

More Than a Sum of its Parts Keynes, Maxwell, and the Organic Whole

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Abstract

Popular accounts of the recent financial crisis miss its systemic and theoretical origins. Aiming to understand the panic that spread through the world of high finance, this essay investigates how conservative economists, under the banner of rational expectations, justified a powerfully anti-regulatory agenda. These economists resuscitated classical postulates and sought to produce a classically liberal macroeconomics on a foundation of individual rationality. But a careful study of John Maynard Keynes' macroeconomics—both as laid out in his *General Theory* and his earlier *Treatise on Probability*—reveals his fundamental insight: the dynamics of a whole economy, as measured by the aggregate quantities of macroeconomics, cannot be reduced to the sum of the actions of individual decision makers. This essay opens up macroeconomics' novel theoretical structure by analyzing its intellectual foundations, which lie in the ideas of nineteenth-century statistical physics and thermodynamics. More than a decade before he published *The General Theory*, Keynes thoroughly worked over Scottish physicist James Clerk Maxwell's statistical theory of matter. Keynes' analysis of Maxwell's velocity distribution (which relates molecular motions to aggregate properties of gases) yielded a distinctive philosophical understanding of the meaning of statistical laws. Thus, statistical mechanics serves as the explicit model for the probabilistic foundations of macroeconomics. This reading dissects macroeconomics' elusive relation between the individual and the aggregate to understand the theoretical foundations of Keynesianism and the true incoherence of the neoliberal project.

The celebrated optimism of traditional economic theory, which has led to economists being looked upon as Cándides, who, having left this world for the cultivation of their gardens, teach that all is for the best in the best of all possible worlds, provided we will let well alone, is also to be traced, I think, to their having neglected to take account of the drag on prosperity which can be exercised by an insufficiency of effective demand. For there would obviously be a natural tendency towards the optimum employment of resources in a Society which was functioning after the manner of the classical postulates. It may well be that the classical theory represents the way in which we would like our Economy to behave. But to assume that it actually does so is to assume our difficulties away.¹

-John Maynard Keynes, *The General Theory*

What then is the role of books such as this? Twofold, in my opinion. First, to provide subject matter for bull sessions.... Second, and more basic, to keep options open until circumstances make change necessary. There is enormous inertia – a tyranny of the status quo – in private and especially governmental arrangements. Only a crisis – actual or perceived – produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around. That, I believe, is our basic function: to develop alternatives to existing policies, to keep them alive and available until the politically impossible becomes politically inevitable.²

-Milton Friedman, *Capitalism and Freedom*

When customized derivatives are used they should entail more rigorous capital requirements. The pros and cons of buying and selling derivatives on or off an exchange should be immediate and clear to all market participants.... An educated consumer is our best customer.... These are professional investors who want this exposure.³

-Lloyd Blankfein, Chairman and CEO of The Goldman Sachs Group, *Testimony before Financial Crisis Inquiry Commission*

Classical political economy starts and ends with the liberal individual. When, in this story, the rational *homo economicus* meets others of his ilk, his natural inclination to “truck, barter, and trade” compels him to engage in mutually beneficial exchange. This is the allegedly organic birth of the market. Since each participant in this market both rationally seeks to maximize his own utility and understands the dynamics of exchange (i.e. economics), the market is, as a whole, rational. Keynes, however, sees in this conclusion a fallacy of composition. In his *General Theory*, he establishes a new method of analysis: macroeconomics, which is the study of the economy as a whole.

¹ John Maynard Keynes, *The General Theory of Employment, Interest, and Money*, [1936] (New York: Harcourt, 1964) 33-4.

² Milton Friedman, *Capitalism and Freedom*, (Chicago: U. Chicago Press, 1982), viii-ix.

³ Financial Crisis Inquiry Commission, “Testimony by Lloyd Blankfein,” January 13, 2010. <http://www.fcic.gov/hearings/> and Andrew Ross Sorkin, “Wall St. Ethos Under Scrutiny at Hearing,” *New York Times*, January 13, 2010. <http://www.nytimes.com/2010/01/14/business/14sorkin.html>

Instead of starting with individual actors, macroeconomics works on understanding the relations of aggregate quantities, such as unemployment, national income, and effective demand. For Keynes, the individual encounters the economy fully subject to his psychological frailties and illusions. His actions are neither fully rational, nor informed by a complete knowledge of the state of the market. With the rise of securities markets, he can invest for the short term, aiming to increase his capital not by calculating the true future value of a company but rather by predicting how mass psychology will evaluate a stock. Since his investments are always made with an eye to liquidity, he can unload an asset at any time at the given market price. In this regime, the performance of the macroeconomic aggregates is irreducible to the investment decisions of individuals and markets cannot be counted on to rationally allocate resources.

The current financial crisis was not born in the offices of South Florida mortgage brokers. Decades of deregulation and neoliberal economic policy led us here. The gradual unwinding of the Keynesian regulatory system, which restricted financial dealings in the wake of the Great Depression, was the stated aim of the Monetarists, a group of economists that gained substantial political clout in the 1980s with the election of Ronald Reagan. Since then, neoliberal economists have sought a return to classical first principles and a justification for reinstituting a more *laissez faire* version of capitalism. This movement has taken the form of a revision of macroeconomics, in which the economically rational individual has reclaimed his position as the fundamental unit of analysis. In this world, that of the rational expectations school, regulation is not only unnecessary but also as counterproductive and coercive as it was to Adam Smith. The practical result has been decades of lucrative financial innovation without a corresponding growth in the regulatory apparatus.

This anti-regulatory policy agenda was predicated on an essential misunderstanding of macroeconomics. Keynes' fundamental insight was that macroeconomic aggregates are irreducible to the psychology of individual decision-making. This bifurcated theoretical structure, which is unprecedented in political economy, can be best understood in relation to physics, economics' constant intellectual companion. Keynes wrote his *General Theory* in the wake of one of history's greatest scientific revolutions – the invention of quantum mechanics and general relativity – and this invention has strong echoes in his work. But to understand Keynes, we must look to the complicated relation between thermodynamics and statistical mechanics. Indeed, a study of Keynes' earlier work on probability theory shows that before he was a great economist, he was first a statistician. He was intimately acquainted with the work of James Clerk Maxwell, the Scottish physicist who first applied statistical methods to the study of matter. Keynes' *Treatise on Probability* reveals the extent to which the relation between statistical physics informed his views on the uniformity of nature and served as the foundation for his macroeconomics.

Both macroeconomics and thermodynamics see coherent, organic wholes in complex systems, which appear to change in predictable ways. They also acknowledge the existences of component parts, whether gas molecules or individual people. But this particulate level has a life of its own and must be described with a completely separate set of rules. In this reading, Keynes' individual psychology corresponds to statistical mechanics. These theories attempt to comprehend huge numbers of elements, each subject to a certain degree of fundamental randomness. In both physics and economics, connections can be forged between these two levels, but these bonds are neither expressive nor rigid. The best one can hope to extract are tendencies or probabilities of action.

It is this essential divide that economists of the rational expectations school cannot see. In their attempts to ground macroeconomics in a rational human nature, these theorists misunderstood essential differences between these dual registers of analysis. They failed to grasp important, irrational macro-phenomena such as asset bubbles or liquidity crises, since they could not see the whole economy as anything but the sum of individuals' rational economic decisions. At this moment, in the wake of a massive collapse of the financial system that has metastasized into a global economic malaise, this crucial failure presents itself in the form of rational irrationality. During both the boom and the subsequent bust, we can see examples of how goodness for the part is not necessarily relevant to what is good for the whole.

Thanks to decades of deregulation and other connected failures of design (e.g., the corruptibility of credit rating agencies), financial titans were able to perform dangerous accounting hijinks. These lax policies produced a situation in which highly leveraged institutions were selling billions of dollars worth of mortgage debt to questionable borrowers, fueling a ludicrous real estate bubble, and trapping the financial system in an interconnected network of massive obligations. Apart from the heavily publicized frauds committed against some shockingly trusting investors, the resulting market implosion was designed, perpetrated, and ignited by professional investors doing their best to maximize their returns. In short, they were acting with as much rationality as they could muster.

As the world economy descended into the depths of the Great Depression, classical economists struggled to develop a compelling explanation for the obvious desperation of the unemployed masses. According to classical theory, labor could be analyzed in the same manner as every other commodity, that is, by determining the price at which demand and supply schedules establish a market-clearing wage. As in all liberal theory, the actors in this drama are rational individuals, concerned not with the amount of money they receive as compensation for each factory shift but instead with what that remuneration allows them to buy. In other words, classical theory takes workers to be bargaining with management over their *real wages*. In this world, every person has the capacity to get a job at any time, provided he is willing to work for the prevailing wage. Thus, if anyone went long without work, it must be due to a personal choice that the going rate was not worth the bother of leaving the house. In this version, the starving masses were not victims; they were merely obstinate.

Keynes argues that this classical theory of employment relies on “two fundamental postulates” adopted “practically without discussion.”⁴ This logical pair formalizes the decision-making calculus for the individual actors on each side of the wage bargain. The first postulate determines the demand schedule for hiring labor: “The wage is equal to the marginal product of labour.”⁵ For the entrepreneur, this logic defines the value of the wage as the amount of output that would be lost if he employed one less unit of labor. Obviously, if deflation forced a factory owner to cut his prices to stay competitive, the demand schedule, so defined, would pass along this loss to his workers in the form of a wage cut. This cut implies no insult to the worker; it is merely the necessary result of a calculation the entrepreneur must make in order to stay in business.

The second postulate defines the supply schedule of labor by explaining how the individual worker decides for what wage he is willing to work. The postulate assumes the worker to be calculating a balance between “the utility of the wage when a given volume of

⁴ Keynes, *The General Theory*, 5

⁵ *Ibid.*

labour is employed [and] the marginal disutility of that amount of employment. That is to say, the real wage of an employed person is that which is just sufficient (in the estimation of the employed persons themselves) to induce the volume of labour actually employed to be forthcoming.”⁶ If this worker can find a job with a wage high enough to satisfy this calculation, he will pursue it. If he is not working, classical theorists assume that he must not think it to be worth his while.

Relying on these two postulates, classical economists could only conceive of two reasons why someone might not be working. The first, “frictional unemployment,” is the time when one is “between jobs.” It is a “realistic” concession to the “inexactnesses of adjustment, which stands in the way of continuous full employment.”⁷ Just as with the friction in a physical system, this effect is the cost incurred for leaving the ideal world of theory and ought to be minimized as much as possible. The other category, “voluntary unemployment,” explains the position of anyone else without a job. For the classical liberal, this situation is the result of an individual choice not to work for the prevailing wage and should be as acceptable to policy makers as any other rational decision.

For Keynes, writing at the height of the Depression’s misery, this theory seemed crazy, “for, admittedly, more labour would, as a rule, be forthcoming at the existing money-wage if it were demanded.” How could the classical theory fail to conceive of a third category – involuntary unemployment – when millions of the out-of-work were starving and searching for any available employment without success? Classical theory explained away these masses’ plights by blaming an “open or tacit agreement among workers not to work for less.” Insofar as the artificially high prevailing wage was the result of collective bargaining (or other efforts to fight necessary wage cuts on behalf of labor), the resulting unemployment is, in this sense, voluntary.⁸

Inspired by the nonsensical conclusion that the Great Depression’s astronomical unemployment statistics were no more than millions of workers’ simultaneous decisions that their jobs weren’t worth the trouble, Keynes raises a fundamental objection to the classical theory of employment. The Classical marketplace drama assumes, he argued, “that the wage bargains between the entrepreneurs and the workers determine the real wage, so that... [workers] can, if they wish, bring their real wages into conformity with the marginal disutility of the amount of employment offered by the employers at that wage. If this is not true, then there is no longer any reason to expect a tendency towards equality between the real wage and the marginal disutility of labour.”⁹ Of course, it is not true that the mass of workers has direct control over their real wages. Workers both negotiate and receive their income in the form of money wages, and “the struggle about money-wages primarily affects the *distribution* of the aggregate real wage between different labour-groups, and not its average amount per unit employment.”¹⁰ As he fleshes out this objection to classical theory’s second postulate, Keynes introduces a meaningful theoretical distance between the choices of individuals and the movements of the aggregate. Later, we will see how this separation is his key theoretical insight.

Any individual worker, or group of workers, might be able to price themselves temporarily into a job by consenting to wage cuts. This will certainly reduce the real wage

⁶ *Ibid.*

⁷ *Ibid.*, 6.

⁸ *Ibid.*

⁹ *Ibid.*, 11.

¹⁰ *Ibid.*, 14.

that these workers receive for their labor. Classical economists extend this micro-scale analysis “to apply to the whole body of labour.” Their conclusions “do not mean merely that a single individual can get employment by accepting a cut in money-wages which his fellows refuse.”¹¹ But Keynes disrupts this extension by pointing out that such an individual sacrifice only produces a *relative* reduction in real wages. Were workers forced to accept blanket cuts that affected them all, there would be no *general* decrease in the purchasing power of the new, lower money wages. Indeed, the very strategy for surviving an economic downturn that works for the individual – lowering his wages so as to undercut all competitors – is destructive when everyone adopts it. Without addressing the systemic problems depressing the aggregate demand for labor, such a race to the bottom by workers will only produce a vicious deflationary spiral.

Crucially, a general reduction in real wages depends on a change in the purchasing power of money itself. Such a change in the cost of living is beyond the bargaining power of workers. That labor unions do not call for massive strikes with each increase in the cost of living (corresponding to a general decrease in real wages), testifies to workers’ inability to affect any general change in their own purchasing power. In light of this disconnection, “a willingness on the part of labour to accept lower money-wages is not necessarily a remedy for unemployment.”¹² This move fundamentally changes the economic logic accounting for the existence of the industrial reserve army. Keynes’ analysis frees workers and their collective bargaining organizations of the responsibility for chronic unemployment; their lack of work is no longer an issue of any individual’s obstinacy. In this regime, involuntary unemployment is symptom of a systemic imbalance in the economy as a whole: the aggregate labor supply exceeds the current aggregate demand for labor. With this analysis, Keynes establishes the management of unemployment as the foundational problem of macroeconomics.

So what is to be done about it? We have seen how the classical solution to recessionary unemployment is composed of many rational individuals deciding to turn things around. Not only must workers adjust their demands downward during wage bargain renegotiations but also capitalists must make daring new investments that will lead to new hiring opportunities. In this tale, workers are merely expected to be realistic about the proper compensation for their labor. The capitalists are the true heroes. Classical theory relies on these men to be bold risk takers, investing in new productive capacity and bringing new commodities to the market. They are the sources of the economic growth that should raise all boats.

The success of this strategy is assured by another fundamental tenet of classical liberalism, Say’s Law. This logic is at the core of Ricardo’s *Principles of Political Economy*. It is the assumption that “the whole of the costs of production must necessarily be spent in the aggregate, directly or indirectly, on purchasing the product. . . . [In short, that] supply creates its own demand.”¹³ This guarantee of a demand for any new products brought to market provides the cover necessary for capitalists to take on their natural responsibility to make new investments. It makes new investment an economically rational choice. Only market distortions – e.g., government interference or unnaturally high labor costs – might hamper this strategy.

¹¹ *Ibid*, 11.

¹² *Ibid*, 18.

¹³ *Ibid*.

Keynes acknowledged that his contemporaries would be loath to make an explicit appeal to Say's Law. Nevertheless, he saw how "contemporary thought is still deeply steeped in the notion that if people do not spend their money in one way they will spend it in another.... [But] those who think in this way are deceived... by an optical illusion, which makes two essentially different activities appear to be the same." The conflation he observes between one's "decisions to abstain from present consumption with the decisions to provide for future consumption" accounts for the miraculous ability of supply to create its own demand.¹⁴ Dissecting this assumption produces a truly macroeconomic explanation for relentless unemployment. That is, how insufficient *effective demand* might leave an economy mired in an unfortunate equilibrium far below full employment.

The macroeconomic explanation for persistent unemployment is the primary aim and core achievement of Keynes' *General Theory*. An exposition of this theory that would capture the true degree of its subtlety and rigor is hopelessly beyond the scope of this essay.¹⁵ My aim with the following analysis is to give an account of how the dynamic interaction among Keynes' aggregate quantities can produce an economic equilibrium below full employment. I intend to show how this description operates without relying on any assumption of individuals exhibiting the standard economic rationality that serves as the first principle of classical economics.

Keynes' theory starts with the proposition that aggregate income depends on the level of employment; when the latter increases, so does the former. The manner in which society spends this income is determined by a set of both objective and subjective incentives, including "objective attendant circumstances and... the subjective needs and the psychological propensities and habits of the individuals composing it and the principles on which the income is divided between them."¹⁶ Keynes subsumes these factors under the relatively stable function called *the propensity to consume*. As this function is (usually) less than unity, when income increases, aggregate consumption increases as well, but not by as much as income.

This gap between aggregate income and aggregate consumption presents entrepreneurs with a problem: consumer demand is not sufficient to account for the whole of any income growth, so some additional demand must exist to "absorb the excess of total output over what the community chooses to consume when employment is at the given level."¹⁷ Without this additional demand, which takes the form of *investment*, firms would be unable to sustain the given level of employment. Thus, given "a community's propensity to consume, the equilibrium level of employment, *i.e.* the level at which there is no inducement to employers as a whole either to expand or to contract employment, will depend on the amount of current investment."¹⁸ When considered together, consumption and investment define the *aggregate demand function*, which relates hypothetical quantities of employment to the expected proceeds of their output. The level at which the aggregate demand function intersects the *aggregate supply function* determines the *effective demand*. This demand is "effective" insofar as it suggests "the level of employment which maximizes the entrepreneur's

¹⁴ *Ibid*, 21-2.

¹⁵ In his eminently readable *General Theory of Employment, Interest, and Money*, Keynes supplies several concise explanations of his theory. The reader is encouraged to turn to this text for a better telling of his macroeconomic story, particularly the outline found in chapter 3, section II (p. 27-32).

¹⁶ *Ibid*, 91.

¹⁷ *Ibid*, 27.

¹⁸ *Ibid*.

expectation of profits.”¹⁹ Unfortunately for the working classes, these functions can easily fall into equilibrium at a level below full employment. This situation produces the characteristic recessionary rut that continually frustrates policy makers’ attempts to stimulate economic growth.

This logic implies another problem: What determines the amount of current investment? In the classical world, Say’s Law all but assures entrepreneurs that well-planned investments will succeed. The implicit assumption, translated into aggregate terms, is that the mere act of bringing a product to market will spur the aggregate demand function to adapt itself to the price set by the aggregate supply function. This means that “effective demand, instead of having a unique equilibrium value, is an infinite range of values all equally admissible, and the amount of employment is indeterminate.... [This is] equivalent to the proposition that there is no obstacle to full employment.”²⁰ Thus, classical theory suggests that any individual should be able to create new jobs at any time by the mere act of deciding to enter the market as an entrepreneur and investing. If this were true, the pervasive job loss intrinsic to recessions would be nearly impossible to explain. This was precisely the trouble that motivated Keynes’ *General Theory*.

In the Keynesian world, where the aggregate demand function stubbornly refuses to accommodate itself to the entry of any given entrepreneur, the factors controlling investment are far more complex than classical theory admits. The *inducement to invest* depends on a complex relation between the reigning expectations of prospective yields (called the *marginal efficiency of capital*) and the rates of return on loans of various terms. While no investor would commit their capital to a program expected to lose money, the future is fundamentally uncertain and even the most impeccably planned capital investment has associated risks. It is the collective estimation of these risks – and the possible rewards of investment – that determines the rate of investment, and consequently the ability of the economic system to fill the ever-increasing gap between aggregate consumption and the aggregate supply price necessary to support a given level of employment.

The inducement to invest is far more speculative than Say’s Law suggests any economic decision ought to be. On an aggregate level, it is based on the collective expectations of the future, a set of conjectures that are fundamentally uncertain and random. The crucial role that the inducement to invest occupies in macroeconomic theory makes it the primary locus of any state intervention, which aims to control unemployment and economic growth. Soon, we will see how this view implies a novel theory of the individual that decisively breaks from classical liberalism’s assumptions about the psychology underlying human nature. More importantly for our purposes, however, *The General Theory* establishes a new relation between the individual and the performance of the economy as a whole, a relation best understood through the lens of physics.

Political economy and physics have a history of intellectual exchange stretching back to the work of Aristotle, who might be said to have invented the philosophical study of both. The authors who built the foundations of classical liberalism – Locke, Smith, and Ricardo – had aspirations to do for their discipline what Newton had done for physics: discover a set of laws underlying all natural processes. The dynamical structure of liberal economic theory, in which prices converge on a central point of equilibrium, has clear

¹⁹ *Ibid*, 55.

²⁰ *Ibid*. p. 26.

inspirations in the Newtonian theory of gravitation. In terms of its method, logic, and inspirations, political economy might be called the “social physics.”²¹

There are strong justifications for subjecting Keynes’ political economy to a comparative analysis with physics. His 1921 *Treatise On Probability* indicates his fluency with physics’ latest problems and theories. Not only are many of statistical methods shared with or derived by mathematical physicists, but the applications he discusses to illustrate the philosophical import of his work come from a variety of branches of physics, including thermodynamics, statistical mechanics, and astronomy.²² Indeed, the very title of his *magnum opus* alludes to the scientific revolution wrought by his acquaintance, Albert Einstein, in his recent generalization of relativity.²³

Keynes alludes to his physical inspiration on *The General Theory*’s first page. In this introductory statement, he states his intention to “argue that the postulates of the classical theory are applicable to a special case only and not to the general case, the situation which it assumes being a limiting point of the possible positions of equilibrium.”²⁴ This correspondence principle, which implies that Keynes’ general theory should reduce to the classical theory in the limit of full employment, could easily have been lifted from a physics textbook of the time. After Einstein ignited the twin projects of quantum mechanics and general relativity in his 1905 *annus mirabilis*, the Correspondence Principle – the idea that all new physical theories should reduce to familiar classical laws at the so-called Newtonian limits of large quantum numbers, small velocities relative to the speed of light, and weak gravitational fields – served as a crucial guide and inviolable test of the surge of new concepts. Indeed, Keynes makes an oblique analogy to general relativity’s new geometric theory of spacetime that, to my mind, confirms his modern physical aspirations for *The General Theory*:

The classical theorists resemble Euclidean geometers in a non-Euclidean world who, discovering that in experience straight lines apparently parallel often meet, rebuke the lines for not keeping straight as the only remedy for the unfortunate collisions, which are occurring. Yet, in truth, there is no remedy except to throw over the axiom of parallels and to work out a non-Euclidean geometry. Something similar is required today in economics. We need to throw over the second postulate of the classical doctrine and to work out the behavior of a system in which involuntary unemployment in the strict sense is possible.²⁵

But if Keynes found *The General Theory*’s *raison d’être* in Einstein’s general relativity, he found inspiration for its logical structure in the dual theories of thermodynamics and statistical mechanics. The slippery relation between these complementary theories of matter provides the perfect model by which one can grasp the truly radical connection between macroeconomic aggregates and Keynes’ analysis of the individual psychology at the root of human nature.

Thermodynamics rose from the residue of the caloric theory, which assumed heat to be a weightless fluid. This fluid, called caloric, could neither be created nor destroyed; it

²¹ Philip Mirowski, *More Heat than Light: Economics as Social Physics, Physics as Nature’s Economics*. (Cambridge: Cambridge UP, 1989)

²² John Maynard Keynes, *A Treatise On Probability*, (London: MacMillan, 1921), 293-306.

²³ Robert Skidelsky, *John Maynard Keynes: Economist, Philosopher, Statesman* (Oxford: Macmillan, 2003), 630.

²⁴ Keynes, *The General Theory*, 3.

²⁵ *Ibid.* 16-7.

flowed from hot bodies to colder ones. Temperature was thought to be a measure of the amount of caloric in a particular body. The theory was essentially mechanical in nature and its success benefitted greatly from the ease of imagining this fluid flowing back and forth like any familiar liquid. It was both causally simple and fully reversible.

Caloric theory evaporated in 1798, under the eye of Count Rumford (Benjamin Thompson), who was occupied with boring cannons for the Elector of Bavaria at his arsenal in Munich. As he watched his tools bore through the metal, Thompson observed the production of heat. Further experiments demonstrated that the friction of a dull tool against the metal produced an “evidently inexhaustible” supply of heat. This result contradicted the supposed conservation of caloric and set the stage for the invention of a substitute theory.²⁶ This came nearly half a century later, when a Manchester brewer, James Prescott Joule, conclusively showed heat to be a form of energy with a mechanical equivalent.²⁷

In 1850, Rudolf Clausius formulated the laws of thermodynamics, as we know them today. The first law of thermodynamics is a mathematical statement of the conservation of energy, a principle that came directly from Joule’s experiments, and is given by:

$$\Delta U = Q + W$$

In place of the once-conserved caloric, the first law stated that all bodies have some internal energy (U). Any change in this energy is the result of either adding some quantity of heat (Q) or performing some mechanical work on it (W). The law most readily applies to a gas-filled piston, which can gain energy by both heating and compression. To this, he added the second law of thermodynamics, a statement about entropy change, a newly defined ratio of added heat to temperature. (Entropy is a notoriously perplexing quantity that is, today, frequently associated with “disorder” to middling results. I hope the reader will excuse any vagueness in this discussion.) From Sadi Carnot’s study of steam engines, Clausius was able to state definitively that the entropy of any closed system cannot decrease. Further work on the entropy changes of steam engines by Lord Kelvin yielded the first rigorous definition of absolute temperature, thermodynamics’ final important quantity.²⁸

Although most of the crucial researches in the initial development of thermodynamics were performed on water, later work showed that the results are generally applicable. Moreover, the model of matter is also irrelevant: it wasn’t until Einstein’s 1905 explanation of Brownian motion that belief in the reality of atoms and molecules was close to universal.²⁹ This flexibility to the underlying theory of matter is crucial, because it speaks to thermodynamics’ intrinsically totalizing register of analysis. It is a science of aggregates and equilibriums, measuring quantities that define the state of a gas as a whole. Without relying on any further levels of description, thermodynamics can predict the evolution of whole systems through time. Its equations can calculate the progress of a chemical reaction, even without any knowledge of atoms, molecules, or elements.

Keynesian macroeconomics operates on an analogous register. As we have seen, it takes its object to be the economy as a whole. Of course, it knows that there are people, who labor, invest, and consume within it, but they are not, in themselves, causally responsible for economic performance. For example, macroeconomics sees unemployment as an insufficiency of aggregate demand, not a labor union’s unwillingness to agree to wage cuts or an entrepreneur’s investing timidity, as classical theory does. As a source of policy,

²⁶ Philip Stehle, *Order, Chaos, Order* (Oxford: Oxford UP, 1994), 28.

²⁷ *Ibid*, 30.

²⁸ *Ibid*, 30-2.

²⁹ *Ibid*, 91.

macroeconomics aims to stimulate growth with additional investment demand or temper an overheated economy with consumption taxes. Macroeconomics does not take individuals, in the liberal sense of the term, as objects of its attention or theoretical terms in its calculations. It sees only the economy as a unit, a whole without parts.

This is not to say that *The General Theory* cannot see people. Indeed, Keynes' ideas about individual psychology and human nature are subtler than anything found in the liberal canon. He rejects its utopian portrait of the liberal individual as a dispassionately rational being with complete knowledge of a fully transparent market, soberly calculating the optimal choice at every turn, unfazed by complexity, and well-versed in economic postulates. In contrast, the Keynesian man is irredeemably human: dominated by "animal spirits," susceptible to illusions, and guided by an uncertain confidence. He is both liable to corruption and easily convinced. While he doesn't spurn logical analysis, his rationality only penetrates so far; at some level, he is always going with his gut.³⁰ Most importantly, he lacks the capacity to know the future.

But where does this Keynesian individual enter? As we have seen, macroeconomics takes demand to be the primary driver of economic activity. Successful management of unemployment depends on not only the maintenance of healthy consumer demand but also continual increases in investment demand. For each element of aggregate demand, *The General Theory* provides a rate-determining function: the propensity to consume and the inducement to invest, respectively. These functions serve as the links between the macroeconomic dynamics of aggregates quantities and the psychological formations of people. Unlike with liberal theories, these functions are not straightforward measurements of entrepreneurial "opportunity."³¹ Instead, they are the results of complex integrations of psychological tendencies, objective circumstances, and predictions about the future.

The above macroeconomic analysis of unemployment showed how the marginal propensity to consume determines the size of the aggregate demand gap, which investment demand must fill to support a given level of employment. As far as we are concerned, this is its primary macroeconomic role. The function's precise behavior depends on a variety of objective and subjective factors, which are averaged to produce a coherent aggregate value for macroeconomic calculations. But its most important effect, the existence of the aggregate demand gap, is due to its usual value below unity. This "normal shape" follows from a "fundamental psychological law... that men are disposed, *as a rule and on the average*, to increase their consumption as their income increases, but not by as much as the increase in their income.... For a man's habitual standard of life usually has the first claim on his income, and he is apt to save the difference which discovers itself between his actual income and the expense of his habitual standard."³² While all economic theories make claims about human nature, the distinctively Keynesian logic is encapsulated in the phrase "as a rule and on the average." Keynesian appeals to psychological laws never yield rigid decision-making calculi; any conclusions are mere tendencies. Instead of mathematically determining what actions an individual should take, these conclusions merely suggest, "as a rule and on the average" what people will do. These conclusions are fundamentally statistical in nature and the resulting macroeconomic quantities do not supervene on individual patterns of thought in any direct way.

³⁰ George Akerlof and Robert Shiller, *Animal Spirits*, (Princeton, NJ: Princeton UP, 2009), 1-56.

³¹ Mark H. Willes, "Rational Expectations' as a Counterrevolution," in *The Crisis in Economic Theory*. ed. Daniel Bell and Irving Kristol. (New York: Basic Books, 1981), 89.

³² Keynes, *The General Theory*, 96-7. My emphasis.

To understand how *The General Theory's* macroeconomics is truly irreducible to individual psychology, we must return to the nineteenth century and investigate the statistical physics that began to emerge from thermodynamics. It began with a theory of atoms. By observing chemical reactions, Amedeo Avogadro had concluded that any given volume of gas at a standard temperature and pressure consisted of the same number of molecules, regardless of the type of substance. During 1850s, this proposal began to attract rigorous analysis and, in the process, became known as the kinetic theory of gases. In 1851, Joule worked out an explanation for pressure by calculating the speed at which some hypothetical and indefinitely small gas particles might collide with the walls of a container. Seven years later, Clausius introduced the idea that these particles collide randomly with each other and thereby produced a viable explanation for diffusion. Gradually, a corpuscular theory of matter was taking shape.

Although this development of kinetic theory had produced a compelling description of the atoms that make up a gas, it was still an essentially deterministic theory. It took the work of James Clerk Maxwell, a theoretical physicist and mathematician from Edinburgh, to comprehend the fundamentally statistical nature required for an atomistic theory of matter. To his colleagues at Cambridge, Maxwell was a decidedly “queer fish,” with a Scottish accent “so broad that his first reading of the lesson in chapel caused considerable untoward merriment amongst all, including the College Master.”³³ He is best known for his accurate formulation of the wave theory of electromagnetism but first made his name working on the kinetic theory. In 1859, he read his groundbreaking “Illustrations of the Dynamical Theory of Gases” at a meeting of the British Association for the Advancement of Science at Aberdeen, Scotland. The paper contained several significant advances, including derivations of the equipartition of energy, the viscosity of gases, and the conduction of heat by gases.³⁴ But his most important result, the distribution of molecular velocities in a gas at a given temperature, will be our focus.

Any appreciable quantity of gas has so many molecules that describing their motions individually would be impossible. For the first time, Maxwell brought a statistical approach to bear on the problem. He assumed that after many collisions, the direction of motion of any particle was completely random, so the distribution of molecules should be isotropic, a relatively weak statistical claim. He then assumed that the probability of a molecule having a component of its velocity along any one of the coordinate axes was independent of its motion along the other two. Later, he would abandon this assumption, coupling the equations for each component of the particle's velocity. (We will soon see the importance of this rejected assumption.) After some further statistical wrangling, he derived a distribution function for the velocity. He showed that the most likely velocity in any given direction was zero, as the probability of motions with equal components in opposite directions is the same. However, the probability of a very low speed (a calculation of speed ignores the direction of motion) was negligible, since it is overwhelmingly likely that at least one component will have an appreciable velocity.³⁵

After some further analysis by Ludwig Boltzmann, these results coalesced into the famous Maxwell-Boltzmann distribution, statistical mechanics' first significant result. It gives a distribution of molecular speeds as a function of the temperature of the gas as a whole: the higher the temperature, the greater the average molecular speed and the wider the

³³ Ivan Tolstoy, *James Clerk Maxwell: A Biography*, (Edinburgh: Canongate, 1981), 93.

³⁴ Stehle, *Order, Chaos, Order*, 36-7.

³⁵ *Ibid.* 36-41.

distribution. While it describes the behavior of gas particles, the distribution function says nothing about the motion of any molecule in particular. This fundamentally probabilistic conclusion contrasts sharply with all previous calculations of corpuscular speed. In 1738, Daniel Bernoulli correctly described gas pressure as the distributed impact of “air corpuscles” colliding with the walls of a container. However, his model assumed that all of the corpuscles were traveling with precisely the same speed.³⁶ The same was true of the work by Joule and Clausius. This belief implied a fully determined relationship between the temperature of the gas as a whole and the motions of its constituent molecules. It was the fundamental randomness at the core of Maxwell’s analysis that transformed the essentially classical kinetic theory into the truly modern statistical mechanics.

By reading this birth of statistical mechanics into *The General Theory*, we can gain a firm understanding of how Keynes situated the individual in relation to the aggregate. In the physical case, the temperature of the gas as a whole – a truly aggregate quantity, defined by thermodynamics – corresponds to a characteristic distribution of molecular behaviors. While this shows the patterns of motion to which gas molecules tend, it never calculates a single equation of motion. Statistical mechanics establishes a new register of analysis that is irreducible to thermodynamics (and *vice versa*). They approach the same physical situations on completely different levels, construct separate objects, and yield different types of results. For example, one does not need to know the details of molecular collisions to know the concentrations of products and reactants when a chemical reaction achieves equilibrium. This prediction is the domain of thermodynamics. But only kinetics can tell the chemist whether that equilibrium will be reached in twenty seconds or twenty hours.

At the very least, we can be certain that Keynes was intimately acquainted with the subtleties of this dual theoretical structure. In his theorizing, he did not merely apply statistical methods to his ideas on political economy; his thought was thoroughly and rigorously mathematical. As a mathematician, he was not only well trained – at Cambridge, he received a first class B.A. in mathematics – but also well respected. His *Treatise on Probability* is a serious mathematical text, which contains several new statistical methods as well as a subtle philosophical discourse on the meaning of probability. In the *Treatise*, Keynes performs a lengthy analysis of “Maxwell’s classic mistake in the theory of gases,” thoroughly critiquing the Scot’s mistaken assumption that the components of a gas molecule’s velocity are independent of each other. Keynes’ analysis is no mere recapitulation of others’ work; he rejects the conclusions of three “authorities” (Bertrand, Poincaré, and Von Kries) and forges his own explanation for Maxwell’s statistical miscue. In sum, this section of the *Treatise* reveals that Keynes was as fluent as anyone in both the mathematics and the physics of statistical mechanics.³⁷

For Keynes, the issue of whether or not scientists may treat a whole object as merely the sum of its constituent parts depends on a stronger assumption than just a belief in the principle of the Uniformity of Nature, namely,

something much more like what mathematicians call the principle of the superposition of small effects or as I prefer to call it... the *atomic*³⁸ character of

³⁶ *Ibid.* 34.

³⁷ John Maynard Keynes, *A Treatise on Probability*, 172-4.

³⁸ Please note that Keynes is using atomic in a slightly different sense than I have previously. Here, an *atomic* character corresponds to a model of nature in which the principle of superposition holds true as a rigid causal law, as opposed to his alternative model of *organic* wholes. I previously used “atomic theory” to refer to physicists’ belief that matter is composed of discrete particles. In this essay, I argue that the invention of

natural law.... Each atom can, according to this theory, be treated as a separate cause and does not enter into different organic combinations, in each of which it is regulated by different laws. Perhaps it has not always been realized that this atomic uniformity is in no way implied by the principle of the Uniformity of Nature. Yet there might well be quite different laws for wholes of different degrees of complexity, and laws of connection between complexes, which could not be stated in terms of laws connecting individual parts. In this case natural law would be organic and not, as it is generally supposed, atomic.³⁹

Given these two possible mereologies, it is clear that truly statistical sciences take the world to consist of organic wholes. In a fundamentally atomic world, addition would be sufficient to derive how a large number of atoms would *cause* in concert. The power of statistics, however, is its ability to represent an ensemble as new object, with an existence all its own. There should be little, at this point, which view of Nature lies at the foundations of both modern physics' theory of matter and *The General Theory of Employment, Interest, and Money*. Each of these pursuits is characterized by a strong discontinuity between the laws governing individual parts and organic wholes, a gap bridged by the statistical methods of Maxwell and Keynes, respectively.

Keynes attributes economics' traditional disregard for the aggregate demand function to the work of Ricardo, for whom Say's automatic adjustment hypothesis was a fundamental law of the marketplace. And since "Ricardo conquered England as completely as the Holy Inquisition conquered Spain," the underlying assumptions had escaped scrutiny.⁴⁰ In light of the twentieth-century reemergence of many of the same classical ideas, Keynes' explanation for their original rise to power bears consideration:

The completeness of the Ricardian victory is something of a curiosity and a mystery. It must have been due to a complex of suitabilities in the doctrine to the environment into which it was projected. That it reached conclusions quite different from what the ordinary uninstructed person would expect, added, I suppose, to its intellectual prestige. That its teaching, translated into practice, was austere and often unpalatable, lent it virtue. That it was adapted to carry a vast and consistent logical superstructure, gave it beauty. That it could explain much social injustice and apparent cruelty as an inevitable incident in the scheme of progress, and the attempt to change such things as likely on the whole to do more harm than good, commended it to authority. That it afforded a measure of justification to the free activities of the individual capitalist, attracted to it the support of the dominant social force behind authority.⁴¹

But for the proper name in the first sentence, this could be an evaluation of the strategy employed by the neo-classicists of the 1960s and '70s. Schooled in the Keynesianism that dominated all levels economics for the decades following *The General Theory*, these self-described counter-revolutionaries sought to reclaim control of their discipline with an appeal

statistical mechanics transformed physicists' atomic theory of matter into what Keynes would term an *organic* model.

³⁹ Keynes, *A Treatise on Probability*, 249.

⁴⁰ Keynes, *The General Theory* 32.

⁴¹ *Ibid.* p. 33.

to classical first principles and a fervent opposition to government intervention in the economy.⁴²

According to Milton Friedman, this insurgency's standard-bearer, the strategy was to build up an alternative set of economic theories – theories steeped in the *laissez faire* ethic of classical liberalism – in anticipation of a politically opportune moment to seize control. The stagflation of the 1970s was a boon to neoclassicism; Friedman's ability to describe the phenomenon gave the movement intellectual heft while the unemployment and price instability primed the public to accept a new economic theory. When Ronald Reagan was elected President in 1980, this reactionary social program, once "politically impossible," became "politically inevitable."⁴³ To say the neoclassicists took full advantage of this opportunity hardly begins to describe its success.

Under the banners of "rational expectations theory" and "monetarism," these theorists sought to re-form both academic and official macroeconomics in the image of classicism. Mark Willes described rational expectations as "an attempt to apply the principles of classical economics to all economic problems and specifically to macroeconomic policy. These principles have never before been seriously applied to macroeconomic policy-making. *Rational expectations, then, is a new classical economics.*"⁴⁴

Its objections struck at the heart of Keynesian theory, seeking to justify a fundamental rejection of so-called interventionist macroeconomic policy. Rational expectations starts by resurrecting a familiar character with its embrace of a "more coherent and sophisticated version" of the classical premise that "individuals optimize."⁴⁵ Ultimately, this new rationality amounts to an immunity to the money illusion; that is, neoclassical agents cannot be "tricked" by macroeconomic policy changes that might cause, for example, a future change in the price level. Under this assumption – that economic agents have rational expectations – individuals build anticipated policy changes into their contracts (including, for example, a clause indexing obligations to the rate of price inflation) and active fiscal or monetary policies have only the potential to confuse things.

To understand the magnitude of this change, recall how the Keynesian man is locked in the present, restricted to taking action guided by predictions, based "partly [on] existing facts, which we can assume to be known more or less for certain, and partly [on] future events, which can only be forecasted with more or less confidence."⁴⁶ These long-term expectations are the results of individual psychology and correspond in the now familiar Keynesian manner to the macroeconomic *inducement to invest*. Of course, Keynes assumes that prospective investors will not willfully blind themselves to information at their disposal (though he never forgets that no quality information is ever gathered without incurring a cost), but, in general, uncertainty reigns. He reminds his readers

that human decisions affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist; and that it is our innate urge to activity, which makes the wheels go round, or rational selves choosing between the

⁴² Willes, "Rational Expectations' as a Counterrevolution" in *Crisis in Economic Theory*, 90.

⁴³ Friedman, *Capitalism and Freedom*, viii-ix. Also, please see this essay's epigraph.

⁴⁴ Mark H. Willes, "Rational Expectations' as a Counterrevolution," in *The Crisis in Economic Theory*, 82. My emphasis.

⁴⁵ *Ibid.*

⁴⁶ Keynes, *The General Theory*, 147.

alternatives as best we are able, calculating where we can, but often falling back for our motive on whim or sentiment or chance.⁴⁷

Because every person uses the facts available to him to produce his own, slightly unique, predictions about the future, the only way to deal with expectations on the aggregate level is with statistics.

On this count, rational expectations theory has an even more fundamental objection to Keynesianism. The charge: “inconsistency.”⁴⁸ According to its “more coherent” logic, the problem with macroeconomics is that “its premises about aggregate behavior are based on conflicting assumptions about individual behavior. [Its] main equations, which represent aggregate functions like consumption and labor supply, are based only indirectly on individual behavior. . . . Aggregate behavior in Keynesian models thus does not correspond with individual optimizing behavior in all conditions.” In light of the above analysis, this hardly seems like an accusation of ignorance on Keynes’ part; this disconnect, which neoclassicists *prima facie* consider a flaw, is the most fundamental insight of his *General Theory*.

Whether ignorant of or disgruntled by the constructive work performed by this “indirect” dependence of the aggregate on the atomic, economists of the rational expectations school sought to make macroeconomics “coherent.” Their plan was to build a foundation that returned individual decision-making to the beginning of all analyses. The reasoning was characteristically simple and appropriately direct: “Because aggregate outcomes are only a sum of individual decisions, the aggregate relationships should have no independent existence.”⁴⁹ That this transformation would violate macroeconomics’ most essential logic did not seem to be a problem.

In the domain of policy-making, this shift had profound implications. This isn’t surprising, since the theory was called into existence in order to justify the very *laissez faire* policies it ultimately suggested were necessary. Although macroeconomics’ foundational problem, the management of unemployment, was an aggregate one, economists from the rational expectations school rejected macroeconomics’ standard measurements as “arbitrary measures of success. . . . Because these models replace individual decisions with aggregate actions, they say nothing about individual welfare. Since these models don’t consider people’s well-being, the economists have to make guesses about what increases it.”

Instead, neoclassicists suggested that policies should be judged on the degree of economic “opportunity” they provide individuals: “Optimizing agents will take advantage of new opportunities to make themselves better off in their own terms. Providing more opportunity is a means of increasing people’s well-being.”⁵⁰ Given the classically accepted atomistic view of aggregate behavior, providing individual investors as much space as possible to make “optimal” decisions should be sufficient to keep the whole economy running smoothly. With individual opportunity as the ultimate criterion, there was a drastic reversal in the policy consensus that had reigned since the Keynesian reforms started during the depths of the Great Depression. In place of fostering systemic stability, economic policy-makers adopted a single goal: deregulation.

⁴⁷ *Ibid.* 163.

⁴⁸ Willes, “Rational Expectations’ as a Counterrevolution,” in *The Crisis in Economic Theory*, 88.

⁴⁹ *Ibid.* 89.

⁵⁰ *Ibid.*

According to the cable news version of the current financial crisis, the fundamental problem was a decade-long building spree fueled by easy-money policies and the predatory behavior of sub-prime lenders. This account finds the ultimate explanation for the near-collapse of the global financial system in the speculative exuberance and market frothiness that gave every player an interest in providing credit to borrowers without the means to pay down their debts. Were news anchors disposed to quoting dead economists on air, they could find support for this theory of the crisis in Keynes: “During a boom, the popular estimation of the magnitude of... risks, both borrower’s risk and lender’s risk, is apt to become unusually and imprudently low.”⁵¹

Certainly, one can tell a history of the crisis in terms of the credit markets: a boom in credit inflated a real estate bubble of historic proportions before a devastating credit crunch nearly destroyed the global financial order. But looking no further than the deeds of mortgage brokers not only obscures the machinery behind the credit boom (and bust) but also ignores the political and theoretical origins of the current predicament. A better story is one about the rise of exotic financial products, such as asset derivatives, mortgage backed securities, and credit default swaps, that fueled Wall Street’s meteoric ascendancy from the 1980s to the present. In this version of events, real estate is abstracted as just another asset class, one that enjoys the misguided but “intuitive feeling that home prices everywhere can only go up.”⁵²

These financial products allow “mortgage originators” to unload the debt of a new mortgage from their balance sheets – sometimes mere minutes after closing. Large financial institutions – both Government Sponsored Enterprises and private investment banks – then repackage this debt, have it rated by one of the private credit rating agencies, and sell tranches of various risk profiles to investors. We are now painfully aware of the problems at every step in this process, and the recent revelations that some trading desks shorted their firms’ own collateralized debt obligations reveals its fundamental unsoundness.⁵³ When home prices inevitably flat lined, unemployment rose, and people started defaulting on their mortgages in record numbers, these asset-backed securities tanked and the complex web of insufficiently capitalized institutional hedges and credit-default swaps triggered a crisis of confidence.

The resulting liquidity crisis demanded government recapitalization of troubled firms to stave off a complete collapse. The chain of previously unthinkable failures – Bear Stearns, IndyMac, Fannie Mae and Freddie Mac, Merrill Lynch, Lehman Brothers, WaMu – came to a head the week of September 14th, when A.I.G.’s London-based Financial Products division brought the world’s biggest insurance company to the brink of collapse. With a vast number of complex businesses, insufficient capital reserves, and billions of dollars in obligations to other players, the Government decided that A.I.G. was too important to the survival of the system, too big to fail. Invoking emergency powers, the Federal Reserve decided to extend A.I.G. an \$85 billion loan in exchange for a 79.9 percent stake in the company, preserving its credit rating and staunching the run.⁵⁴

How did such a fragile system develop? How could the puncturing of an obviously overinflated asset bubble set off such a devastating chain reaction of bank runs and capital

⁵¹ Keynes, *The General Theory*, 145.

⁵² Akerlof and Shiller, *Animal Spirits*, 150.

⁵³ Gretchen Morgenson and Louise Story, “Banks Bundled Bad Debt, Bet Against It and Won,” *New York Times*, December 23, 2009. <http://www.nytimes.com/2009/12/24/business/24trading.html>

⁵⁴ James Stewart, “Eight Days,” *The New Yorker*, September 21, 2009, 66-73.

calls? For many commentators, the answer lies in the three-decade-long supremacy of “market fundamentalism,” the belief “in what former US president Ronald Reagan called the magic of the marketplace.”⁵⁵ This all-consuming belief in the power of the market to automatically self-regulate has its intellectual roots in the work of the rational expectations school. It was premised on the belief that individual agents, whether single investors or corporations, could produce rational aggregate behavior from the sum of their own individually rational decisions.

The coordinated assault on the Depression-era regulatory structure, which had been able to prevent cataclysmic bank runs for nearly half a century, worked along two paths. First, sympathetic lawmakers and regulators actively dismantled regulatory limits on the activities of financial institutions. The law most widely cited in connection with the current crisis is the 1999 Gramm-Leach-Bliley Act; this bill, which received strong bipartisan support, repealed a provision of the Glass-Steagall Act of 1933 prohibiting banks from merging with securities firms and “lift[ed] some restrictions governing nonbank banks,” among other “modernizations.”⁵⁶

Second and more importantly, free market fundamentalists prevented the regulatory structure from keeping up with the breakneck pace of financial innovation, allowing a “shadow banking sector, unprotected by deposit insurance,” strict capital reserve requirements, and other essential banking regulations to grow into a dominant force.⁵⁷ Unrestricted by allegedly cumbersome and outdated regulations, these institutions were able to take on massive risks without the oversight real banks are traditionally subject to. But they were also exempt from the federal deposit insurance that has traditionally maintained confidence and prevented bank runs from overwhelming the financial system. Unprotected by federal guarantees and unrestricted by heavy capital reserve requirements, the shadow banking system was vulnerable to a bank run when bearish investors began making capital calls *en masse*:

These so-called non-bank banks are the investment banks, bank holding companies, and hedge funds. Functionally these do just what a ‘bank’ does. They take out loans with short maturities – a great deal of it typically borrowed from banks or from bank holding companies – and then they invest that money. And there can be a ‘run’ on these institutions just as there can be a run on traditional banks. In the same way that nineteenth-century bank depositors fled into currency in times of panic, every short-term lender may want to be the first in line not to renew its loans to investment banks, bank holding companies, and hedge funds.... They have been fully solvent before the flight to liquidity began, but in a liquidity crisis they may not be able to afford the higher rates for continued borrowing.⁵⁸

This is precisely what happened when borrowers began defaulting on their debts and billions of dollars-worth of mortgage-backed securities foundered. Thanks to the incredibly complex networks of mutual obligations, hedges, credit-default swaps, and insurance policies, runs on non-bank banks in this shadow system started a chain reaction as panic spread through the teetering financial system. Only a massive government recapitalization – requiring the

⁵⁵ George Soros, “The Worst Market Crisis in 60 Years,” *Financial Times*, January 22, 2008. www.ft.com

⁵⁶ U.S. Senate Committee on Banking, Housing, and Urban Affairs, “Financial Services Modernization Act: Summary of Provisions.” <http://banking.senate.gov/conf/grmleach.htm>

⁵⁷ Akerof and Shiller, *Animal Spirits*, 72-3.

⁵⁸ *Ibid.* 82.

Federal Reserve to invoke emergency powers over companies normally outside its purview – could slow the accelerating crisis.

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The difficulties which exist are not chiefly due, I think, to our ignorance of the remote future. The possibility of our knowing that one thing rather than another is our duty depends upon the assumption that a greater goodness in any part makes, in the absence of evidence to the contrary, a greater goodness in the whole more probable than would the lesser goodness of the part. We assume that the goodness of a part is favourably relevant to the goodness of the whole. Without this assumption we have no reason, not even a probable one, for preferring one action to any other on the whole. If we suppose that goodness is always organic, whether the whole is composed of simultaneous or successive parts, such an assumption is not easily justified. The case is parallel to the question, whether physical law is organic or atomic.⁵⁹

–John Maynard Keynes, *A Treatise on Probability*

When economists of the rational-expectations school refounded macroeconomics on classical liberalism’s theory of the individual decision, they treated Keynes’ fundamental insight – the dual structure that linked organic aggregates to irredeemably human actors – with contempt. In an effort to introduce “coherence” by reducing the whole to a simple sum of its moneymaking parts, neoclassical theorists denied the independent reality of the economy. They claimed to aspire to create “a value-free positive economic science.”⁶⁰ Yet they not only began with a political agenda – deregulation wherever possible – but also ignored the physical origins of Keynesian macroeconomics. Instead of recognizing the irrationality and uncertainty intrinsic to predictions, they had complete faith “that the goodness of a part is favourably relevant to the goodness of the whole.”⁶¹ And just like A.I.G., the unregulated behemoth that nearly destroyed global finance, they forgot to hedge.⁶²

In retrospect, the disconnect between the goodness of the part and the goodness of the whole is obvious in both the boom in the credit markets and in their subsequent collapse. Indeed, the mortgage securitization process itself could not have developed into such a massive venture had it not proved profitable – that is, economically rational – to each of its many players. Mortgage originators had little incentive to enforce stringent qualifications on their prospective borrowers, as they unloaded the toxic debt to large financial institutions as soon as possible. Originators’ income came from fees on the sale of the mortgage, not the long process of repayment. Ditto for the bankers who assembled the pools of subprime mortgages; they collected fees on the creation and sale of mortgage-backed securities. It was the investors – pension funds, Wall Street traders, and charitable foundations – who stood to lose money if the original borrowers defaulted. But these securities provided such good returns during the boom years that investment managers, whose bonuses were determined by short-term profits, could not bear to stay out of these

⁵⁹ Keynes, *A Treatise on Probability*, 310.

⁶⁰ Milton Friedman, “The New Dimension of Politics,” *Monetarist Economics*, (Institute of Economic Affairs, 1991)

⁶¹ Keynes, *A Treatise on Probability*, 310.

⁶² James Stewart, “Eight Days,” *The New Yorker*, 62.

ebullient markets while their rivals made billions. The same competitive fever compelled Wall Street executives to guide their firms into risky businesses, even if their own in-house economists knew the underlying assets to be overvalued.

Although this towering investment apparatus was clearly irrational on the aggregate, it proved absolutely irresistible to each individual decision maker. Then-Citibank C.E.O. Charles Prince summed it up in a July 2007 interview. Even as the obvious problems with subprime mortgages made his firm's exposure to a collapse in the credit markets impossible to ignore, he told the *Financial Times* that he had no intention of pulling out of the lucrative business. "When the music stops, in terms of liquidity, things will be complicated," he said. "But as long as the music is playing, you've got to get up and dance."⁶³

Once home prices stopped their absurd rise, the classical fallacy of composition appeared with devastating results. When the confidence that had supported unjustifiably high asset prices gave way, investors rationally sought to be the first to pull their stakes out of these toxic assets. Because the esoteric financial products pitched by the non-bank banks were unprotected by federal guarantees – thanks to decades of market fundamentalists' anti-regulatory policies – the over-leveraged shadow banking sector was especially vulnerable to a cascade of capital calls. Add to this the Basel Committee on Banking Supervision's decision in the late 1990s to allow firms to set their capital reserve requirements using their own internal risk calculations, rather than those made by external regulators, and it is obvious that Wall Street was completely unprepared for a panic-driven liquidity crisis.⁶⁴

The 2008 liquidity crisis and the fire sale of toxic mortgage-backed securities it engendered is the perfect example of how individually rational decisions can devastate an economy: "Of the maxims of orthodox finance none, surely, is more anti-social than the fetish of liquidity, the doctrine that it is a positive virtue on the part of investment institutions to concentrate their resources upon the holding of 'liquid' securities. *It forgets that there is no such thing as liquidity of investment for the community as a whole.*"⁶⁵

Viewed through this lens, blaming overzealous mortgage brokers, uneducated borrowers, and greedy Wall Street investment bankers for the financial crisis seems beside the point. Though culpable for the damage wrought by their individual decisions, they appear to be mere shortsighted profiteers. The fundamental problems that condemned the global economy to the worst downturn since the Great Depression were the decades of anti-regulatory policies predicated on the false belief that a whole is nothing more than the sum of its parts, the economy nothing more than millions of rational individuals. And in perhaps the greatest irony of all, we've found ourselves back where Keynes started. With Wall Street firms back to earning enormous profits, and the stock market buoyed by billions in government support, commentators are insisting that the Great Recession is nearly over – this, despite two straight years of massive job losses and projections that Americans will soon experience the highest unemployment rate in a generation.⁶⁶

⁶³ John Cassidy, "Rational Irrationality," *New Yorker*, October 5, 2009. www.newyorker.com

⁶⁴ Joe Nocera, "Risk Mismanagement," *New York Times*, January 4, 2009. <http://www.nytimes.com/2009/01/04/magazine/04risk-t.html>

⁶⁵ Keynes, *The General Theory*, 155. My emphasis.

⁶⁶ Peter Goodman, "U.S. Job Losses in December Dim Hopes for Quick Upswing," *New York Times*, January 8 2010. <http://www.nytimes.com/2010/01/09/business/economy/09jobs.html>

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