of self-interested workplace exchange and labor-price insensitivity to labor-market conditions. It is both unfortunate and surprising that, despite often being members of the same university economics departments, Kerr *et al.* failed to engage the Early Keynesians. (Hicks (1955, 1974) and Okun (1981) are notable exceptions, while Solow always conceded the superior knowledge of the MIT labor economists.)

The likely roadblock was that the former's workplace modeling was wholly literary, featuring much realistic detail. To the casual reader, the non-rigorous, hyper-descriptive approach indicated (incorrectly) that Kerr *et al.* were institutionalists, working outside the neoclassical framework.\*\* But, despite that widespread misunderstanding, the message of mid-century workplace analysis is accurate, powerful, and relevant. The disputatious course of macro theory could have been beneficially altered by more frequent faculty-club lunches, accompanied by serious conversation, between the Early Keynesians and the Neoclassical-Revisionist labor economists.

\*Dunlop (1994, p.380) further described the adoption of separate-venue modeling by the mid-20<sup>th</sup> century labor economists: "The objective changes in the economy – within sectors, in the emergence of large enterprises and workplaces, and in the ideas and arrangements developed to govern and manage these workplaces – made it quite obvious to a new generation of economists in the 1940s, who were exposed in practical terms to labor markets and labor-management-government issues, that conventional (external) labor-market theory was grossly inadequate. It neglected a vast range of activities within the walls of organizations as well as their forms of interaction with exterior markets."

\*\*The labor economists believed they were working within neoclassical theory. Again from Dunlop (1988, p.80): "The work of the 1930-1960 period on labor markets and wage determination was in the mainstream of economics and an extension of still earlier mainstream work. It was not an institutional sideshow."

*Analytic roots.* Unsurprisingly, the Workplace-Marketplace Synthesis has important antecedents besides Okun, Chandler, middle-century labor economists, original efficiency-wage theorists, and Early Keynesians. Most notably, generalized-exchange modeling draws from the path-breaking analyses of Nobel Laureates Ronald Coase and Herbert Simon. Coase (1937) and the new-institutional theorists he inspired have made substantial contributions by investigating the rational choice between market and intra-firm exchange. Simon (1951) and his organization-theory colleagues insightfully mapped the mechanisms and content of optimizing workplace exchange. It defies reason that the new-institutional and organizational literatures, both of which are fundamental to understanding economic behavior after the Second Industrial Revolution, have been ignored in mainstream macroeconomics.

Finally, the more recent contribution of the most stubborn of the New Keynesian macroeconomists must be acknowledged. Their dogged insistence that attention be paid to the available evidence has critically informed assessments of the policy-relevance of SVGE modeling. An important, albeit modest, subset of New Keynesians have continued providing a central role for (assumed) labor-price rigidities, despite bleak prospects for incorporating such analyses into the coherent SVGE framework. Keeping wage-centric thinking alive, if only on the periphery of modern thinking, has helped pave the way for the generalization of price-mediated exchange and its fundamental reconfiguration of macroeconomic theory.

### Plan of the eBook

This eBook focuses in large part on microfounding, in modern highly specialized economies, the causal link from nominal demand disturbances to same-direction changes in employment, output, and profit.<sup>37</sup> That ambitious objective requires the reconstruction of macroeconomics to be both coherent and stabilization-relevant. The context for the exercise is the U.S. economy and the

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<sup>37</sup> Modern economies are extremely complex, generating a range of plausible focuses for macro research agendas. But, if the ultimate goal is providing useful guidance for stabilization authorities, a spotlight on the mystery of money, i.e., venerable nominal-real connection, is appropriate.

relevant stabilization authority the Federal Reserve.<sup>38</sup> The core analysis is pursued in three steps: first, specifying the axiomatic nature of the workplace venue of optimizing price-mediated exchange; second, using that framework to model rational behavior occurring inside large establishments. Third, generalized workplace exchange is melded with textbook marketplace exchange, producing exceptionally powerful results.

The next chapter constructs the baseline workplace-equilibrium model. Axiomatic employee preferences and technological constraints are informed by the huge practitioner literature as well as the more recent work of behavioral economists. In particular, the literature on the nature and use of reference standards in large-firm labor pricing is summarized, revealing their building-block status in the profit-seeking design of pay policies and, ultimately, TVGE modeling. Once such standards assume their proper place in employee preferences, robust nonconvex workplace exchange (recall Figure 1.1) can be derived from utility- and profit-maximizing behavior.

As emphasized, meaningful WER nonconvexity was the Holy Grail of original efficiency-wage theorists. The generalization of exchange demonstrates that costly, asymmetric workplace information and routinized jobs, both characteristic of large, specialized establishments, motivate rational nonmarket labor pricing capable of suppressing wage recontracting and supporting the channel through which nominal disturbances induce continuous-equilibrium involuntary layoffs. Such wage rigidity has played a crucial role in the world as it has been progressively reshaped by the Second Industrial Revolution.

Chapter Three drops the assumption that equilibrium reference standards cannot be recalibrated to reflect changing employment prospects, endowing generalized-exchange analysis with macrodynamics largely free of arbitrary restrictions. The enhancement is facilitated by advances in recursive modeling most closely associated with Sargent and rooted in Bellman's work on intertemporal optimization. Model dynamics are intuitively motivated by the rational tradeoff between wage rents and permanent job loss, introducing the second class of involuntary job loss (employment downsizing) into dynamic general decision-rule equilibrium.

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<sup>38</sup> Labor-market institutions that influence the WER specification (Figure 1.1) vary significantly among nations. Consequently, space considerations require restricting the introductory generalized-exchange analysis to a single economy. For some indication on expanding the international reach of the analysis, see Chapter 7.

Also provided is a powerful framework for modeling income distribution and economic growth. TVGE macrodynamics are broadly inclusive, spanning subsistence economies to the modern, globally-specialized “new corporate forms” era. By the end of the third chapter, optimizing workplace behavior accommodates sunk capital, scale economies, infrastructure externalities, product-pricing power, spontaneous labor-cost cartelization, the “hold-up” problem, and periodic broad market failure. The rich and varied enhancements of mainstream thinking support high- and low-frequency stabilization provided by well-designed and executed monetary interventions in total nominal spending.

Chapter Four focuses on improved wage-price dynamics embodied in aggregate supply microfounded by generalized optimizing exchange. Its two-venue reinterpretation of the Phillips curve is boldly offered as the final word on the controversial topic. The chapter also demonstrates that, given a credible monetary authority, wage-setting in large, specialized workplaces rationally uses catch-up to price inflation that has already occurred rather than expectations of future inflation, an outcome that broadly conforms to actual practice. The only real surprise of the rational dominance of catch-up relative to expectations in firms with substantial specific human capital and long-tenured employment is that it took so long to figure out. Moreover, TVGE aggregate supply revives the original Fed analysis of the 1970s stagflation, which uniquely fits the available evidence. That explanation proves to be far superior to today’s reductive consensus treatment of the stagflation decade.

Chapter Five, building on the Hicks-Leontief aggregation theorem in the context of heterogeneous venues, constructs intertemporal general workplace equilibrium theory. The chapter additionally completes Ben Bernanke’s benchmark model of the Great Depression, providing a coherent, dynamic-equilibrium framework for understanding behavior characteristic of that extraordinary period of destructive market failure. With inspiration from Edmond Malinvaud’s monetary model of medium-term stabilization, the sketchy modern analysis of macro stagnation is similarly enriched. Completing a trifecta of implications, two-venue analysis is used to assess the ubiquitous search/match/bargain theory, the stabilization aspirations of which become a casualty of the generalization of exchange. That result is long overdue.

In Chapter Six, a compact version of the Workplace-Marketplace Synthesis is assembled, completing the core reconstruction of stabilization-relevant macroeconomics. The WMS resuscitates the fixed-wage general-equilibrium (FWGE) school of macro modeling that insightfully attempted to microfound Keynesian consumption, attracting interest in the 1960s and 1970s. The inability to derive meaningful wage rigidity from model primitives relegated the FWGE analysis to undeserved obscurity. Next, generalized-exchange implications for the management of production capability, partly inspired by Keynes's attention to destabilizing uncertainty, are examined. Recent work on investor/lender confidence and rational inaction is reviewed and used to introduce the credibility of the central bank's employment objective into generalized-exchange modeling. Indeed, when used to explicate the 2008-09 acute instability, the analysis indicates that the welfare consequences of real-side credibility can substantially exceed nominal credibility – an important outcome for policymakers. Toward the end of the chapter, TVGE modeling is closely assessed relative to the more familiar SVGE theory.

The next chapter models unions and collective bargaining, a consequential topic that has been badly treated in SVGE macroeconomics. Once again, the analysis revives seminal work of mid-century labor economists that has been forgotten in graduate economics programs. Workplace-equilibrium analysis provides a determinant solution to management-union collective bargaining, a satisfying result that extends the power of the Edgeworth and Pigou classic analyses. Generalized exchange provides a platform for incorporating union-influenced labor-price dynamics into formal policy-relevant macro theory. The TVGE union-model capacity to enhance our understanding of macro phenomena is illustrated by two episodes: (a) the 1980s Thatcherite reorganization of the British economy and (b) the medium-term wave of labor-cost bankruptcies in core U.S. industries such as steel, airlines, and automobiles that began at about the same time. Even when unions go away, meaningful wage rigidity does not. MWR is an inherent characteristic of large, specialized workplaces.

Robust nonconvex workplace exchange is the principal reason for the existence of large-firm human-resource departments and their ubiquitous equity-based policies. Building on that perspective, Chapter Eight provides a more in-depth look at management's rational workplace

behavior, providing useful links from the high theory of economics departments to the practical core curriculums in MBA programs. The more robust linkage extends the personnel-economics literature associated with Edward Lazear and is long overdue. The formal generalized-exchange narrative should be especially welcome to business-school economists, whose students typically hold abstract models to a high standard of applied relevance. Economic theory enriched by generalized exchange fits almost seamlessly with, and helps provide analytic coherence to, other MBA courses on the best-practices management of large, bureaucratic enterprises.

Chapter Nine looks at antecedent theorist thinking on the two principal nonmarket venues of rational exchange, the workplace and government. The first part, most relevant to the arguments developed in this book, critically summarizes the tellingly meager economic literature on optimal workplace exchange. A central task here is a more finely drawn separation between what is original and what is derivative in the GEM Project's completion of morale-centric efficiency-wage theory. The second part does little more than identify government as the third fundamental venue in a generalized theory of economic exchange.

Finally, in Chapter Ten, the substantial body of monetary-policy implications from the TVGE model class is organized and considered in some detail. Generalized exchange is used to identify and inform three classes of adverse nominal disturbances, with special attention paid to nonstationary shocks. The analysis then provides a robust framework within which stabilization authorities can design and implement effective strategies to ameliorate the type of instability and extreme welfare loss that was encountered in the 2007-09 Great Recession. Mainstream macro thinking is strikingly unhelpful in such episodes of heightened instability. The pressing need for macroeconomics to do better when the economy and policymakers are most challenged centrally motivates the GEM Project. Quite a lot of evidence is then reviewed, followed by parting thoughts on the fundamental importance of the generalization of price-mediated exchange.