Essentials of Constructive Heterodoxy: The Market

Kakarot-Handtke, Egmont

University of Stuttgart, Institute of Economics and Law

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Egmont Kakarot-Handtke*

Abstract

The consensus is that orthodox economics is a failure in three dimensions: conceptual, methodological, and empirical. Heterodoxy has meticulously sorted out the multitude of errors, mistakes, and distortions. Yet, this alone does not help out of stagnation. Economists have now to go into constructive mode. The most urgent task is to replace the misleading supply-demand-equilibrium representation of the market. The reconstruction of the centerpiece of the market system from scratch paves the way to the new paradigm. Nobody can talk about the market system without a correct idea of how the market works. Heterodox economists must take the innovative lead.

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*Affiliation: University of Stuttgart, Institute of Economics and Law, Keplerstrasse 17, 70174 Stuttgart, Germany. Correspondence address: AXEC Project, Egmont Kakarot-Handtke, Hohenzollernstraße 11, 80801 München, Germany, e-mail: handtke@axec.de. Research reported in this paper is not the result of a for-pay consulting relationship; there is no conflict of interest of any sort.

1 Consensus

> There is little or nothing in existing micro- or macroeconomics texts that is of value for understanding real markets. Economists have not understood how to model markets mathematically in an empirically correct way. (McCauley, 2006, p. 16)

The consensus is that orthodox economics is a failure. Heterodoxy has meticulously sorted out the multitude of errors/mistakes/distortions but seems to be a bit clueless.

> As will become evident, there is more agreement on the defects of orthodox theory than there is on what theory is to replace it: but all agreed that the point of the criticism is to clear the ground for construction. (Nell, 1980, p. 1)

After the ground has been cleared sufficiently it is now time for construction. The question is, where to start.

The market is the pivotal entity of the market system and the centerpiece of standard economics. The familiar representation is the supply-demand-equilibrium cross or what Leijonhufvud called the totem of the micro. The methodological defects of this construct are common knowledge.

> Much of economic theory is based on three questionable assumptions: (1) the world is deterministic; (2) decision makers act as if they know the values of all relevant parameters; and (3) consumers and firms respectively, act as if they were maximizing utility and profit. (Stigum, 1991, p. 29)

Orthodox economics is founded on behavioral assumptions. For several reasons this has been the wrong starting point. What is decisive: no specific behavioral assumption can serve as a starting point for economic analysis because no way leads from the understanding of human behavior to the understanding of the behavior of the economic system. It makes no difference whether one applies constrained optimization or animal spirits.

Of course, it is quite commonsensical to focus first on human behavior and to second-guess motives, expectations, and plans but ultimately this leads to nowhere as the failure of standard economics testifies. Common sense has always been a bad guide in scientific matters and is, in the last instance, not distinguishable from scientific incompetence.

Section 2 gives a formal description of the most elementary economic configuration, that is, the pure consumption economy. From these minimalistic premises follows in Section 3 the market clearing price as result of the purely structural Law of Supply and Demand. In Section 4 the random environment is defined. In Section 5 the market is put to work in the random environment. Section 6 concludes.

2 Abstraction and simplification

The economy is a complex system. Because it is impossible to directly observe the actual economy in its totality, the first task is to create a simplified mental representation. As a matter of fact, what is needed for good methodological reasons is the simplest possible description of the monetary economy. This description cannot be other than highly abstract and all depends on whether the abstraction succeeds. Abstraction, almost needless to emphasize, must eventually arrive with the highest precision at concrete facts, that is, at the touch points of theory and the real thing. As ever more phenomena are integrated into the representation the theory becomes successively more complex and approximates the real thing to an always higher degree. The starting point of an analysis can never be criticized for over-simplification, only for botched over-simplification.

> I think we have to admit that most successful scientific theories are lucky over-simplifications. (Popper, 1994, p. 173)

The most elementary economic configuration is the pure consumption economy. It is defined by:

$$Y_W = WL \tag{1}$$

wage income Y_W is equal to wage rate W times working hours L,

$$O = RL \tag{2}$$

output O is equal to productivity R times working hours L,

$$C = PX \tag{3}$$

consumption expenditure C is equal to price P times quantity bought/sold X.

The first three equations relate to income, production, and expenditure in a period of arbitrary length. The period length is conveniently assumed to be the calendar year. Simplicity demands that we have for the beginning one world economy, one firm, and one product. To spell this out is to point the way to the required differentiations and extensions.

It is important to recall that foundational propositions cannot be simple or trivial enough. Complexity emerges from the interaction of simple elements.

For the graphical representation of the pure consumption economy see Figure 1.

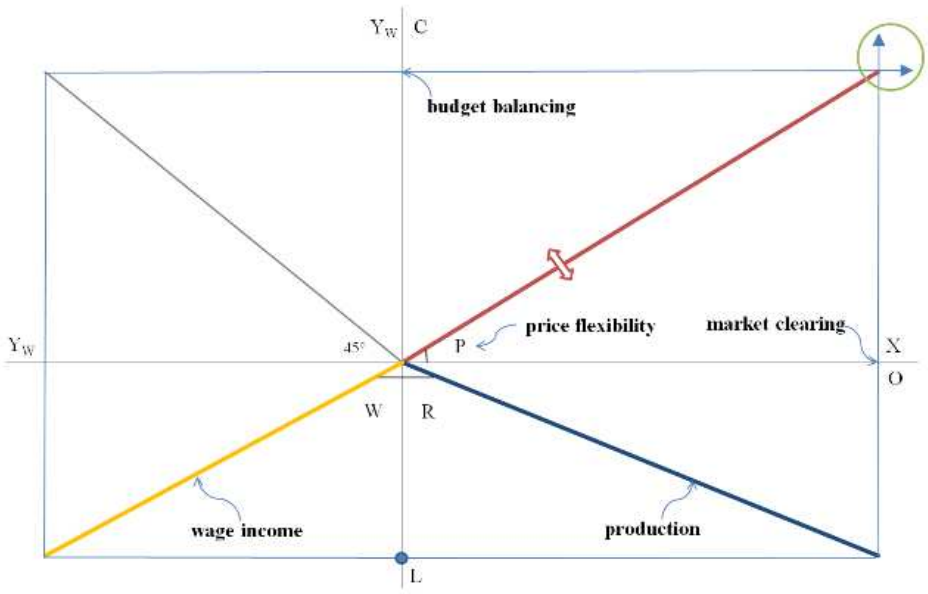

Figure 1: Pure consumption economy with market clearing and budget balancing

At any given level of employment L, the wage income that is generated in the consolidated business sector follows by multiplication with the wage rate. On the real side, output follows by multiplication with the productivity. Finally, the price follows as the dependent variable under the conditions of budget balancing, i.e., $C = Y_W$ and market clearing, i.e., $X = O$. Note that the ray in the southeastern quadrant is *not* a linear production function; the ray tracks *any* underlying production function. Note also that it is methodologically inadmissible to take the assumption of decreasing returns into the premises. Note finally that W is the *average* wage rate if the individual wage rates are different among the employees, which is normally the case.

If the wage rate W is lowered, the market clearing price P falls. If the number of working hours L is increased the price remains constant, provided productivity R does not change. If productivity decreases the price rises. If productivity increases the price falls. If wage rate and productivity vary in lockstep the price stays put. All this can be directly read off from the four-quadrant graphic.

In any case, labor gets the whole product and profit for the business sector as a whole is zero. All changes in the system are reflected by the market clearing price.

We know, of course, that the firm sets a price which is different from the market clearing price. This case has to be dealt with in a separate analytical part.

3 Market clearing price and real wage

> No more cause of natural things should be admitted than are both true and sufficient to explain their phenomena. (Newton, 1999, p. 794)

From the first three equations and the two conditions follows the price as dependent variable:

$$P = \frac{W}{R}. \tag{4}$$

This is the most elementary version of the Law of Supply and Demand for the pure consumption economy with one firm. In brief, the price equation states that the price is always equal to unit wage costs $\frac{W}{R}$. Employment is not a determinant of the price. The price formula is testable in principle and fully replaces supply-function–demand-function–equilibrium.

Conditional price flexibility is, clearly, an algebraic concept. Nothing is said about the behavior of the firm. Price setting behavior has to be dealt with in a separate analytical part.

From (4) follows

$$\frac{W}{P} = R \tag{5}$$

that is, the real wage is equal to the productivity.

The first point to notice is that the real wage is *not* determined by supply-demand-equilibrium in the labor market. If anything, only the *nominal* wage rate is. The wage rate W may go up or down by an arbitrary percentage rate, this has, due to conditional price flexibility, no effect whatever on the real wage. The wage rate is here the nominal numéraire.

The crucial systemic fact to point out against the orthodox approach is: if the product price is determined in the elementary economy by 'supply and demand' in the product market then the real wage cannot be determined by 'supply and demand' in the labor market.

The real wage is determined by the systemic and the production conditions. What is not determined at the moment is the labor input L. Hence, it may well be the case that the actual labor input is below the full employment level. Employment has to be dealt with in a separate analytical part.

Note that marginal productivity of labor or capital does not play any role whatsoever. These are entirely redundant subjective concepts with no counterpart in reality. Here we are alone concerned with *objective* systemic relationships.

Employment, wage rate or productivity are irrelevant for the profit of the business sector as a whole. In the pure consumption economy with budget balancing monetary profit cannot be other than zero.

> The consensus to date has been that it is mathematically impossible for capitalists in the aggregate to make profits. (Keen, 2010, p. 2)

The emergence of profit has to be dealt with in a separate analytical part.

4 The market over time

The period values of the variables are formally connected by the familiar growth equation:

$$Z_t = Z_{t-1}\left(1+\dddot{Z}_t\right)$$

or

$$Z_t = Z_0\,(1+\dddot{Z}_1)\,(1+\dddot{Z}_2)\ldots(1+\dddot{Z}_t) = Z_0\prod_{t=1}^{t}(1+\dddot{Z}_t)\,. \tag{6}$$

with

$$Z \leftarrow W, L, R, P, X, \ldots.$$

The path of the representative variable Z_t is determined by the initial value Z_0 and the rates of change $\dddot{Z}_t$ for each period. Each path has three segments: past, present, future. The past rates of change are known and can be inserted in (6).

Assumptions are a necessary ingredient of any theory. Their justification or, as the case may be, their futility materializes in the course of the analysis. What has to be avoided for compelling methodological reasons is assumptionism. It should be obvious that it is illegitimate to take green cheese assumptions like equilibrium, perfect competition, well-behaved production functions, optimization, etc. into the premises. This is methodological dilettantism.

In the path equation, the rates of change are the unknowns which have to be determined. It is a good methodological rule to start with the simplest possible assumption.

> The simplest hypothesis is that variation is random until the contrary is shown, the onus of the proof resting on the advocate of the more complicated hypothesis (...). (Kreuzenkamp and McAleer, 1995, p. 12)

The preliminary random hypothesis produces an evolving consumption economy. The respective probability distributions of the change rates are given in general form by:

$$\begin{array}{c} Pr\left(l_W \leq \dddot{W} \leq u_W\right) \\ Pr\left(l_R \leq \ddot{R} \leq u_R\right) \\ Pr\left(l_L \leq \ddot{L} \leq u_L\right) \end{array} \tag{7}$$

The defining equations (1) to (3), and (6) including (7), constitute a simulation.

Before the formalism can be applied concrete assumptions about the initial conditions and the upper (u) and lower (l) bounds of the probability distributions have to be made. This is the point where input from experience is needed. We know from observation for instance that productivity changes lie normally between, say, 5 percent and 0 percent per period. But it may happen that the rate of change is -100 percent in case a plant burns down or is cut off from the power supply or is paralyzed by a software bug or something else of this sort. In order to bring the simulation as close as possible to reality, we take the probability distribution from experience, and in order to make it simple, we first exclude all kinds of accidents.

We know that probability distributions may change over time and that accidents do happen. What we do not know is the exact date and extent of a possible accident in the future. For a start these features of reality are excluded from the analysis. They may be taken in as soon as the elementary relationships have been clarified. To begin with, the usual i.i.d. condition holds for each random variable.

A simulation yields a scenario and not a prediction. Each scenario is fully determined, explicit, and traceable in every detail. A simulation as defined by the four equations and the probability distributions is a well-defined mathematical object just like a system of deterministic equations. While they are formally on the same footing both mathematical objects yield different kinds of outputs: the system of deterministic equations yields a solution vector, a simulation yields a bundle of paths. This bundle has a counterpart in reality.

The upper (u) and lower (l) bounds of the respective probability distributions are, for a start, taken to be symmetrical around zero. This produces a drifting or stationary economy as a limiting case of the growing economy. There is no need at this stage to discuss the merits and demerits of different probability distributions. Eq. (7) represents the general stochastic case which in the limit $u - l \to 0$ shades into determinism.

Under the condition of market clearing and budget balancing the evolving consumption economy is a well-defined mathematical object that contains no subjective elements.

5 The three-dimensional market

Starting with the equations and conditions, we now have these independent variables left: W, R, L. It is assumed that their random rates of change are distributed

symmetrically around zero. With this all variables are formally determined and one of the possible concrete outcomes on the product market is summarized in Figure 2.

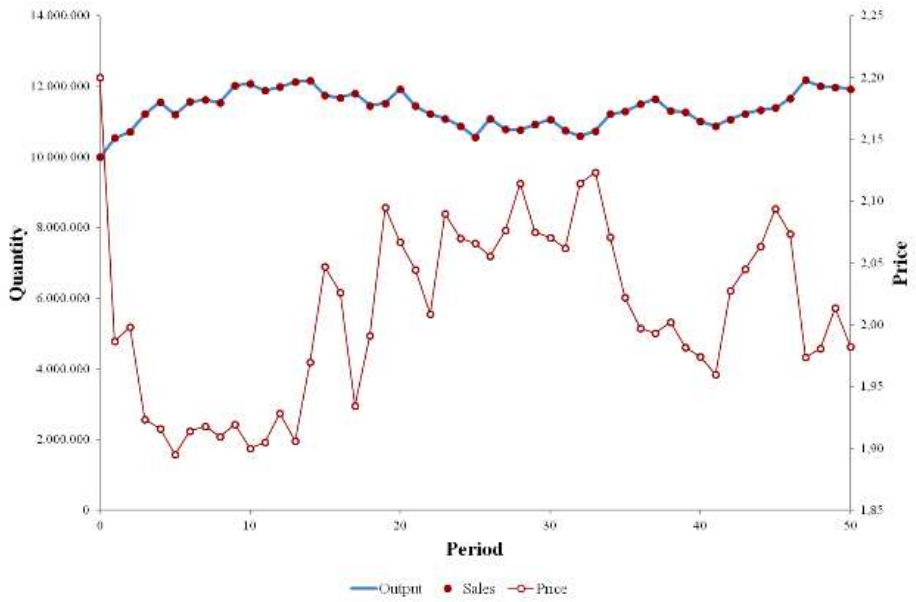

Figure 2: The three dimensional product market: supply and demand quantities (left axis), market clearing price (right axis), time (horizontal axis). The congruent paths of output O and quantity sold/bought X indicate market clearing over the whole time span of observation. The price is throughout the market clearing price. This representation replaces the obsolete two dimensional supply-function–demand-function cross.

Due to the market clearing condition the paths of real supply O and real demand X are congruent over the whole time span of observation. With wage rate and productivity given by random changes in each period the market clearing price is uniquely determined. The random changes of employment play no role for the price.

In proto-scientific thinking this price was regarded as equilibrium price. It is therefore important to note that the concept of equilibrium is not applied. The reason is simple: it is a metaphor that always had been inapplicable in economics. The talk of market forces that push or pull towards equilibrium is pure animism, i.e., the redundant verbal interpretation of a mathematical operation.

> Generally speaking, "equilibrium" is simply the solution of a system of equations. (Ingrao and Israel, 1990, p. 263)

Since we have no system of deterministic equations we have no equilibrium in the orthodox sense. The price path in Figure 2 has only one correct interpretation: it satisfies all objective systemic requirements.

The paths of wage rate, productivity, and employment are not predictable but the market clearing price is testable after the fact, that is, for all past values of wage rate

and productivity eq. (4) must hold in the pure consumption economy with market clearing and budget balancing.

6 Extensions and Conclusion

The extensions of the most elementary market representation are pretty obvious:

- The condition of market clearing has to be lifted, this brings inventory changes into the picture.
- The condition of budget balancing has to be lifted, this brings saving/dissaving as well as loss/profit and changes of the quantity of money/debt into the picture.
- The initial market has to be differentiated, this brings the interaction of markets and the structure of relative prices into the picture.
- Within the firms the wage rates have to be differentiated.

Needless to say that all these refinements have to be consistently carried out within the given formal framework. The main results of the systemic analysis of the structural economic interdependencies are:

- It is true that supply and demand are at the heart of how market economies work but with supply-demand-equilibrium Orthodoxy got the formal representation wrong.
- The Law of Supply and Demand for the pure consumption economy with one firm states that the market clearing price is always equal to unit wage costs. The price formula is testable in principle and fully replaces the vacuous supply-demand-equilibrium.
- The crucial systemic fact is: if the price is determined by 'supply and demand' in the product market then the real wage cannot be determined by 'supply and demand' in the labor market.
- The pure consumption economy with market clearing and budget balancing is reproducible for an indefinite time with zero profit in each period. The conditional market clearing price reflects all random changes in the elementary consumption economy.
- The three-dimensional market representation replaces the misleading two-dimensional representation of Orthodoxy.
- Because they do not meet scientific standards, textbooks with the familiar 2D instead of the correct 3D market representation have to be taken out of the curriculum.

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