

**TECHNOLOGY AND THE NEED FOR AN ALTERNATIVE VIEW OF THE FIRM IN POST
KEYNESIAN THEORY**

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Resumo:

O objetivo do artigo é contribuir para a discussão sobre a necessidade de uma visão alternativa da firma dentro da teoria Pós-Keynesiana. Esta necessidade é claramente percebida quando a tecnologia é inserida no arcabouço teórico Pós-Keynesiano. O artigo discute inicialmente duas principais contribuições neste campo dentro da literatura Pós-Keynesiana (a megacorp de Eichner e o polipólio de Victoria Chick). Procuramos mostrar que tais contribuições não se constituem em teorias da firma, mas sim teorias de preço, cuja caracterização da firma privilegia a sua estrutura de custos. Procuramos mostrar que a representação geométrica do comportamento da firma através de curvas de custos é insuficiente para construir uma teoria da firma compatível com alguns fenômenos macroeconômicos de interesse da teoria Pós-Keynesiana. Isto sem mencionar a sua insuficiência para lidar com progresso técnico, que é, sem sobra de dúvidas, o elemento central na explicação do dinamismo do sistema econômico. A partir desta discussão, procuramos mostrar que a teoria da competência da firma, derivada de autores como Penrose, Richardson, Teece, Loasby, pode dar grandes contribuições para o desenvolvimento de uma teoria da firma que dê conta, por um lado, das preocupações originais da escola Pós-Keynesiana, e, por outro, ajude no desenvolvimento de temas fundamentais por ela não tratados adequadamente, como por exemplo, progresso técnico. O artigo termina com algumas inferências sobre como esta nova abordagem pode ter impactos em alguns fenômenos macroeconômicos.

Palavras-chave:

Pós-Keynesianos, Teoria da Firma e Progresso Técnico

Abstract:

The aim of the paper is to contribute to the discussion about the necessity of an alternative vision of the firm in the Post-Keynesian Theory. This necessity is clearly acknowledged when technology is introduced in the Post-Keynesian approach. The paper starts discussing two important contributions in the Post-Keynesian literature (the megacorp of Eichner and Victoria Chick's polipoly). We try to show that both approaches do not constitute theories of the firm, but instead theories of pricing. Moreover, we show that the geometric representation of a firm's behaviour through some cost curves is insufficient to generate a theory of the firm that is compatible with the very same macroeconomic phenomena that Post-Keynesians are interested in. Among these phenomena, one of the most important is technological change, without doubt a central element to explain the dynamism of the economic system. From this discussion, we show that the knowledge base theory of the firm can contribute to the development of a theory of the firm that takes into account, in one hand, the original concerns of the Post-Keynesian Theory and, in the other hand, helps on the development of fundamental themes that are not treated adequately, like technical change. We finished the article with some inferences about how this new approach can have some impacts on macroeconomic phenomena.

Área 1:

Metodologia, História e Economia Política

Código de Classificação *JEL*:

A – Economia em Geral

Introduction

There has been a widespread agreement among economists as to technical change as a fundamental factor to explain economic development and its importance for investment behaviour. Despite Keynes' unequivocal acceptance of Schumpeter's explanation of the "major movements" of investment in capitalist societies (1930: 86), neither Keynes nor the Keynesians followed up this recognition of the crucial role of technical change. Post-Keynesian economists have given little attention to the whole dimension of the technical change phenomenon, for they are concerned to purely quantitative aspects of investment and employment. As a result, they have avoided the analysis of technical change and innovation, by considering it a phenomenon exogenous to the system.¹ However, in the same way as "money matters", the way technical change is generated and incorporated into the system also "matters". Therefore, it is necessary to analyse technical change in its all institutional dimensions, and not only through variations on capital/output and labour/output ratios or shifts in the production function. Also, it should be recognised that the approach to technical change proposed here has some implications for the institutional set-up upon which the expected aggregate demand and the supply functions are based. The most important of these implications, which we shall explore in this work, is the fact that the incorporation of technical change into Post-Keynesian analysis clearly calls for a new approach to the firm.

It is important to say that we are neither searching for new microfoundations to macrodynamics, nor do we have sympathy for methodological reductionism. However, we believe that there are some interactions, not microfoundations, between the micro

¹ We are not saying that they do not incorporate technical change in their analysis, as the work of Kaldor (1962), Joan Robinson (1965), and Eichner (1991) have shown. What we are claiming is that their treatment, although functional to the analysis of income distribution, is unable to deal with all the dimensions of technical change. For a review about the way Post-Keynesians deal with innovation, see Crocco (1999).

and macro level of analysis, as we shall see in the following discussion about the relationship between the process of firms' decisions and the determination of the point of effective demand.

The theory of the firm in the Post-Keynesian school

Broadly speaking, one may identify two different approaches to the firm in Post-Keynesian literature: the polipolistic firm (Joan Robinson, 1933; Chick, 1983) and the oligopolistic firm (Eichner, 1976, 1991; Shapiro, 1992, 1995, 1997).

According to Chick (1983) the concept of a polypolistic market is a very simple one, meaning 'many sellers'. Firms are viewed as an "institutional embodiment of the profit-maximizing owner-manager". (Kozul-Wright, 1997).

To show Keynes' argument she defines the market as composed by many atomistic small sellers, which operates under uncertainty. Chick's characterisation of the firm is based upon the disassociation between size of the firm and the fact that the firm is a *price-taker* or *price-setter*. Following Keynes' approach, Chick poses the expectation at the centre of her analysis, making it the relevant concept to the understanding of the behaviour of a small firm that it is not a *price-taker*. As she points out,

The expected position of the demand curve it [the small firm] faces in the near future will determine the price it should set for its product and the quantity it should produce. (Chick 1983: 26)

To understand the advantage of the use of the concept of polypolistic market it is necessary to have in mind that Chick was interested in showing how the point of effective demand is determined regardless the structure of the market. A key point here is the understanding of firms' behaviour under uncertainty, by distinguishing three stages in decision-making, based respectively on hypothetical, expected, and actual levels of demand (1983: 85). The hypothetical level of demand is essential to the

definition of the supply curve, as it indicates the optimum level of production (the criterion of optimality being anyone) and price given by various hypothetical levels of demand. The expected level of demand will be one of the various hypothetical demand curves and it will determine the volume of output and employment offered by the firm. Whether the expected level of demand is equal to the actual level of expenditure is another matter. There is no guarantee that they will be equal. If a mismatch occurs, “then a third stage of decision-making process may be entered into, in which the now past level of actual demand influences the current expectations, causing the producer to choose another hypothetical level of demand as the basis for his decision” (1983: 86). If the expected demand reveals to be equal to the actual demand, equilibrium is achieved and there is no incentive to change the expected level of demand for the next periods.

The megacorp theory, on the other hand, considers a market structure composed by interdependent, growth maximising, large firms. The ‘imperfections’ of competition in this case endow the business environment with a degree of stability sufficient to make investment decisions possible (Richardson 1972, 1990; Shapiro 1997). The behaviour and organisation of the megacorp is based on the managerial theory of the firm, where there is a clear separation between ownership of capital and management of the corporation. Moreover, the scope and scale of megacorp’s production requires a professionalised management that is impossible to be observed in the traditional neoclassical firm (Shapiro 1992: 20).

In this framework the objectives of the firm coincide with the objectives of the executives, what Shapiro calls ‘managerial firm’s dominance’. This understanding

grounds Eichner's (1976, 1991) view of megacorp's behaviour. The modern corporation aims at maximising growth, as it is the main interest of management.

It should be noticed that this does not mean that the megacorp has no interest in making as much profit as possible. The point is that profit will be obtained by its rate of growth. In this sense, all operations inside the megacorp are aimed at facilitating the objective of maximising growth. In Shapiro's (1995: 297)

Firm growth is the 'long-run' expression of the profit objective, and while the firm cannot maximize its 'long-run profit' (there is no such profit), it can strive for an ever-increasing profit. It can 'maximise' profit growth.

It is according to this framework that the process of pricing and the role of technical change should be analysed. The market power of the megacorp will be used to set a price (through a mark-up mechanism) that should be sufficient to generate the funds that investment requires. Continuous investment is a precondition for maximising growth and the price mechanism is the instrument that allows the generation of the necessary profits to finance it.

In its turn, technical change is essential to make profits by increasing the competitiveness of the firm, that is to say,

Just as profit is needed for investment, investment is needed for profit. Firms can make profits only as long as they are competitive, and enterprise competitiveness requires investment. ... The firm has to meet the technical advances of competitors, and the product and output demand of customers, and it cannot do either without investment in its product and production processes. (Shapiro 1995: 297)

A brief assessment of the Polypolitic firm and the Megacorp

The summary description of both accounts shows the advantages and limitations of each approach. There are two common advantages. In both cases the firm is considered

price-maker and the market operates under some “imperfections” of competition. This means that the firm set prices in its own interests whatever they are. Second, both accounts incorporate a time dimension on price decisions, through the incorporation of future prospects and expectations on the formation of prices. That is to say, they bring into the framework uncertainty.

Moreover, each approach has its own advantages. The polypoly perspective main contribution is to show that the size of the firm is not a relevant aspect to determine the capacity of the firm to set its own prices. As Chick has shown, the latter does not change whether we consider many small firms or few large firms.

In its own turn, the megacorp can be viewed as more realistic representation of economic life. Apart from considering that firms can (and do) affect market outcomes, it incorporates many features of a capitalist economy, like separation between ownership and control, technical change, differentiation of products, distinctive degrees of market power, and competitiveness, as well as it establishes the link between pricing and funding.

However, there are drawbacks, the most important being that both approaches do not constitute theories of the firm, but instead theories of pricing. According to Sawyer (1995), in the Post-Keynesian perspective,

prices play many roles other than (or in addition to) the allocative/co-ordinating one. Gerrard (1989) identifies this as conductive, positional, strategic and financial. The conductive role relates to the passing on of costs in to prices through say mark-up prices, and of prices into wages. The positional role concerns the relativity of the price of one economic agent with another (e.g. the importance of relative wages). The strategic role of prices reflects firms adopting competitive strategies, whilst the financial role is to enable firms to generate sufficient funds to finance expansion. (1995: 304)

Although it should be recognised the relevance of a theory of pricing to explain macroeconomic phenomena – e.g. income distribution, the determination of the point of effective demand, or the dynamism of the system – we need to know more than the cost structure of the firm in order to deal with and have a comprehensive understanding of the real world. The geometric representation of a firm's behaviour through some cost curves is insufficient to generate a theory of the firm that is compatible with the very same macroeconomic phenomena that Post-Keynesians are interested in. Among these phenomena, one of the most important is technological change, without doubt a central element to explain the dynamism of the economic system.

In the polypoly approach, technology is considered exogenous to the functioning of the system - it is given – and it is available to everyone. As we shall see, this simplified assumption to technical change does not deal with its all features. Further, to assume the exogeneity of technological knowledge is to ignore the fact that a great deal of it is firm-specific.

In its turn, the megacorp approach considers both the technical change and the research and development activity as important elements to a firm's competitiveness. However, this recognition is not fully explored. Following Schumpeter's tradition, the capacity to innovate is directed related to size of the firm. Market power gives to the firm the necessary assurance to invest and to allocate resources in R&D. Moreover, the use of technological knowledge generated by this latter activity is important to sustain and improve the megacorp's market share. However, they do not explicitly recognise that this process is (partly) firm-specific and contingent to the firm's past history. In short, the point is that this understanding deals with just one dimension of the innovative activity.

The fact that a great deal of technological knowledge is firm-specific (i.e. originated through learning processes) and characterised by cumulateness, tacitness, technological trajectories, etc., requires a new concept of firm capable of dealing with all these features. As Kozul-Wright notes,

... once innovation is understood, the question of firm size (...) appears far less important than the wider issue of organising and co-ordinating the learning process (1996: 01)

Therefore, as far as we admit into our formal reasoning the reality of technical change and innovation, geometric representations of either small or large firms based on cost curves say to little about how firms obtain “sufficient” knowledge to take an investment decision.

As this is an essential point, let us take a closer look at the discussion of this distinctive concept of firm for it will be easy to see its implications for some macroeconomic factors.

The firm as a repository of knowledge²

Marshall has already recognised the dependence between growth of knowledge and economic development and the importance of the firm in “co-ordinating the generation and testing of novel conjectures” (Loasby, 1994: 115). In Marshall’s words,

Capital consists in great part of knowledge and organisation... Knowledge is our most powerful engine of production... Organisation aids knowledge (1961: 115).

As noted by Loasby (1994: 255), the corollary of this proposition is that the lack of appropriate organisation impedes knowledge. The task ahead of an organisation is not

² We draw on ideas of Marshall, Penrose, Richardson, Nelson and Winter, Loasby and Teece to understand how firms deal with the world of continuous product and process development.

to “make the best of what is known”, but instead to find out “what is at present unknown” and this requires co-ordination. Again, as Marshall put forward, a firm is a form of organisation that aids knowledge, that is, firms provide the institutional framework and co-ordination needed to “the generation and testing of new conjectures”. Firms thus undertake knowledge creating activities, which are the underpinning of economic growth.

A firm should therefore be viewed as a repository of knowledge, which is manifested (or embodied) in its capabilities. Capabilities refer to the ways of organising and getting things done (indirect knowledge) and of doing things (direct knowledge). As defined by Richardson, the capability of a firm is its possession of “knowledge, experience and skills which enable it to undertake ‘activities’ such as discovery and estimation of future wants, research, development, design, execution and co-ordination of processes of physical transformation, the marketing of goods and so on” (1972: 888). And this “know how” can only be fully understood if one keeps in mind that it is the outcome of an interactive process involving all firm’s constituents (as well as external organisations, such as suppliers, customers, rivals, financial institutions).

In order to create an environment that allows interactive learning to occur, cooperation between various (and possibly conflicting) groups within the firm and continuity of relations are important. Information sharing, codification of procedures, adaptation of work routines, common language and culture – in short, the creation of “routinized behaviour” (Nelson and Winter, 1982) – cannot be done overnight. Once a set of routines is created, the capabilities of the firms will depend not just on the individual of whom it is composed but also on particular pattern of “intimate connections” between them (Loasby, 1994: 254). Thus, external transfer of an individual’s

knowledge beyond a firm's boundary may be difficult if not impossible, since taken out of the context it may be quite useless (Teece, 1982: 45).

As a matter of fact, the knowledge embodied in capabilities contains a significant degree of tacitness, which cannot be codified and transferred, but rather must be acquired through practical experience and learning. We may then say that capabilities are firm-specific and "sticky" in the sense that they cannot be easily, quickly and at low cost acquired or passed on (Penrose, 1959; Teece et al. 1990).

Penrose (1959) has already shown, through the concept of firm's "productive opportunities", how a firm's knowledge base conditions its growth and diversification. Internal learning combined with the entrepreneurial vision of where, when and how the acquired learning can be put into use compromises the "productive opportunities" of a firm. Each success (or failure) will lead to fresh learning and new "visions"; new knowledge being created out from last experience (Loasby 1994: 256).

Firm's knowledge base grows out from the knowledge accumulated through learning and experience, contingent on the firm's past history (path dependency). This knowledge creating activities underpin dynamic competition and economic growth. In fact, technological change (or innovation) is nothing more than a series of simultaneous knowledge creating activities undertaken by a number of firms often in close cooperation with external organisations (users of innovation, universities, public research bodies, rivals, etc).³ It is the size and the nature of this 'stock' of knowledge that differentiates one firm from another and inhibits the free transfer of technological knowledge among them.

³ In this respected see Kozul-Wright (1996)

This privileged knowledge, embodied in firm's capabilities, is used by firms to exert influence on market conditions and profitability. On the one hand, distinctive capabilities are the source of profitability differentials that are, in turn, translated into different rates of accumulation. On the other hand, firms use their privileged knowledge (*and not only its pricing policy*) to affect markets conditions, instead of passively accepting given market conditions.

Summing up, our focus concentrates then on the firm and the knowledge on which is based. Accordingly, as noted by Kozul-Wright (1996: 27)

firm's boundaries are no longer contained by its size but by its knowledge base, and there can be no *a priori* optimal rule with respect to firm size, industrial structure and economic growth.

Firm's Capabilities And Its Impacts On Some Macroeconomic Phenomena

In our view this approach to the firm may affect some macroeconomic phenomena. Due to lack of space it is impossible to make this discussion in its fully extension, so in what follows we draw some macroeconomic implications of this approach.

We shall concentrate on one important aspect. The interaction between continuous technical change and the process of decision-making. What we have in mind is two kinds of decision: production decision and investment decision.

Capabilities and the Point of Effective Demand

As we have argued elsewhere (----- 1999), the discussion about production decision is important as it has some impacts on the determination of the point of effective demand. The first point to be addressed here is related to the firm's ease of hiring and dismissing labour force. As shown previously, due to the process of building capabilities it takes

time for a new employee to learn the routinized behaviour of a firm. Moreover, when an employee is dismissed, the firm gives up not only a unit of labour force, but also part of the firm's tacit knowledge. This latter cannot be replaced by the employment of another worker. The capabilities of the firm are not decomposable into the capabilities of the managers and individual workers, but involve teamwork that must be coordinated and practised. These features imply that there is a cost involved in the process of dismissing and hiring labour force. Even if the same person that is being dismissed is re-hired in the future some cost will be involved. Moreover, according to Teece and Pisano (1994) there is not market for capabilities, except possibly through the market for business (to buy or to sell a whole firm). In other words, capabilities must be built because they cannot be bought. As a consequence, a firm becomes much more cautious when dealing with its labour force, as individual and organisational skills acquired in the learning process demand time and are costly. Hence, these costs become an important element when a firm has to decide about its optimal level of employment.

A second important element to take into account is the fact that firms, according to the approach used here, can affect their own demand. As we are dealing with product innovation, firms know that there is a possibility for the increase of their market share due to the novelty of the product. Moreover, it is well recognised that every new successful product has a life cycle. As a result, every firm expects that whenever it launches a new product into the market, the demand for its product will show oscillations similar to those predicted by the product cycle theory.

From a theoretical point of view, the above discussion sheds light on the question of whether or not it is still acceptable to assume that a firm varies the amount of its labour force every time its production expectations are not validated. In other words, in the case of considering an institutional framework where the firm regards its capabilities as

a valuable asset, is an invalidation of the firm's production expectations sufficient to alter the level of employment it offers?

The claim made here is a negative answer to the last question. Firms will define the amount of labour force to hire according to expectations related to the whole life cycle of its products. The implication of this view is that in the enquiry of the point of effective demand, production expectations is no longer theoretically adequate and should be replaced by what we call '*medium-period expectation*' or '*single-product expectation*' (----- 1999). The latter have been defined as the expectations concerning the *quasi-rents* arising from the introduction of a new product. It involves many production decisions, although it also involves a shorter perspective of time and less monetary resources than the acquisition of a capital good. In other words, we are claiming that the level of employment at a specific point of time is defined by the medium-period expectations (MPE hereafter), given the total level of investment.

Two consequences can be derived from the replacement of medium-period expectations by production expectations. First, the variation of employment becomes less frequent for the length of time involved in the formation of two MPEs is longer. Second, as we are assuming that firms can interfere with its own demand, it is necessary to rethink how present expectations are formed in face of a possible mismatch between previous expectations and the actual demand.

The fulfilment or not of previous expectations certainly will affect the expectations about the next product innovation. However, medium-period expectations are concerned with a new product that is, at the same time, a development of the previous one. Holding everything else constant, this means that a firm can affect its own demand by launching a new product in the market. The main implication of this special feature is that there is no one-to-one relationship between the mismatch of previous

expectations and the formation of the next one, as it is in the case of short-period expectations. The disappointment of previous expectations does not necessarily imply a negative revision of expectations for the new product. As the latter has some element of novelty, there is a possibility that firm's demand will be positively affected. Of course, if disappointment is great the expectations will have to be revised. The key element in this discussion is that firm's demand cannot be considered stable when product innovation is considered. Product innovation implies that a firm cannot be seen as passive in relation to its own demand. As we have seen, the concept of competition used here means rivalry, which, in turn, implies an active behaviour of the firm in relation to market conditions.

By the same token, in the case of medium-period expectations, the match of previous expectations and realised outcomes does not necessarily produce an equilibrium that equates the prospective yields of sequential products. As we are dealing with a new product that belongs to a technological trajectory, a successful prediction of the prospective yields of a previous product can positively affect the expectations for the next ones.⁴

Capabilities and Investment Decision

The discussion now turns to some implications of the understanding of the firm as a repository of knowledge and its consequences for the process of formation of long-period expectations. The attention will be concentrated on one question: what will happen with the investment decision in the Post-Keynesian approach if product

⁴ What is behind this analysis is the discussion about the development of a technological trajectory and its relation to the weight of argument (Crocco 1999, 2000). The success or failure of the introduction of an innovation changes the weight of argument in relation to the introduction of the next innovation (Crocco 1999). In situations where the previous product innovation has been successfully introduced (expectations were confirmed), there is an increase in

innovation is allowed. In other words, we have to analyse what the impact on long period expectations (LPE) will be if we assume that there will be future developments in the firm's product.

Keynes and the Post-Keynesians have been concerned about the precariousness of the basis upon which investment decisions are made, due to uncertainty related to this kind of decision.

However, as Keynes has already pointed out,

It would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain. It is reasonable, therefore, to be guided to a considerable degree by the facts about which we feel somewhat confident, even though they may be less decisively relevant to the issue than other facts about which our knowledge is vague and scanty. (Keynes C.W. VII: 148)

According to the quotation above, one has to be guided by the facts of the present situation when deciding whether to invest or not. The usual approach in this case is to introduce into the framework conventions that are held by investors at the moment of the decision. While this cannot be denied, our previous discussion of capabilities suggested that another element can be introduced into this framework.

Applying Keynes's framework mentioned above to the problem in question, it can be seen that when an investor makes a prospect of future receipts from the sales of the products produced by the capital asset that is now being bought, he attaches great weight to the prospective yields from the product that will be produced *immediately* by the new equipment. The main point here is to show that when one tries to analyse the firm's investment decision, one has to acknowledge that the firm has been developing a

the weight of argument related to the introduction of the new one, and so, there is an increase in confidence allowing for higher expectations for the next product.

technological trajectory. Because of some features of the technological knowledge possessed by the firm (tacitness, cumulateness, etc - expressed through its capabilities), the formation of expectations can be made on stronger grounds as the immediate past outcomes obtained by the firm strongly affect the formation of expectations about the immediate future, even when these expectations are about an investment in a new plant.

A firm knows that the immediate products to be produced usually represent a stage on a technological trajectory that has been developed by the firm. Unless the first type of product to be produced by the new capital good is a completely new product (a change of the technological trajectory), there will be strong connections between the latest products produced with the old capital asset and the first products to be produced with the new capital asset. Thus, the expectation of prospective yields from the first type of products to be produced with the new capital asset are strongly affected by the outcomes obtained by the latest types of products produced with the old equipment.⁵ In other words, the formation of LPE becomes *partially* endogenized.

Conclusion

We try to show that if technical change is to be understood in its all dimensions a specific theory of firm must be considered. As we have discussed a firm viewed as a repository of knowledge seems to be the best way to deal with technical change. We have argued that Post Keynesians theories of the firm (polypolistic and megacorp) are insufficient to cope with the learning process that is inherent to the innovative activity. Moreover, and finally, we have demonstrated that there are some macroeconomic

implications whether we assume a theory of firm based upon the concept of capabilities or based upon a pricing mechanism.

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⁵ If the latest innovations have been introduced successfully, the confidence about the introduction of the new product innovation increases along with the weight related to this decision (Crocco 1999).

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