Sraffa's 'Given' Quantities of Output and Keynes's Principle of Effective Demand

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[I]t is in the 'present' that the 'normal' rate of profits has always been firmly located. … [B]ecause this is the rate of profits which is being realised *in the present* …, it is also the rate of profits which that present experience will lead entrepreneurs in general to expect *in the future* from their current investment. (Garegnani, 1979, original emphases)

1. Introduction

Sraffa (1960) takes the quantities of output as 'given' when considering the determination of prices. He gives little hint at how the quantities of output have come to be what they are. A commonly accepted interpretation of the given quantities of output in the Sraffa system is that they reflect the state (level and composition) of effective demand (see e.g. Garegnani, 1984, 1990; Kurz, 1990, 1992, 1994; Cesaratto, 1995). It is in this vein when the 'Sraffian Keynesian' approach attempts to synthesise Sraffa and Keynes; that is, to provide an integrated framework in which the Sraffian system serves for the determination of prices and the Keynesian principle of effective demand for the determination of the quantities of output.

While the 'Sraffian Keynesian' approach proposes in a general agreement that it is the state of effective demand that determines output not only in the short but also in the long period, the approach varies widely in specific arguments and formulations. The initiative for the approach was taken by Garegnani's 1962 work (Garegnani, 1962), which has been followed by a series of his own elaborations (Garegnani, 1982, 1983, 1992). Some important work along these lines, exhibiting high hopes for some kind of formalisations to deal with the topic, was done in the 1980s (e.g. Eatwell, 1983; papers in Eatwell and Milgate, 1983 and in Bharadwaj and Schefold, 1990). The efforts of positive construction, however, seem to have been increasingly distracted by the theoretical brawls with the 'Kaleckian' steady-state approach. Meanwhile Serrano's (1995) idea of the 'Sraffian supermultiplier' was an important constructive contribution, if it subsequently came in for criticisms within the Sraffian camp (Trezzini, 1995, 1998, Park, 2000). In contrast to various attempts to 'formalise' the determination of output in the long period, Palumbo (1996), Garegnani and Palumbo (1998), and Palumbo and Trezzini (2003) take a critical stance to such attempts, arguing that the actual process of capital accumulation and output growth is too complex to be dealt with in a formalised way. Recently Trezzini (2005) and Garegnani and Trezzini (2010) pursue some particular Sraffian-Keynesian lines of research. That there is continuing interest in the approach is witnessed by a collection of essays published recently (which were originally discussed in a 1998 conference) (Ciccone *et al*, 2011, Parts III and IV).

The following pages are intended as another strand of attempt at synthesising Sraffa and

Keynes, presumably more in the spirit of Garegnani (1962, 1982, 1983, 1992) and in an explicitly multi-sector framework. A key concept is a 'fully-adjusted position' of the economy (Vianello, 1985). The state of the economy is a fully-adjusted position when, in every industry, productive equipment (the size and composition of the means of production) and the state of demand are fully adjusted to each other so that (*i*) the productive equipment is utilised at the 'normal' level and (*ii*) the output produced in each industry is at the level exactly matching its total use (that is, for the replacement of used-up capital equipment, new investment and consumption in the economy as a whole). It will be suggested that the Sraffa system of production prices *refers* to a fully-adjusted position, under the condition of free competition (just *referring*; that is, even if prices determined in the Sraffa system are established and the economy is in free competition, there is no need for the economy to be actually in a fully-adjusted position).

The framework we propose consists of three systems of equations. The first system is for a state of the economy which is not constrained by effective demand; the second and the third are for an effective-demand-constrained state of the economy. These systems of equations are paired in two ways. The first and the second deal with fully-adjusted positions, and the first will serve as the baseline in comparison with which the second is specified. Whilst the second sets out the relations reflecting full adjustment under the constraint of effective demand, the third describes the 'realised' state of the economy under the same constraint of effective demand, which is usually not a fully-adjusted position. Consideration of all these three systems of equations, in the two ways of pairing, is necessary for a comprehensive analysis of the *long-period* configuration of the economy.

The state of the economy that the first system of equations describes is the 'Warranted Growth (WG)' state of the economy, so dubbed in the spirit of Harrod (1939). The WG state is a fully-adjusted position holding for the existing configuration of capital equipment. At the beginning of a period, the economy is equipped with a given configuration of capital equipment. One can then, by aid of the system of equations to be presented, find what will be called the 'warranted investment' for each industry corresponding to that existing capital equipment. The warranted investment for a given capital equipment in a given period is the volume of investment which would bring about a fully-adjusted position corresponding to that capital equipment; thus, the resulting output in each industry is the capacity output corresponding to the given capital equipment and precisely satisfies its total required use. The WG state being a fully-adjusted position, one can construct a price system *à la* Sraffa corresponding to the quantities of output in that state and obtain the prices of production for this state of the economy.

The warranted investment *must* be equal to the capacity saving corresponding to the given capital equipment and hence not autonomous. The reason to consider this state of the economy is that it will be used as the baseline in comparison with which the 'Effective-Demand-Constrained (EDC)' state of the economy is to be specified. An economy in the EDC state is one where the quantities of output are determined in accordance with the state of effective demand. To represent such an economy in the lines of *long-period analysis* is the objective of the second system of equations to be presented in the paper. Another key idea in this endeavour, in addition to the concept of a fully-adjusted position, is the autonomy of

actual investment, that is, the idea that actual investment is usually at a different level from the warranted one (thus, actual output, determined in reference to actual investment, is also usually at an other-than-normal level). We shall conceive that, in a multi-sector model such as ours where the unit of analysis is an industry, the autonomy of investment reveals itself, and thus should be represented, *at the level of individual industries* and that the autonomy of investment at the aggregate level is simply the combined result of such industry-level autonomy. We shall also take, as the magnitude representing the autonomy of investment in an industry, the volume of (gross) investment in that industry *relative to its WG counterpart* (the very reason why we consider the WG state before the EDC state). As we are concerned with the long-period configuration of the economy, the EDC state we consider is as much a fully-adjusted position as the WG state is (we shall give an EDC fully-adjusted position the shorter name of a 'long-period position (LPP)' in distinction with the WG fully-adjusted position). Given the volumes of autonomously determined investment in the respective industries, the system of equations to be presented will yield such configurations of the means of production and the quantities of output that satisfy the two conditions of a fully-adjusted position. Included in the system are the Sraffian price equations corresponding to these quantities of output, from which one obtains the prices of production for the state in question. (If one assumes, as we do, constant returns to scale, these prices will not be different from those to be established in the WG state; if no such assumption is made, of course, they will be different.) Though both a WG state and an LPP are fully-adjusted positions, there are differences between them. The critical, qualitative, difference is obviously that, for an LPP, full adjustment is envisaged under the condition of autonomous investment. Quantitative differences are to be observed in the size of the stock of means of production in each industry and, hence, in the level of the capacity output and of the capacity saving (Garegnani, 1962, 1982, 1983, 1992), with their relative sizes across the industries in an LPP too being generally different from those in a WG state.

Our standpoint is, in accordance with the Keynesian one (extended to the long period), that the long-period state in which the economy finds itself is an LPP, not a WG state. But, even when the quantities of output are those arising from an LPP (and thus, prices are production prices *à la* Sraffa), the 'realised' state of the economy which will appear to the eye of the statistical observer is not a fully-adjusted position. This is because the configuration of capital equipment existing in the economy at the beginning of the period under consideration—the starting point of our analysis—is usually different from that to be established in the LPP. Thus the rates of profits realised on the existing capital equipment are not uniform across the industries, being affected by the degrees of utilisation of the capital equipment. Our third system of equations is to describe this 'realised' state of the economy where the quantities of output are those which are to be established in the LPP and commodities are valued in terms of the prices of production corresponding to those quantities of output, against the backdrop of the existing capital equipment, this now being seen as utilised at an other-than-normal level. Here an additional aspect of the economy, one regarding the depreciation of the means of production with respect to the degree of utilisation, should be taken into account.

There are two major problems facing a multi-sector framework such as ours which

intends to provide a long-period analysis reflecting the condition of effective demand. The first is how to represent the autonomy of investment decision made in the respective industries over the long period, attention being drawn to two aspects of the problem: *autonomy* and *long period*. To address both aspects is the reason why the consideration of the WG state is brought in prior to the system for the LPP. Given the existing stock of capital equipment and the 'fundamental parameters' (that is, the technique in use and the real wage rate (or the normal rate of profits)), the volume of warranted investment for each industry is dictated. We can then represent the autonomy of investment in terms of the autonomous decision on the *ratio*, in each industry, of the volume of actual investment relative to that of the WG state. The autonomy of investment is then represented by the ratio being not necessarily unity. This way of representation is also an answer to the long period aspect of autonomous investment. The configuration of capital equipment changes over time as a result of investment in the previous period(s) and the volumes of the warranted investments follow the suit in the respective industries. Accordingly do the volumes of autonomous investments change over time (due either to changes in the warranted investments or to changes in the ratios between the warranted and actual investments, or to both; the first kind of changes reflect the capacity-generating effects of investment in the long period and the second kind the effective-demand-constituting effects in the short period).

The second problem is related to the relationship between investment and saving. In accordance with the principle of effective demand, it is investment that generates the same volume of saving, not the other way around. It is noted that this principle in precise terms applies to the economy as a whole, regarding the aggregate investment and the aggregate saving. Equality between saving and investment is to be observed also at the level of industry, but the equality is achieved through a different mechanism from the one for the economy as a whole. The volume of saving that is brought into line with investment in each industry is not the same as that which is generated from the industry concerned (for example, from the pockets of the wage earners and the profit earners of that industry). Saving in the mind of savers is not industry-specific. Saving is *generated* of the same size as investment through the multiplier mechanism at the aggregate level, and this aggregate saving is *allocated* to the respective industries in line with the volume of actual investment that has been made in each industry. This necessitates the consideration of the *financial market*, the space where the allocation of the aggregate saving takes place.

The paper proceeds as follows. Section 2 presents some main ideas and concepts in the context of an aggregate economy. Section 3 is for the presentation of a multi-sector framework, where the three systems of equations are set out, representing respectively the WG state, and the LPP and the 'realised' state of the economy. There will also be a discussion on how the prices of production *à la* Sraffa are understood to refer to a fully-adjusted position and how the quantities of output determined in the LPP can be interpreted as the 'given' quantities of output in Sraffa's original system. The arguments in Sections 2 and 3 proceed on the formulation of saving behaviour in terms of the social classes such that workers do not save whilst capitalists save a constant fraction of their income. This allows us not to deal explicitly with the financial market, keeping its working in the background. Section 4 brings the working of the financial market out into the open, for which we adopt the Kaldorian

saving behaviour assumption in which the saving units are households and firms. Section 5 discusses some constraints which should be taken into account for the EDC state of the economy. The whole argument is illustrated in Section 6 by way of the 'Hicks-Spaventa' two-sector economy and here we find our construction serves well to illustrate Joan Robinson's famous classification of various Growth Ages. The appendix extends the basic model by introducing the government activity.