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A note in tribute to the Kaldor´s "Cambridge Equation" since the 50s to our days

Uma nota em tributo a "Equação de Cambridge" de Kaldor desde os anos 50 aos dias de hoje

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Abstract: This note presents a historical overview of the important contribution made by Kaldor named "Cambridge Equation" and the debate around the theme. Our main objective here is to summarize this kind of literature from the start to our days. Here, we present the development of such theory by initiating in his seminar article "Alternative Theories of Distribution", passing to Pasinetti's contribution by differentiating class, after that the introduction of government activities, extensions with an Open Economy until our days, where the globalization and financial system is considered. We also present the original Solow-Samuelson-Meade and other critiques. Finally, we show the importance of the theory to the present intending to understand social-economic behaviours.

Keywords: Income Distribution, Kaldor, Cambridge Equation, History Economic Thought.
JEL Classification: B10, B19

Resumo: Esta nota apresenta uma visão geral histórica da importante contribuição feita por Kaldor chamada "Equação de Cambridge" e o debate com relação ao tema. Nosso principal objetivo aqui é resumir este tipo de literatura desde o início até os nossos dias. Aqui, apresentamos o desenvolvimento dessa teoria iniciando em seu artigo do seminário "Teorias Alternativas da Distribuição", passando à contribuição de Pasinetti por classes diferenciadoras, em seguida a introdução da atividades de governo, extensões com uma Economia Aberta até os nossos dias, onde a globalização e sistema financeiro é considerado. Nós também apresentamos as críticas originais de Solow-Samuelson-Meade e outros. Por fim, mostramos a importância da teoria para o presente com o intuito de compreender os comportamentos socioeconômicos.

Palavras-chave: Distribuição de Renda, Kaldor, Equação de Cambridge, História do Pensamento Econômico.
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1. Introduction

The theory of long-run growth macroeconomic analysis starts when Harrod (1939) and Domar (1947) presented the "razor wire problem", which implicates that the economy's expansion could be sustainable if the natural and warranted growth ratios are equal. According to this problem, only an incredible coincidence, or maybe a dictator regime, could guarantee that equilibrium. Thus, the population growth rate, savings rate, and technological progress should be controlled by the system. Otherwise, the economy will be unstable. This result was named "Harrod Instability" and is defended, even in our day, by some economists, such as Peter Skott and Soon Ryo (see Skott, 2010).

However, by analysing this problem, Solow (1956) and Kaldor (1956) search for an alternative solution. The first author presents a neo-classical solution, easing the technical coefficient, since, for him,

> […] this fundamental opposition of warranted and natural rates turns out in the end to flow from the crucial assumption that production takes place under conditions of fixed proportions. There is no possibility of substituting labor for capital in production. If this assumption is abandoned, the knife-edge notion of unstable balance seems to go with it. (SOLLOW, 1956, p. 65).

Based on these arguments, his theory supports the supply-led growth theories, which is central to the mainstream growth theories today, and to the development of many extensions.

The second author developed a theory of growth based on the income distribution perspective, and using stylized facts , which is our focus here, intending to present a review about his main contribution, as well as important extensions after him. He made flexible the savings rate, and this effort shows us that the growth rate will be given by multiplying the propensity to save by the profit rate of the economy. Kaldor's essence is the demand-led growth theories where consumption push the economy, giving less importance to productivity (see the marginalism critique made by Kaldor in his 1966 article). Such a result was named "Cambridge Equation" and all extensions from this theorem must return to the original result if modifications are not considered. The divergence of both solutions generates a debate between great economists like Pasinetti, Samuelson, Modigliani, Kaldor, Dalziel, Steedman, Meade and others. Fleck and Domenghino (1987), named this debate "Cambridge (UK) versus Cambridge (Mass)" since most of the important papers related to the discussion came from both Cambridges.

Our note aimed to show the evolution of the debate on the Cambridge Theorem, as well as its theoretical generalization until the present day. Our contribution consists of an analysis of the literature through its beginnings to the present day, studying the impacts of globalization on the interest rate. It was possible to observe that the workers' class does not influence significantly the interest rate, which proves the weakness of such class to the economic systems, even to the most complete ones. This paper is divided into two sections. The next one shows a historical overview of the Cambridge Theory presented by Kaldor

and their extensions in a long-run perspective. In the end, we present a discussion about the importance of such an approach and some recent studies about the theory in our days.

2. The Cambridge Theory and their Long-run Extensions

Kaldor (1956) seeks to analyse the long-term equilibrium, showing how the income distribution is affected by the mismatches between aggregate demand and output in full employment. To expand the literature, the author develops the idea of stylized facts, which is defined in 1961, to present a new approach concerning demand-led growth. In this vein, he considers the hypotheses of a closed economy, full employment, and without government activities that are adapted to his model. The results show a profit rate been constant along the growth path, and represented by the profit marginal propensity to save. Such theory is known as the "Cambridge Equation". This theory collaborates to understand the gap between capitalists' and workers' incomes, by considering endogenous wage- and profit-shares. For him, this solution deals with both developed and developing economies to equalize these classes, helping the workers to a better situation.

Pasinetti in 1962, as a disciple of Kaldor, continues the development of the theory by spreading the savings between classes. For him, income distribution is determined by the level of investment of the economy, which is represented by the profit share. That is, in the long run, non-labours variables influence the model. His results affirm that the workers' propensity to save doesn't influence the distribution of income, and only the capitalists' propensity to save will determine the value of profits, and affect the savings for all classes. In other words, workers are irrelevant to the solution of the economic system. The social conclusion of Pasinetti's is that in such a period the difference of income between capitalists and workers was huge, and this new technique creates tools to search for a more earned equalization.

Meade (1963) and Samuelson and Modigliani (1966) criticize Pasinetti's result by showing that, if the marginal propensity to save of the workers is bigger than the investment share $\left(s_W > \frac{I}{Y}\right)$, the model tends to disappear with the capitalist class, this result was named "Pasinetti's Paradox" or "Dual". In this case, if we have a suppressed capitalist class, capitalism will disappear, therefore, this result can only be guaranteed considering marginalists assumptions, such as laissez-faire. For them, and according to Oreiro (2009, p. 129), "[…] the central argument of Meade, Samuelson and Modigliani is that the 'Pasinetti process' gives rise to equally general and symmetrical results […]", which is not valid to Pasinetti's Theorem and is corrected by Pasinetti (1966) and was improved by Harcourt (1969).

However, all these authors did not consider the public sector presence in their works. To solve this problem, Steedman (1972) expands the Pasinetti model, by introducing the government activities, which earn their income from taxation, and is responsible to transfer income to the most vulnerable class (workers). His model deals with a closed economy where the labour force receives wages and profits as income, and obtain income transfers

from government expenditures. On the other hand, the income of capitalists is formed only by profit, which is taxed by the government. The amount collected by the public agent is in part transferred to workers, and the rest is used for self-consumption purposes since the budget is always balanced. This work is the first in the field to introduce the government as an agent, responding to the "Anti-Pasinetti Paradox". He also defends a heterodox agent as responsible for the economy balanced between both classes.

He concludes that in a situation of growth with full employment, the rate of profit will be equal to the interest rate, and independent of production methods. Indicating that if the agent chooses to invest in capital or other kinds of system, the earn retention will be the same, such result is also considered by Araújo (1992) concerning government savings and an unbalanced budget. The income distribution, as well as economic growth, are not influenced by labour taxation. Being the tax on profits is the only one that affects the profit rate and -shares on his framework. Thus, the existence of taxation does not affect the essential nature of the "Cambridge Equation" obtained by Pasinetti when he proves the mathematical equilibrium in his works. Therefore, the following results depend on the natural rate of growth, the profit taxation, and the savings rate of capitalists. However, the taxation affects the disposable income of workers, which proves that this class will not be able to hold all capital, due to its fragility. With this result, Steedman confronts the idea of the "Dual".

Steedman's result was replied by Fleck and Domenghino (1987), by saying that his result only sustain a balanced growth path. According to them, if the model imposes an unbalance growth path, the government will provide an increase in the worker's income which will make the "Anti-Pasinetti Possible". Therefore, since the government only provide income transfer to workers to subsistence proposes and can generate public deficit or surplus, Dalziel (1989) shows that Steedman's result also is guaranteed in unbalanced growth paths, and he expands the theory by considering an open economy. His result reinforces Pasinetti's Theorem and shows the robustness of the "Cambridge Equation".

Based on this discussion, Dalziel (1991) includes a treatment of interest flows between the government and holders of public bonds, generalising how indirect taxation is treated to include a tax on the purchase of capital goods. With this proposal, the author considers different government savings propensity to each earn spread between taxation and bonds. His paper reflects the direct impact on savings due to the different propensity to save interest receipts as a result of the indirect impact of changes in tax revenue. As the economy in this model depends on the distribution of income in the private sector and the size of public debt, his interest rate considers the budget deficit. If the government decides to operate with sustained budget deficits financed by the issuance of government bonds or with monetary policy, the interest rate will remain the same as in the "Cambridge Theorem". "Thus, the Cambridge Theorem can provide fundamental insights into the income distribution conflicts which result in acceleration inflation or unemployment in modern capitalist economies" (DALZIEL, 1991, p. 299).

Once steady-state inflation is introduced into the analysis, Palley (1997) expands the model by introducing a monetary economy. Such understanding allowed the author to develop a framework dealing with an inflation tax effect, which requires that agents augment their nominal money balances to maintain their steady-state, and this affects savings. "If the distribution of money holdings depends upon relative consumption shares, then the saving propensity of workers affects the distribution of the burden of the inflation tax, thereby affecting the determination of the steady-state income distribution" (PALLEY, 1997, p. 634). The effect of considering inflation tax affects savings, and the distribution of money holdings across capitalists and workers becomes relevant for the determination of the interest rate and the income distribution in a steady-state.

It is interesting to note that, the late response to the post-Keynesian view of the "Cambridge Equation" by the orthodoxies was made by Samuelson (1991), reinforcing the marginalist proposal and the symmetrical results of Pasinetti's Theorem. After this seminal work, unfortunately, the mainstream stopped to respond the heterodox line of thinking, limiting their contributions to their approaches and converging the theory to the naïve belief that only their results explain the economic reality. The debate starts to resurge after the 2008 economic crisis since the mainstream does not provide an efficient way to predict such anomalous economic behaviour, as we can see in Torre and Ize (2020) and Farmer (2017), it is important to the post-Keynesians look to these kinds of works and provide a health debate again.

3. The presence of Kaldor's Theory in Our Days

The theory of the long-run perspective aims to explain how economies grow. Therefore, Kaldor developed a theory that concerns not only this objective but to build of a model also considering the implications of the income distribution. De Araujo Oliveira and Sugahara (2021) show, a history of the evolution of the economic thought based on many Kaldorian extensions which are used to determinate the behaviour of the income distribution by introducing important proposals, such as government activity and an open economy, to be analysed in specific contexts of new theorems. One of their subjects is the "Neo-Pasinetti Theorem" obtained by Kaldor (1966), which result in the "Cambridge Equation" by other means than those developed by Pasinetti. According to Kaldors' theorem, in an economy in which the differentiation between the propensities to save from profits and wages is due to the nature of business income. Oreiro and Magalhões (2019) prove the robustness of the same and conclude that workers only save subsistence proposes by saving to consume when they are retired.

Another recent work is Cavalcanti (2019), he shows the behaviour of inequality in Brazil between 1995 and 2015, analysing the indices measuring personal income distribution, showed a reduction in income inequality. This behaviour occurred with the growth of middle-class income. In the short and long terms, it is possible to use the degree of opening of the capital account as a measure to reduce income inequality. Since in the

short term, a reduced inequality is a necessary condition leading to a more open capital account. In this vein, the growth of the capital stock is higher than the profit rate. While in the long run, there should be a greater restriction on capital mobility.

The opposite is seen in rich economies in recent decades. In a numerical analysis for the United States, Taylor, Foley and Rezai (2019), concluded that there was a growing concentration of wealth associated with a falling employment rate and a more concentrated income distribution. The authors further claim that long-term income and wealth distributions follow accumulation rules established by Pasinetti in combination with a technical progress function for labour productivity growth that incorporates a Kaldor effect and induced innovation. These results show that one need not rely solely on supply-side explanations for economic growth. Important features as a financial sector, active fiscal and monetary policy, and open economy, allow for more realistic interactions and deserve further exploration.

The policy issue was the subject of study by de Araujo Oliveira, Sugahara and Teixeira (2021) they prove that political choices positively impact the distribution and do not affect the essence of the result of the dynamics and balance of the Kaldor neo-Pasinetti model and "Cambridge Equation". The consumption incentive is positively related to the profit ratio and negatively related to the valuation ratio, these results are close to the pro-poor theory when government activities are used to compress the income gap between capitalists and workers. On the other hand, incentives can only increase profit, representing a pro-rich theory.

Besides the "neo-Pasinetti Theorem", de Araujo Oliveira and Teixeira (2020) reviewed the contributions of Metcalfe and Steedman (1979) which proposes the consideration of an Open Economy and international financial system to the original Cambridge Equation. They show the impact of Globalization on the model. The authors present an extension that proves that even considering these assumptions, the essential nature of the Theorem preserves, and the exports and imports only affect the total amount of each income class. Another contribution was presented by Romero (2019) which combines the Kaldorian perspective with Schumpeter to extant a new cumulative growth model, and exemplifying with empirical analysis to the case of the "Cambridge Equation". All of these contributions reflect the importance of the theory exposed in the previous sessions, where the extensions of the Kaldorian model confirmed the robustness theorem.

The interest rate aims to express what would happen in a full employment system in the long run. It shows a principle that governs part of the sphere of distribution in an economic system, which does not consider the impacts of workers. Thus, no matter how much the middle class, majority composting by workers, is growing, this growth is not enough to impact the Cambridge equation, although it contributes to the improvement of the income distribution. In other words, globalization has an impact on income distribution, but it does not improve inequality. Thus, the class of workers remains irrelevant to the system

Seems here that the contribution made by Kaldor in the earliest '50s stands robust to our days. The main reason for us is the extensions which did not consider the relevance of

the workers inside of the results, by considering that only capitalist's influence the income distribution since this class has the majority of the capital stock and determines the level of investment of the economy. Such results are exposed in all extensions mentioned above, even in the most recent literature. Present this systemization by showing the importance of the Cambridge Equation to understand how the researchers keep interesting to develop an extension of the theorem to our days was the main contribution of our work.

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