Keynes and Cambridge Keynesians on employment and income multipliers: the input-output linkages were there?

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Área 3: Método, teoria econômica e história econômica

Abstract

The paper deals with the misconception according to which Keynesian employment and income multipliers completely ignore linkage effects between economic activities because they have an aggregative character. To achieve that end, textual records of Keynes and Cambridge Keynesians on employment and income multipliers are gathered together, showing that, since its inception, these multipliers are dimensionless constructs and were gestated considering the typical linkages of input-output analysis – *i.e.*, the multipliers should be computed from vertically integrated magnitudes. The paper also connects some Cambridge Keynesian literature with suggested input-output representations for employment and income multipliers.

Keywords: Keynesian macroeconomics; Multipliers; Input-output.
JEL codes: B22; C67; E12.

Resumo

Este artigo lida com a concepção equivocada segundo a qual os multiplicadores de emprego e renda keynesianos ignoram os efeitos de interligação entre as atividades econômicas por causa de seu caráter agregado. Para atingir esse objetivo, registros textuais de Keynes e de keynesianos de Cambridge sobre os multiplicadores de emprego e renda são reunidos, mostrando que, desde sua concepção, esses multiplicadores são construtos adimensionais e foram gestados considerando as interligações típicas da análise insumo-produto – *i.e.*, os multiplicadores deveriam ser computados a partir de magnitudes verticalmente integradas. O artigo também conecta alguma literatura dos keynesianos de Cambridge com representações de insumo-produto sugeridas para os multiplicadores de emprego e renda.

Palavras-chave: Macroeconomia keynesiana; Multiplicadores; Insumo-produto.

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1. Introduction

The short answer for the question in the title is yes. Just from that, one can think how a misconception according to which employment and income multipliers completely ignore linkage effects between economic activities – just because they have an aggregative character – had to have such a long life. The long answer would show us that statements like that could not be more false. It is astonishing that they are denied in the very first page of an often cited paper published in a major economic review. Macroeconomic textbook explanations for the Keynesian multiplier also have their share in introducing quite a misleading conception about its calculation for decades now. By taking the well known identity between the sum of final demand components on the right-hand side and the aggregate income on the left-hand side, economists got used to think that the multiplier is supposed to link two different units: final demand and income. By false analogy, the same can be thought about the employment multiplier – that it should be linking the poles of final demand and aggregate employment. Perpetrating a solecism, input-output practitioners are also used to think in multipliers – and labeling them accordingly – as a device showing sectoral correspondence between final demand and production, employment, income etc.

This negative attitude towards the received theory is not what we want to emphasize, though. In fact, we should be able to show in this paper that multipliers are, since its inception, dimensionless constructs. Either they are ratios between income and income or between employment and employment. And there is more: Keynesian employment and income multipliers were gestated considering the typical linkages of input-output analysis. In other words, the ratios we should take in account in order to calculate these multipliers come from vertically integrated magnitudes. In order to establish these assertions, some of John Maynard Keynes' statements are gathered together, as well as that ones in the famous Richard Kahn's employment multiplier article, in Joan Robinson's *Introduction to the theory of employment* and in other Cambridge Keynesians as well.

Section 2 builds on the concepts of secondary and primary employment and the ratio between these two magnitudes. Section 3 discusses the original presentations of the multipliers made by Richard Kahn and John Maynard Keynes and delves into an attempt to clarify some misunderstandings concerning an alleged absence of linkages in these specifically macroeconomic constructs. Section 4 presents the shape into which the multiplier has come in the *General Theory* and has been

assessed by Joan Robinson following its immediate publication. Section 5 connects some Cambridge Keynesians with the central theme of this paper and suggests input-output representations for employment and income multipliers and Section 6 concludes the article.

2. The ratio of secondary to primary employment

Considering that Keynes' (1936) reference in *The General Theory* is to Richard Kahn's (1931) paper, that is the natural candidate for starting our inquiry. It is just disconcerting what one can read in the very first page of an often cited paper published in a major economic review (Kahn 1931, p. 173):

> The increased employment that is required in connection actually with the increased investment will be described as the "primary" employment. It includes the "direct" employment and also, of course, the "indirect" employment that is set up in the production and transport of the raw materials required for making the new investment.

Disconcerting because there is a relatively widespread misconception according to which employment and income multipliers completely ignore linkage effects between economic activities just because they have an aggregative character. Kahn could hardly be more straight about this point: primary employment takes in account all the possible linkages between economic activities. As Kahn (1984, p. 91) considers the pamphlet *Can Lloyd George Do It?* as the landmark which allows him to writing his *Economic Journal* piece, it is also possible to find there[2] references about direct and indirect employment. For instance, "each million pounds spent annually on road improvements would employ, directly or indirectly, 5,000 workpeople" (Keynes 1929, p. 103). "The importance of indirect employment" (Keynes 1929, p. 105) could not be disqualified, judging by the fact that Keynes has dedicated an entire section of this pamphlet to analyzing it. The following remarks should not leave any doubts:

> There is nothing fanciful or fine-spun about the proposition that the construction of roads entails a demand for road materials, which entails a demand for labour and also for other commodities,

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2   The famous pamphlet in defense of the Liberal Party was written by Keynes and Hubert Henderson to elucidate some topics encountered in a previous party document (*We Can Conquer Unemployment*).

which, in their turn, entail a demand for labour. Such reactions are of the very essence of the industrial process (Keynes 1929, p. 105).

Remembering that Keynes (1929) was not writing solely for his peers, a further example was offered:

> That a demand for a suit of clothes implies a demand for cloth; that a demand for cloth implies a demand for yarns and tops, and so for wool; that the services of farmers, merchants, engineers, miners, transport workers, clerks, are all involved – this is the ABC of economic science (Keynes 1929, p. 105-106).

The definition of primary and secondary employment with the clear-cut role played by consumption expenditures had appeared in a Memorandum to the Committee of Economists of the Economic Advisory Council[3]:

> I define 'primary' employment as additional employment brought about otherwise than as the result of the increased consumption of newly employed men; and 'secondary' employment as employment resulting from such increased consumption (Keynes 1930a, p. 187).

And then in a draft report for the same council:

> But, apart from the primary employment which increased investment is capable of providing, there is or may be a further source of secondary employment, as we may call it, additional to the amount of primary employment associated with the actual production of the output which will result in investment. For the newly employed men and others whose receipts are increased as a result of the new investment may spend these receipts (or part of them) on increasing their own consumption, with the effect of increasing employment in industries producing consumption goods; and those engaged in these consumption industries will also have more to spend; and so the ripple of increased demand will spread over the whole pool of employment (Keynes 1930b, p. 439).

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[3] An important statement for multisectoral analysis was also made there: "The amount of secondary employment ensuing on a given amount of primary employment does not depend on how the primary employment has been brought about" (Keynes 1930a, p. 187). One could confront that statement with ten Raa's (2005, p. 30): "Household consumption reinforces production effects irrespective of the source of the latter. The Keynesian multiplier acts indiscriminately".

Towards the now well known Keynesian multiplier, but still dealing with the ratio of secondary to primary employment, we can quote Kahn (1931, p. 173) again:

> To meet the increased expenditure of wages and profits that is associated with primary employment, the production of consumption goods is increased. Here again wages and profits are increased, and the effect will be passed on, though with diminished intensity. And so on *ad infinitum*. The total employment that is set up in this way in the production of consumption-goods will be termed the "secondary" employment. The ratio of secondary to primary employment is a measure of these "beneficial repercussions" that are so often referred to.

Sections XI and XIII in Kahn (1931) return to these employment definitions focusing on the ratio of secondary to primary employment (Kahn, 1931, p. 182-186) and on the relationship between the creation of primary employment and the total increase in employment (Kahn, 1931, p. 187-190) – this latter relationship properly corresponds to the employment multiplier. The term, however, had not been established yet. In the same vein, follows the explanatory sequence in Keynes (1929, p. 106):

> But this is not the whole of the story. In addition to the indirect employment with which we have been dealing, a policy of development would promote employment in other ways. The fact that many workpeople who are now unemployed would be receiving wages instead of unemployment pay would mean an increase in effective purchasing power which would give a general stimulus to trade. Moreover, the greater trade activity would make for further trade activity; for the forces of prosperity, like those of trade depression, work with a cumulative effect (Keynes, 1929, p. 106).

In this way, the relationship between an initial impulse and the total employment so created has emerged[4].

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[4] That is not to say that a complete exposition of the multiplier can be found in this pamphlet (Keynes, 1929); or even that Keynes was the first scholar presenting the idea attached to it. Certainly, a plethora of previous quotes indicates the opposite, as, for instance, advocates Murphy (2009, p. 30) for William Petty's precedence or Bortis (2008, p. 63-33) for François Quesnay's implicit exposition of the "multiplier principle" and for Nicholas Johannsen for developing it explicitly (see also Patinkin, 1982, p. 191 for this last one). Notwithstanding, the very Richard Kahn (1984, p. 91) considers the pamphlet *Can Lloyd George Do It?* as the milestone allowing him to write his employment multiplier piece (Kahn, 1931) – also recognizing his debt to Colin Clark and James Meade for the original formulation and to Jens Warming for the final presentation of the multiplier. "In a way, a lot has been said about the multiplier before Keynes, but Keynes was the only one who integrated this principle into a comprehensive and coherent theoretical scheme capable of further elaboration and of integration into wider frameworks of analysis" (Bortis, 2008, p. 66).

3. The multiplier

The means to prosperity (Keynes, 1933a, p. 339) presents a much more incisive statement about the previous point: "But if the new expenditure is additional and not merely in substitution for other expenditure, the increase of employment does not stop there. The additional wages and other incomes paid out are spent on additional purchases, which in turn lead to further employment". By using the same terminology encountered in Kahn (1931), Keynes (1933a, p. 341) has defined primary employment as the one directly or indirectly generated by means of primary spending, also using the secondary employment definition and attaining a well-fitted employment multiplier concept for macroeconomics.

> This primary expenditure will, in any of these cases, set up a series of repercussions leading to what it is convenient to call *secondary employment*. Our problem is to ascertain the total employment, primary and secondary together, created by a given amount of additional loan-expenditure, i.e. to ascertain the multiplier relating the total employment to the primary employment (Keynes, 1933a, p. 341, original emphasis).

Going back to Kahn's (1931, p. 182-183) "calculation of the ratio of secondary to primary employment" we can now assert that, if p is the primary employment and s is the secondary employment, the ratio of secondary to primary employment, $\frac{s}{p}$, has the following relation with the employment multiplier, m :

$$m=\frac{p+s}{p}=1+\frac{s}{p} \tag{1}$$

Both the ratio of secondary to primary employment and the multiplier have the same units measured in the numerator and in the denominator. So, they are dimensionless.

Now this relationship has been taken care, the focus can be moved back to the interindustry linkages. In spite of apparently specifying "the gross amount of expenditure, provided out of additional borrowing, the *primary expenditure* and the employment directly created by this expenditure, the *primary employment*", Keynes (1933a, p. 341, original emphases) was not dealing only with directly created employment – throughout his section II building example –, but with both direct and indirect employment required by the initial expenditure:

It is often said that in Great Britain it costs £500 capital expenditure on public works to give one man employed for a year. This is based on the amount of labour directly employed on the spot. But it is easy to see that the materials used and the transport required also given employment. If we allow for this as we should, the capital expenditure per man-year of additional employment is usually estimated, in the case of building for example, at £200 (Keynes, 1933a, p. 339).

The assertion implies that the input-output employment multiplier of construction was about 5,000 at that time, exactly his estimate for road improvement presented in the first of his quotes in this paper – with the addendum that each million pounds "would employ, directly or indirectly, 5,000 workpeople" (Keynes, 1929, p. 103). Then, the number of jobs *per* million pounds spent in final demand for construction can be split into 2,000 jobs directly created in the very construction activity and 3,000 jobs indirectly created elsewhere. So, the opposition here is between different units – pounds spent in final demand and number of people employed – and, in that way, could never characterize a dimensionless Keynesian type of multiplier, but a typical input-output employment multiplier.

And then, in a piece originally published on *The Nation* and already called The Multiplier, we can find the definition of primary employment taking in account both directly and indirectly created jobs:

The employment thus created by the expenditure on the capital works themselves, including transport and materials, it is convenient to call the 'primary employment'. Similarly employment, given by the increased expenditure of taxpayers who have been relieved as a result of increased Government borrowing, can be also reckoned as 'primary employment'.
I then proceeded to argue that this primary employment sets up a series of repercussions leading to what it is convenient to call 'secondary employment' (Keynes, 1933b, p. 171).

Similarly to what can be found in the *General Theory*, the next page after Keynes' multiplier definition (Keynes, 1933a, p. 342) brings the focus to estimates that can be understood as concerning income multipliers, then followed by new statements about employment multipliers. Later, turning back to an income multiplier, we can find the assertion that the "calculation to obtain the appropriate multiplier is much the same as in the case of employment; except that it is somewhat greater, since to obtain the national money-income we do not have to make the same

deduction for a rise in prices" (Keynes, 1933a, p. 346n), deduction which assumes that "as men are gradually brought back to employment and as prices gradually rise, the multiplier will gradually diminish" (Keynes, 1933a, p. 344). The use of the terms primary and secondary employment was anything but a matter of casual reference by Keynes, as one can infer even by his correspondence towards the *General Theory*, specially with Richard Kahn, that can be found in volumes XIII and XX of the *Collected Writings*.

4. The *General Theory* and after

The primary / secondary split, as it can be found in the *General Theory*, needs again some caveats about to the use of the word *directly* there:

> For in given circumstances a definite ratio, to be called the *multiplier*, can be established between income and investment and, subjected to certain simplifications, between the total employment and the employment directly employed on investment (which we shall call the *primary employment*) (Keynes, 1936, p. 113, original emphases).

From the passages quoted above, coming from Keynes himself, one can easily conclude that, as before, the multiplier should be defined as a ratio between the total employment and the employment directly and indirectly employed on investment. But no one can deny that this is an exercise of good faith for economists that have only read the *General Theory*.

Also in the *General Theory*, Keynes (1936, p. 115-116) makes clear that there are no reasons to assume that income and employment multipliers are the same, in spite of being a convenient temporary hypothesis for exposition purposes. Kahn's (1931, sections XI e XIII) calculations for the ratio between secondary and primary employment also runs in terms of income groups (wages and profits) and expenditures from these groups, not considering the expenditures as direct functions of employment, as one can read from Keynes (1936, chapter 3) and its D_1 aggregate. And even there, Keynes appears to be assuming that income and employment are directly correlated, and not that the expenditure is a function of employment: "That is to say, consumption will depend on the level of aggregate income and, therefore, on the level of employment N" (Keynes, 1936, p. 28). Then: "When employment increases, D_1 will increase, but not by so much as D; since when our

income increases our consumption increases also, but not by so much" (Keynes, 1936, p. 29, original emphasis).

Notwithstanding, maybe a potential confusion from these expositions have fostered the growing of alternative multiplier concepts, although inappropriate. Further, employment and income multipliers should be separated in a way that consumption depends on the aggregate number of jobs in the former case and on the total income in the latter one. Just after the *General Theory* got printed, Joan Robinson doesn't seem to be confused at all in this subject, despite the movings from employment to income and the other way around:

> We must now consider in more detail the effect of an increase in investment upon income and upon saving. When an increase in investment takes place, say in house-building, at a time of general unemployment, men are given jobs in building, in making materials, such as bricks, glass and door-knobs, and in transport. The additional employment thus given is the *primary* increase in employment due to the increase in investment (Robinson, 1937, p. 15, original emphasis).

And then, closing this point for the induced consumption that conforms the Keynesian multiplier:

> When employment increases the men concerned increase their rate of consumption – buying more boots and shirts and bacon and cheese. Similarly, when more profits are being made by building contractors and so forth, the individuals whose incomes have increased will spend more upon consumption goods. Thus employment will increase, and more profits will be earned, in making the boots and other goods for which the market has now improved. The boot operatives, in turn, have more money to spend when they are taken into work, shareholders receive larger dividends, the shops and cinemas and garages make bigger profits. With larger incomes being earned in the consumption-good industries a further increase in consumption takes place, and employment and profits, in making boots and selling petrol and the rest, increase still further. Larger incomes again lead to more consumption, and so on round and round. The addition to employment in the consumption-good industries is the *secondary* increase in employment due to the increase in investment (Robinson, 1937, p. 15, original emphasis).

5. The Cambridge Keynesians and input-output representations

The closure of the last section with Robinson's quotes brings us to a very comfortable place, as she leaves us with no doubts about the vertical integrated magnitudes involved in computing both primary and secondary employment. In spite of Pasinetti's (1973) crystal clear explanation on the concept of vertical integration – now more than half a century ago – few of us became used to stretch it until its last consequences. One huge exception in macroeconomics is Kalecki's (1968) explicit use in his three department analysis and another long standing one in the understanding of the multisectoral connections of Keynesian multipliers is Miyazawa (1968, 1976). It is worth mentioning that the analysis for the employment multiplier that can be found in Kurz (1985) starts from the same categories of primary and secondary employment present in Kahn (1931).

Fortunately, now we have a couple of correct input-output representations. Keynesian multipliers – delivering the same results as the presented in this article – for employment can be found in Trigg and Lee (2005) and for income in ten Raa (2005). A recent assessment with extensions for Sraffian supermultipliers can be found in Leite (2024). Let us develop here, although in a very telegraphic way, an alternative representation. If we write:

$$\mathbf{A}\mathbf{x} + \mathbf{f} = \mathbf{x} \tag{2}$$

where $\mathbf{A}$ is the technical coefficient matrix, $\mathbf{x}$ is gross output vector and $\mathbf{f}$ is the final demand vector, we can represent the Leontief system as

$$\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{f} \tag{3}$$

with $\mathbf{I}$ standing for the identity matrix.

Defining $\mathbf{l}$ and $\mathbf{v}$, respectively as employment and income vectors *per* gross output unit, total employment and income, *i.e.*, primary plus secondary employment and income can be written as:

$$p_l + s_l = \mathbf{l}'(\mathbf{I} - \mathbf{A})^{-1} \mathbf{f} \tag{4}$$

$$p_v + s_v = \mathbf{v}'(\mathbf{I} - \mathbf{A})^{-1} \mathbf{f} \tag{5}$$

The vertically integrated character of equations (4) and (5) could be obscured by substituting $\mathbf{x}$ from (3). Nevertheless, by defining $\mathbf{f_c}$ as the household consumption vector – or, for that matter, as the induced (by employment or by income) part of final demand – we can split primary and secondary employment and income as:

$$p_l = \mathbf{l}'(\mathbf{I}-\mathbf{A})^{-1}(\mathbf{f}-\mathbf{f_c}) \tag{6}$$

$$p_v = \mathbf{v}'(\mathbf{I}-\mathbf{A})^{-1}(\mathbf{f}-\mathbf{f_c}) \tag{7}$$

$$s_l = \mathbf{l}'(\mathbf{I}-\mathbf{A})^{-1}\mathbf{f_c} \tag{8}$$

$$s_v = \mathbf{v}'(\mathbf{I}-\mathbf{A})^{-1}\mathbf{f_c} \tag{9}$$

Now, primary employment and income, respectively in (6) and (7), are computed after an operation of vertical integration of the portion of final demand due to autonomous expenditures (total final demand expenditures minus induced final demand expenditures), and secondary employment and income, respectively in (8) and (9), after the vertical integration of the induced part of final demand. Then, the respective employment and income multipliers can be rewritten from (1) as:

$$m_l = \frac{p_l + s_l}{p_l} = \frac{\mathbf{l}'(\mathbf{I}-\mathbf{A})^{-1}\mathbf{f}}{\mathbf{l}'(\mathbf{I}-\mathbf{A})^{-1}(\mathbf{f}-\mathbf{f_c})} \tag{10}$$

$$m_v = \frac{p_v + s_v}{p_v} = \frac{\mathbf{v}'(\mathbf{I}-\mathbf{A})^{-1}\mathbf{f}}{\mathbf{v}'(\mathbf{I}-\mathbf{A})^{-1}(\mathbf{f}-\mathbf{f_c})} \tag{11}$$

That is, the numerators contain total employment and income and the denominators contain only the vertically integrated employment (10) and income (11) due to autonomous final demand. Still, we are talking about dimensionless units of measurement, as the multipliers have either units of employment divided by units of employment or units of income divided by units of income. For both cases, it is not the units of final demand expenditures that enter immediately in the calculation, but these units converted in vertically integrated units of employment or income.

The analysis developed here could never be complete without the contributions of the generation of economists following Keynes' guidance at first hand, as his textual records alone could lead us in error sometimes. So, it was not a random choice of words that made up this article title – we are talking about the contributions of the Cambridge Keynesians, as labeled by Pasinetti (2007). Tentative multisectoral generalizations, successful or not, from Keynesian employment multipliers (Kahn, 1931) have been made at least since Goodwin (1949, 1950). Robinson (1937), for the issue we had in mind, was explicitly quoted in full agreement with Keynes and Kahn.

And Cambridge Keynesians of the second generation also matter. Pasinetti championed the idea that the principle of effective demand can be expressed in a multisectoral context (Pasinetti, 1974, p. 41) by introducing labour coefficients and solving the system subject to a "genuinely macro-

economic condition" (Pasinetti, 1993, p. 20) – the sometimes misinterpreted[5] condition for full employment (Pasinetti, 1981, 1993), which shows the requirements of the system in terms of production structure, labour coefficients and propensities to consumption that should prevail in order to achieve full employment at some point. Naturally, the connection with an employment multiplier can be implied from the entire argument. And, of course, it is not a plausible assumption that his great synthesis would have emerged without Sraffa (1960). So, the portraits composed by Pasinetti (2007) are almost complete.

6. Conclusion

This article has shown textual evidence that favours the understanding that Keynesian employment and income multipliers were originally thought as dimensionless ratios of two vertically integrated magnitudes: the vertically integrated employment (income) due to the whole final demand vector – that happens to be total employment (income) – and the vertically integrated employment (income) generated by the autonomous part of final demand. As such, Keynesian multipliers take in account direct and indirect linkage effects typical of input-output analysis and are dimensionless by definition – and not a device to transform final demand units into employment (income) units.

Despite the possibility of other formal input-output representations, this paper has presented a simple alternative that pretends to mimic the previous Cambridge Keynesian textual evidence, restating the multiplier as a straightforward ratio between primary plus secondary employment (income) and primary employment (income). Fortunately, some correct representations using input-output analysis with more detailed mathematical steps can now be found elsewhere, and the reader is encouraged to explore them (Trigg and Lee, 2005; ten Raa, 2005; Leite, 2024).

Two more pieces of advice based on the previous presentation: for macroeconomists, input-output analysis is not a fanciful and unnecessary tool – intersectoral linkages are the "ABC of economic science" (Keynes 1929, p. 105-106) and input-output analysis is our best shot in estimating multipliers. And for input-output practitioners, Keynesian multipliers are dimensionless and genuinely macroeconomic constructs, despite they have been gestated considering the typical linkages of input-output analysis.

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[5]   See Pasinetti (1985, 2001) for some answers to his critics.

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