

AT LAST, A COHERENT THEORY OF INVOLUNTARY UNEMPLOYMENT

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GEM PROJECT WORKING PAPER NUMBER 4

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ABSTRACT

Mainstream macro theorists reasonably insist on coherence with mainstream microeconomics. The early Keynesian separation of macro and micro into incompatible systems has long been unacceptable in the academy. In pursuit of coherence, modern model-builders work within the common framework of dynamic stochastic general-market-equilibrium (DSGE). We know, however, that the general practice has a fundamental problem. The consensus model class cannot coherently accommodate involuntary job loss, especially in response to nominal demand disturbances, and consequently cannot be stabilization relevant. The inability of modern theorists to convincingly conjoin coherence and stabilization-relevance has marginalized their thinking, notably forcing it to the policymaking sidelines during the perilous Great Recession. This paper shows how to restore stabilization relevance without giving up model coherence. The key to that happy outcome is the intuitive generalization of rational labor-related exchange from the marketplace to the large-establishment workplace. Two-venue general equilibrium modeling is an important, sensible innovation, introducing a powerful new frontier to macro analysis and opening up an extensive research agenda – an overview of which is provided.

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Given its outsized contraction in total spending, veteran macroeconomists are not surprised that the Great Recession generated a huge number of involuntarily lost jobs. The table shows that significant forced job loss is characteristic of every U.S. downturn for which relevant data are available. That periodic recessions always feature involuntary unemployment is profoundly embarrassing to mainstream macro theorists. It is disheartening that the headline business-cycle phenomenon cannot be coherently accommodated by the profession's market-centric dynamic

stochastic general-equilibrium (DSGE) model class. The failure goes a long way toward explaining why modern macro thinking, which dominates graduate-school curriculums and cutting-edge journals, was ignored by stabilization authorities in their successful 2008-09 management of the most perilous instability since the 1930s depression.

If macroeconomists are serious about stabilization relevancy, better theory is a must. This paper outlines an alternative, intuitive model class organized around dynamic general decision-rule equilibrium that coherently generates involuntary job loss from adverse disturbances in nominal demand. The summary analysis is drawn from, and presented much more fulsomely in, the GEM Project (gemproj.org). What follows has four parts. The first provides necessary background analysis on rational wage determination in highly specialized economies. The second uses that foundation to reconstruct textbook labor supply to be congruent with the existing production landscape, which we know to have been substantially altered by the Second Industrial Revolution and its advent of large bureaucratic corporations. A great deal of the GEM Project's incremental reworking of macro theory is motivated by its modernization of labor supply. The third reconsiders labor demand, a task that requires some updating of production theory. In the final section, the pieces of the involuntary-unemployment puzzle are brought together around the concepts of meaningful wage rigidity and continuous decision-rule equilibrium. The paper ends with an opportunity alert – a overview of promising projects that exist at the Project's new frontier of macroeconomics that is simultaneously coherent and stabilization-relevant.

INVOLUNTARY 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

Source: Bureau of Labor Statistic

I. BACKGROUND ANALYSIS

Consider two facts about textbook wage theory. First, it is little changed from its original construction by the great 19th century marginalists. Second, for more than 100 years mainstream thinking has been badly out of step with evolving actual labor pricing, as reflected today in its disconnect from the contemporary management literature on wage setting. In what follows, the fundamental problem is identified to be the consensus market-centric DSGE model's inherent suppression of rational nonmarket labor-pricing that occurs in large, specialized firms. The mainstream inability to coherently restrict wage recontracting in a large class of employers crucially prevents a causal link from nominal disturbances to involuntary job loss.

Coase (1937) pioneered the rational boundaries between the market and the firm around the time the *General Theory* was being written. Decades later, Simon (1991) and Williamson (1985) closely modeled rational behavior inside large corporations. Throughout the middle 20th century, Kerr (1994), Dunlop, Harbison, and other hands-on labor economists focused on the large-establishment workplace, carefully documenting the objectives and transaction mechanisms governing employee-employer exchange. It is problematic that Coase, Simon, Williamson, Kerr, Dunlop, and their colleagues never gained much traction in mainstream macro thinking.

Notwithstanding macroeconomists' inattention, firm size-heterogeneity has exerted crucial influence on macro performance since the Second Industrial Revolution. The generalization of rational exchange from the marketplace to the workplace draws on the profound transformation of the global production landscape to usefully bifurcate labor pricing, one branch located in the marketplace and the other in the large-establishment specialized workplace. The result is the first coherent, stabilization-relevant theory of wages in a more than a century.¹

In the small-establishment venue (SEV), cost-effective employee oversight allows the market-centric modeling of the 19th century marginalists to satisfactorily explain labor pricing. Employer

¹ In the GEM Project's introductory wage theory, labor is point-of-hire homogeneous; well-known Harris-Todaro (1970) transfer rationally governs inter-venue worker flows. Firms are homogeneous subject to fundamental size heterogeneities. Firms maximize profits; workers maximize utility grounded in axiomatic preferences.

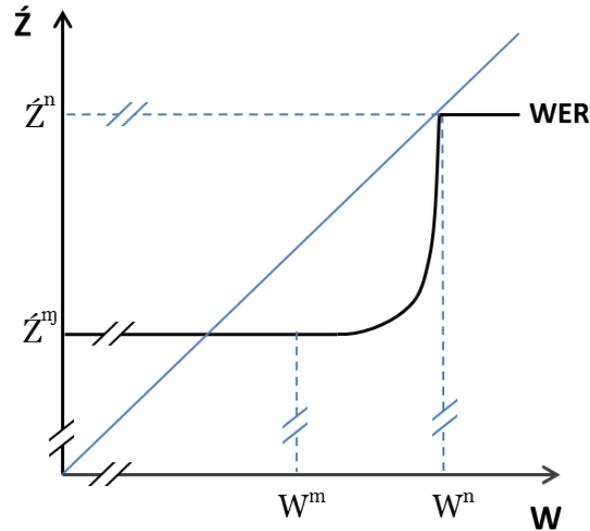
profit-seeking and employee utility-maximization produce the beautiful equality among the nominal wage paid, the value of labor's marginal product (Keynes's First Classical Postulate), the value of labor's marginal disutility of work (his Second Postulate), and the market wage: $W_K = VMPL_K = VMRS_K = W^n$. Firms and workers can do no better than being market-price takers.

The large-establishment venue (LEV) is broadly understood to be a much different story. Employers and employees confront greater complexity, largely because worker oversight is now restricted by costly, asymmetric information. Labor input (E_j), demonstrating 1:1 correspondence with production, cannot be measured or priced in the marketplace. Firms must construct their own labor-pricing apparatus. Furthermore, the evolution of best-practices compensation systems soon recognized that workers' preference for equitable treatment by management, suppressed in competitive-market exchange, significantly influences on-the-job behavior (OJB) and must be factored into rational workplace exchange.²

LEV management of labor input, defined as $E_j = \dot{Z}_j H_j$ where H denotes labor hours on the job and \dot{Z} productivity, is separable into two parts. The crucial objective is sufficient identification of the Workplace Exchange Relation (WER) to enable labor pricing consistent with unit-cost-minimizing employee behavior: $W_j = W^n_j = \max(\dot{Z}_j/W_j)$ and $\dot{Z}_j = \dot{Z}^n_j = (E_j/H_j)^n$. The GEM Project's derivation of the robust nonconvex WER class illustrated in the Figure microfounds the equality of the wage paid (W), the employer's efficiency wage (W^n), and the employees' reference wage (W^n), locating the critical unit-cost-minimizing WER discontinuity: $W_j = W^n_j = \max(\dot{Z}_j/W_j) = W^n_j = \sup \mathbf{K}_j > W^n$ where \mathbf{K}_j denotes employee equity-based reference standards.³ Keynes's Second Classical Postulate is eliminated and replaced by the workplace optimization of cooperative labor productivity ($\dot{Z}_j = E_j/H_j$), a practitioner-recognizable process that yields chronic labor rents and, over the stationary business cycle, downward nominal wage inflexibility.

² For elaboration, see Chapter s 2 and 10 in the GEM Project's eBook (gemproj.org/eBook). The former rigorously integrates employee equity-based reference standards (\mathbf{K}_j) into the optimizing-exchange model and the latter provides an overview of the huge empirical literature substantiating the process.

³ The WER class illustrated in Figure 1 is derived from axiomatic model primitives in Chapter 2 (Figure 2.1) of the GEM Project's eBook (gemproj.org/eBook). That derivation and its subsequent dynamics (constructed in Chapter 3) are the key to macro theory that is simultaneously coherent and stabilization-relevant.



LEV management's second objective is to assure an adequately sized workforce, a task that turns out to be not particularly difficult. Continuous-equilibrium labor pricing ($W_J = W_J^a = W_J^a > W^m$) combines with the substantial pool of SEV employees to produce an elastic market-supply schedule at W_J^a . To anticipate the labor-demand section yet to come, firms specify production schedules (with particular levels of labor hours, capital services, and material input) as an increasing function of their rational expectations of product demand. Labor demand is consistent with Keynesian causation from nominal demand to employment/output.

The cost-effective symmetric workplace information needed to enable neoclassical textbook equality between the wage paid and marginal disutility of work has long been an obviously untenable universal assumption, making room for Keynes's shrewd rejection of his Second Postulate. Say's Law is, once and for all, scrapped. Add to the mix workers' axiomatic preference for fair treatment, and the stage is set for a necessary revolution in the treatment of rational labor supply.

At the heart of the generalized-exchange revolution is the nonconvex Workplace Exchange Relation derived from model primitives in the GEM Project and captured in its baseline form by the Figure. The WER supplies labor input that has 1:1 correspondence with production and is governed by axiomatic employee preferences and technological constraints. It is the most serious exercise in writing down labor-supply functions since the Second Industrial Revolution. The

crucial WER, present (but not microfounded) in the macro literature since Annable (1977, 1980, 1984), is best understood as a heretofore unappreciated fundamental law of modern macroeconomics, uniquely enabling coherent theory to accommodate involuntary job loss. Once a substantial share of workers are rationally pushed off their neoclassical labor-supply schedule, continuous-equilibrium macro modeling can answer important, previously unanswerable questions and explain significant, previously inexplicable evidence.

II. MODERN LABOR SUPPLY

Keynesian thinking, beginning with *The General Theory*, fundamentally reorients macro causation. In it, nominal demand disturbances induce same-direction changes in employment/output, implying that any plausible model of recognizable recessions must break the beautiful $W=VMP=VMRS=W^m$ analytic stranglehold imposed by the estimable 19th century marginalists. The great difficulty, persisting into the 21st century, is that Keynes and his followers of all vintages have always worked within a market-centric framework; they were consequently unable to rationally suppress wage recontracting, never microfounding $W=VMP>VMRS$ necessary to support their policy conclusions. As Barro reminds, rejection of the Keynes's Second Postulate must be justified. How can a rational worker prefer job loss to a wage cut if the latter violates neither market opportunity costs nor the disutility of labor?

The GEM Project has, at last, solved Barro's conundrum, providing a long overdue reworking of textbook labor supply that is central to understanding why money matters. The three-panel diagram below illustrates the fundamental labor-supply innovation. The first panel reproduces the central Workplace Exchange Relation, featured in the previous section and representing optimizing on-the-job labor behavior in the productivity-wage space. To reiterate, the WER class characteristic of specialized workplaces featuring costly, asymmetric information and routinized jobs is derived from axiomatic model primitives consistent with profit- and utility-maximization in the Project. It microfounds a labor-input ($\dot{Z}=E/H$) schedule relevant to large establishments. The second panel transposes WER labor supply to a more typically configured two-dimensional space, i.e., labor price is on the Y-axis. The strange-looking diagram is a big deal, capturing essential features of a hundred years of labor-management experience in the new corporate forms

that enabled the Second Industrial Revolution. The third panel is more familiar, illustrating the textbook market labor-supply schedule in the wage-hours space. In the well-known narrative, individual firms can purchase effectively unlimited labor input of constant productivity at the market wage. The remainder of this section compares panels B and C.

X-axis. The X-axis measures labor-input productivity ($\dot{Z}=E/H$) in Panel B and labor hours (H) in Panel C. The difference is central to how to do coherent macroeconomics in modern, highly specialized economies. The large firms represented in Panel B cannot simply manage labor hours. The hours and productivity components of labor input E , which measures cooperative effort that is in 1-1 correspondence with production, must be separately managed in firms' simultaneous pursuit of production targets and minimized unit costs.⁴ Separation critically permits economic modeling to accommodate costly, asymmetric workplace information and routinized jobs. The third panel's use of hours alone is broadly understood to require cost-effective direct employee supervision, which is understood to be restricted to small, owner-managed firms that populate macro textbooks.

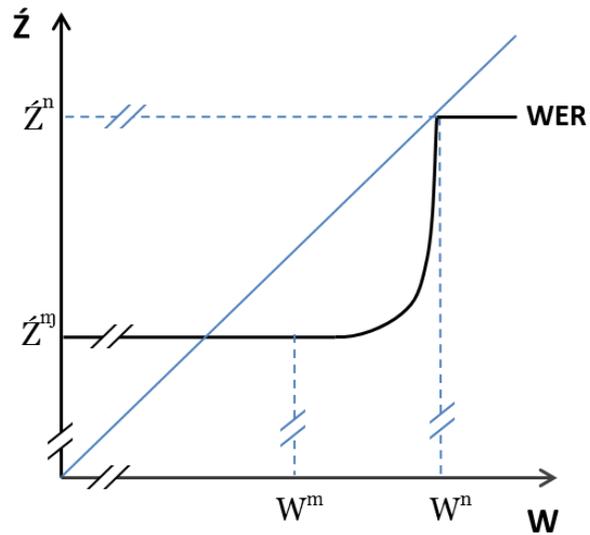
Determinant wage. Labor supply in Panel C requires interaction with labor demand to yield a determinant wage. The resulting equilibrium satisfies Keynes's First and Second Postulates ($W=VMP=MRS=W^m$). By contrast, the supply schedule in Panel B determines the optimal wage on its own! The generalized-exchange model equilibrates the employers' efficiency wage, minimizing unit labor cost, and employees' reference wage, satisfying their axiomatic preference for equitable treatment by management.⁵ Panel B equilibrium captures essential properties known to govern rational labor management and pricing in large establishments. Demand-independent labor pricing produces, over the business cycle, rational downward rigidity of nominal wages. As demonstrated in the next section, it also allows firms' rational expectations of product demand to play a direct role in determining the level of employment. Panel B's supply-schedule discontinuity at the unit-cost-minimizing feasible wage orients baseline labor-pricing

⁴ For elaboration, see Chapters 2 and 8 in the GEM Project's eBook.

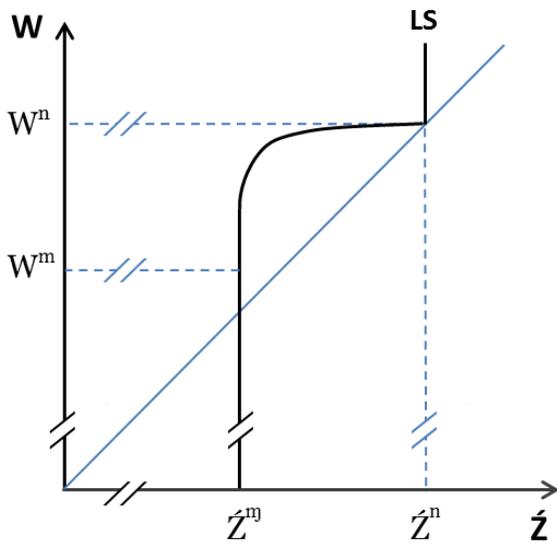
⁵ See Chapter 2 in the GEM Project's eBook.

dynamics around preventing *cuts* from the efficiency/reference wage. That perspective, familiar to practitioners, differs substantially from Panel C's familiar two-way, flexible wage dynamics.

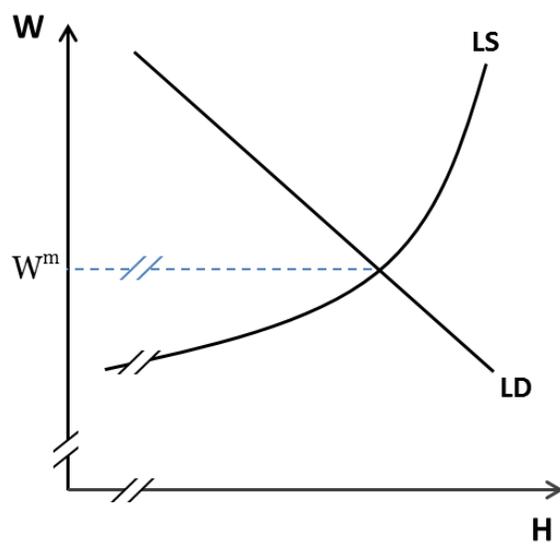
Panel A
Wage Exchange Relation (WER)



Panel B
Labor Supply in Large Firms



Panel C
Market Exchange



In a large, admirably careful set of interviews with 104 business leaders conducted in the U.S. in the early 1990s, a period that includes the 1990-91 recession, Bewley asked why they did not cut wages: “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.” (1999b, p.1) Employers were describing (once translated into generalized-exchange terminology) the active management of nonconvex WERs. Evidence consistent with such behavior is ubiquitous.⁶

Chronic rents. Labor pricing produced by supply-demand interaction in Panel C is the market wage, reflecting the rational payment of workers’ opportunity costs. In Panel B, employee compensation produced by equilibrating the efficiency and reference wages (W^n and W^r) reduces the role of market opportunity cost to providing the lower bound on the wage range (W^m to W^n) featured in the firm’s WER schedule. Large establishments rationally pay chronic (time-varying) wage rents, pushing many employees off their market-supply schedule. That displacement explains a host of persisting puzzles in mainstream market-centric macroeconomics.⁷

Other features. In the GEM Project, the small-firm wage is functionally equivalent to the labor-pricing of Panel C. Coexisting venues of rational firms, one populated by large establishments paying wage rents and the other by small firms paying market-opportunity costs, greatly enrich macro theory. Two-venue modeling features rationed “good” (rent-paying) jobs and plentiful “bad” (no-rent) jobs, with inter-sector flows governed by under-appreciated Harris-Todaro

⁶ See Chapter 10 in the GEM Project’s eBook for a survey of the literature. It is particularly interesting 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. Perhaps even 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. The elaboration is consistent with the dynamic analysis presented in Chapter 3 in the GEM Project’s eBook.

⁷ See especially Chapters 2, 3, and 6 in the GEM Project’s eBook..

(1970) mechanics. Forced job loss, including both temporary layoffs and permanent employment downsizing, rationally results from adverse demand disturbances. Downsizing plays a key role in the analysis of longer-term unemployment, motivating intensive labor-market price discovery during the difficult transition from rent-paying to market-paying jobs.⁸ Finally, the central role of large corporations in coherent generalized-exchange macro theory should itself be emphasized. Over the past 100 years, such firms have grown to dominate modern economies, today accounting for a substantial share of total world output, an even greater share of global trade, almost all high-productivity routinized jobs, and most involuntarily lost jobs. The 19th century production landscape was very different, generating market-centric labor-supply modeling that was once appropriate but for a long time now has badly misled economic theorists.

III. MODERN LABOR DEMAND

In the introductory GEM treatment of production, the two venues in bifurcated generalized-exchange macroeconomics are each defined for a given state of technical knowledge. The large-establishment venue (LEV) is populated by homogeneous firms, characterized by scale and input specificities that generate costly, asymmetric workplace information and routinized jobs. Homogeneous firms in the small-establishment venue (SVE) demonstrate the absence of scale, no meaningful specificities, and cost-effective worker monitoring.

SEV production is especially simplified. First-degree homogenous output is posited to be increasing in its single homogeneous input, labor hours. Innovative modeling is confined to LEV production, $X_J=f(E_J,K_J)$ such that $E_J=\dot{Z}_J H_J$ and $K_J(t)\leq K_J^P(t)=f(K_J(t))$ where K denotes capital services used in production, K_J^P the maximum available capital services, and K the nonhuman capital stock. In the short-run, encompassing cyclical deviations from trend but excluding technological change, cooperative labor input (E) is used in fixed proportion with K .

LEV employee behavior is the intuitive starting point for reconsidering of the textbook theory of production.⁹ Recall some definitions. From the perspective of the LEV representative

⁸ For elaboration, see Chapters 3 and 5 in the GEM Project's eBook.

⁹ For elaboration, see Chapters 2 and 3 in the GEM Project's eBook.

establishment, the proper measure of labor input is (E_J) , for which the production function is well defined. Variable E_J is linked to labor hours paid for (H_J) by a scalar \dot{Z}_J , which in generalized-exchange modeling captures worker rational on-the-job behavior (OJB):

$$E_J = E^Q_J + E^G_J + E^S_J(t) = \dot{Z}_J H_J, \text{ such that } \dot{Z}_J \geq 0,$$

where E^Q measures the contribution from unenhanced employee hours, E^G denotes from general human capital, and E^S from firm-specific human capital. The introductory generalized-exchange theory assumes workers are homogeneous in E^Q and E^G . With respect to the input of physical capital, there exists maximum real output (X_J^P) described by a capacity function, $X_J^P = f(K_J)$, such that X_J^P is increasing in capital stock K_J and provides an upper bound on production, $X_J \leq X_J^P$. Capital services K_J flow from the capital stock, $K_J^P = f(K_J)$, such that $K_J \leq K_J^P$.

Here's the rub. Large-scale production, ubiquitous after the Second Industrial Revolution, corrupts the analytic integrity of marginal productivities for both labor hours $(\delta X_J / \delta H_J)$ and capital stock $(\delta X_J / \delta K_J)$, depriving coherent market-centric modeling of critical microfoundations. The generalization of rational exchange imposes $H_J = E_J / \dot{Z}_J$ on labor services, the complications from which occupy a great deal of the GEM Project. Meanwhile, large-establishment capital stock (K_J) is both insufficiently divisible and excessively firm-specific to support Euler-theorem distribution.¹⁰ Given indivisibility, proportional amounts of capital cannot be withdrawn in response to relatively small reductions in output, as illustrated by the absence of small-lot capital-stock liquidations in cyclical downturns. What is instead marginally withdrawn, with a cut in output, is some utilization of capital services (K_J) made available by the existing capital stock. Neither LEV input, E nor K , can be rationally priced in the marketplace.

The reformulated LEV production-function permits a useful distinction between *capital-capacity utilization* $(\mathcal{O}(t) = K_J(t) / K_J^P(t), K_J^P(t) = f(K_J(t)))$ and *production-capability* $(\mathcal{C}(t) = X_J(t) + \mathcal{C}_J(t) \leq X_J^P(t), \mathcal{C}(t) = \mathcal{C}^V(t) + \mathcal{C}^T(t))$. The former is a familiar concept. The latter is more novel, reflecting the workplace availability of inputs needed to support scheduled output, with $\mathcal{C}(t)$ denoting firms' margin of unused production capability that is best understood as a short-term buffer against unanticipated increases in product demand. Significant stationary variations in product demand

¹⁰ For elaboration, see Chapters 3 in the GEM Project's eBook.

alter both production-capability (\mathcal{C}), via adjustments to labor availability, and capital-capacity utilization ($\mathcal{A}(t)$).

LEV labor demand is embedded in the rational management of production-capability (\mathcal{C}). Management identifies its production schedule, with its particular levels of labor hours, capital services, and material input, as an increasing function of firms' rational expectations of product demand subject to profit seeking. As a result, optimal labor input is recognizably adjusted over the business cycle. Given that labor hours available for production (H_J^P) are increasing in the level of employment ($H_J^P=f(N_J)$, such that $\Delta H_J^P/\Delta N_J>0$), rising demand at some point pushes firms to hire more workers, a process that is influenced by overtime premiums as well as physical/socioeconomic constraints on the length of the workweek. Expectations of weakening product demand induces the adjustment mechanism to run in the opposite direction, generating results that can include reduced workweeks, layoffs, and job downsizing.

Given $W_J=W_J^n=W_J^{\hat{n}}$, labor input that is in 1:1 correspondence to production can be measured by worker hours. Chronic wage rent combines with the substantial pool of SEV employees to produce an elastic market-supply schedule to LEV firms at their profit-seeking wage (W_J^n).¹¹ As already noted, large-establishment employment determination is directly aligned with the generalized-exchange reorientation of macroeconomics to feature powerful causation from nominal demand disturbances to same-direction changes in employment and output.

IV. CLOSING POINTS

The necessary condition for adverse nominal demand disturbances to coherently induce forced job loss is the rational suppression of wage contracting. Such suppression requires meaningful wage rigidity (MWR), which features both downward nominal rigidity over stationary business cycles and chronic, time-varying wage rents. The inability of consensus market-centric macro modeling, as captured in the New Neoclassical Synthesis, to accommodate involuntary unemployment is wholly rooted in its inability to microfound necessary MWR. Such labor

¹¹ The generalized-exchange mechanics recall Oskar Lange's early interpretation of *The General Theory's* "unemployment equilibrium" in which Keynes implicitly assumes an infinitely elastic labor-supply curve in response to a rigid money wage,

pricing has been shown to require nonmarket exchange. The GEM Project's signature generalization of rational exchange from the marketplace to the large-establishment workplace microfounds rational, continuous-equilibrium involuntary job loss. The new frontier of macroeconomics is both coherent and stabilization-relevant.

GEM Project. The paper provides an overview of how to coherently model continuous-equilibrium involuntary joblessness. For reasons of space the heavy analytic lifting, especially the derivation of meaningful wage rigidity from axiomatic model primitives and its rich conversion to dynamic analysis, occurs off-stage in the GEM Project's eBook Chapters 2 and 3 (gemproj.org/eBook), suggesting that more information on the Project would be useful.

The GEM Project is an open-platform interactive website that provides a home for theorists who suspect that the rigorous analysis of labor pricing and use is fundamental to constructing policy-relevant, coherent macroeconomics. It focuses on optimizing price-mediated exchange in the large-establishment workplace, a venue that is familiar to practitioners and broadly understood to have decision rules, constraints, and mechanisms of exchange that differ fundamentally from marketplace rules, constraints, and exchange mechanisms. The Project emphasizes the unique, conscious nature of labor input, especially in the context of agency problems and routinized jobs, and is organized around the identification of axiomatic worker preferences as well as the construction and application of a rigorous model of on-the-job behavior. It derives the existence, stability, uniqueness, and aggregation properties of workplace equilibrium from optimizing employee-employer exchange. The Project demonstrates that rigorous workplace modeling usefully augments the exclusive focus of mainstream theorists on marketplace exchange, greatly enhancing the explanatory and predictive capacities of the formal economic method.

Research agenda. This paper closes with an opportunity alert, especially for young macroeconomists in search of dissertation and early-publication topics. The fundamental reconfiguration of macroeconomics induced by the generalization of rational exchange is both coherent, thereby playing by the modern academy's crucial rule of engagement, and stabilization relevant, preserving the possibility of having something useful to say. What's not to love? The eBook featured on GEM Project website, explicating the continuous-equilibrium two-venue

macro model class, is tasked to introduce the critical workplace venue of economic exchange to macroeconomists. Given that preparatory role, analysis is necessarily limited, leaving a cornucopia of important, interesting work undone.

Some notable examples of low-hanging fruit that remain for research by industrious readers are:

- Extend the generalized-exchange model to open economies, reworking longstanding mainstream trade theorems;
- Design and execute numerical simulation exercises for active- K_j dynamics, including job downsizing, wage givebacks, and the nature of employment growth that accompanies robust capital accumulation;
- Carefully explore the nature and role of increasing returns in generalized-exchange modeling;
- Enrich and test the briefly sketched two-venue general-equilibrium (TVGE) model of stagnation dynamics;
- Enrich and test the briefly sketched TVGE version of Bernanke's model of depression dynamics;
- Further document the validity and implications of the rational-arrangements labor pricing that established the relative importance of inflation catch-up versus expectations in large-establishment wage determination;
- Formally integrate the TVGE and the Search/Matching/Bargaining models, delivering macro labor analysis from its protracted period of wandering in the desert of voluntary unemployment;
- Carefully integrate TVGE modeling, with special capacity to accommodate Lewis transfer and long-term global trends in living standards, into modern growth theory;
- Carefully investigate the broad range of implications resulting from introducing residual rent (pure profit) into formal macro theory as well as the more general substitution of Jensen's factor-income distribution for Wicksell-Wicksteed's model;
- Enrich Edgeworth, Nash, Pigou, and the remaining bargaining literature by application of GEM axiomatic preferences and technology constraints to the formal modeling of unions and collective bargaining with both passive and active government participation;
- Enrich and test the compact generalized-exchange analysis of the nature and implications of the axiomatic substitution of the preference for fair treatment for the broadly discredited assumption that employees inherently prefer to shirk on the job;

- Elaborate on the modeling of extreme instability, with special attention to the critical role of stabilization authorities' real-side credibility;
- Use the generalized-exchange framework to fundamentally rework consumption analysis;
- Use the generalized-exchange framework to fundamentally rework investment analysis, with special attention to pure profits, hold-up problems, uncertainty, and the independent role of investor/lender credibility attached to stabilization authority's real-side objective;
- Use the generalized-exchange framework to rework fiscal analysis, with attention to Ricardian equivalence and payroll taxes;
- Use the generalized-exchange framework to carefully recalibrate the role of rational expectations and the Lucas critique;
- Use the generalized-exchange framework to carefully reconsider the Solow residual and its use in RBC modeling;
- Use the generalized-exchange framework to carefully reconsider Piketty's and Stiglitz's analyses of the longer-term behavior of the capital share;
- Use the generalized-exchange framework to carefully reconsider the Robinson and Sraffa capital controversies;
- Use the generalized-exchange framework to rework the analysis of monetary rules – i.e., rule specification by Taylor and others as well as rules versus discretion;
- Use the generalized-exchange framework to analyze the nature, history, and consequences of monetary-policymaking objectives;
- Use the generalized-exchange framework to enrich the analysis of central-bank nominal and real credibility and, more particularly, to rethink the Fed/ECB narratives in support of that credibility;
- Use the generalized-exchange framework to enrich the analysis and tools of central-bank management of aggregate nominal demand;
- Introduce the generalized-exchange analysis into business-school best practices literature.

The GEM Project provides useful advice to young macroeconomists. The 2007-09 Great Recession was a watershed event, indicating that the mainstream status of coherent market-centric DSGE modeling is winding down. A theory that is pushed to the policymaking sidelines during the most perilous instability since the 1930s is no longer the future of career-building dissertations and research. That future will belong to analysts who are instead engaged in coherent *and* stabilization-relevant research. Within that program, which must feature

meaningful wage rigidity, there is a great deal to do. That prospect and the excitement that accompanies it have long been absent in macroeconomic mainstream.

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