Effective Demand: Securing the Foundations – A Symposium

Olivier Allain, Jochen Hartwig and Mark Hayes

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Abstract: This Symposium consists of individual comments by three authors on papers previously published by the other two (Allain, 2009, Hartwig, 2007 and Hayes, 2007) on the topic of Keynes's principle of effective demand as set out in *The General Theory*. The Symposium includes updated versions of PKSG working papers 1210, 1211 and 1212 together with an introduction by all three authors.

As Allain puts it, there is a closure problem, in our understanding if not in *The General Theory* itself. Allain's solution is to redefine effective demand so that it becomes the end point of a process of convergence of expectations on outcomes. Hartwig (following Chick, 1992, in particular) requires entrepreneurs to form a view about aggregate demand rather than simply their own industry price. Hayes retains Keynes's definition of effective demand and price-taking firms but introduces a division of entrepreneurs between employers and dealers which is not explicit in Keynes's text.

Keywords: Keynes – effective demand – formation of expectations

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Olivier Allain, Centre d'Economie de la Sorbonne, 106–112 Boulevard de l'Hôpital, 75013 Paris, France. E-mail : olivier.allain@parisdescartes.fr

Jochen Hartwig, KOF Swiss Economic Institute at ETH Zurich, Weinbergstrasse 35, 8092 Zurich Switzerland. E-mail: hartwig@kof.ethz.ch

Dr M. G. (Mark) Hayes, Robinson College, Cambridge CB3 9AN, United Kingdom. Email: mgh37@cam.ac.uk

Effective Demand: Securing the Foundations

OLIVIER ALLAIN, JOCHEN HARTWIG AND M. G. (MARK) HAYES

Introduction to the Symposium

This Symposium consists of individual comments[1] by three authors on papers previously published by the other two (Allain, 2009, Hartwig, 2007 and Hayes, 2007) on the topic of Keynes's principle of effective demand as set out in *The General Theory* (Keynes, 1936). The reader will need to consult the original papers before engaging in detail with the comments but here is a summary of the main issues at stake.

Keynes's *magnum opus* has been the subject of interpretation for over 75 years which for some may be sufficient grounds to desist. Until the mid-1960s there was a reasonable consensus as to its meaning and significance, which subsequently dissolved with the counter-reformation in economics. In the early 1970s many relevant papers, including drafts of *The General Theory* and related correspondence between Keynes and many others, were published as Volumes XIII and XIV of the *Collected Writings* (Keynes, 1971–89), followed at the end of the decade by the contents of the famous laundry basket in Volume XXIX. These publications prompted an extensive discussion of Keynes's principle of effective demand, culminating in the eponymous study by Amadeo (1989).

The present authors share a continuing dissatisfaction with the paradoxes and contradictions that remain within the literature on this topic and they have each contributed new insights in the papers subject to comment. The value of this Symposium to the reader is first in recording the common ground now established between all three authors. This is not to suggest that this common ground represents the work of the authors alone; each has drawn

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[1] The comments were originally presented in person at the Fifth 'Dijon' Post-Keynesian Conference held at Roskilde in Denmark on 13–14 May 2011.

extensively on the work of others to whom the original papers and the comments make due reference. Secondly, although the common ground is wide, there remain significant differences of view, which the authors believe should not, if possible, remain unresolved, so that the Symposium identifies an agenda for future debate and research.

The common ground includes agreement that in *The General Theory* aggregate demand refers, not directly to the expenditure decisions of consumers and investors, but to the state of short-term expectation of entrepreneurs and therefore (at one level of meaning) relates exclusively to supply decisions. Thus expectation determines output and employment, as in the title of Chapter 5 of *The General Theory*. The state of short-term expectation corresponds to a set of prices expected for the delivery of output of different types of goods produced, in the general case, by processes of different durations. These price expectations are binding for a unit interval of time that Keynes calls the 'day' and expectations can differ from realised results. Realised prices and incomes affect employment only insofar as they affect price expectations. Whether expectations are fulfilled is a separate matter. Entrepreneurs, each producing one type of good as part of a Marshallian industry, set their production and employment to maximise their expected profits over time, taking as given the expected price, their production functions and costs. Industry prices are flexible so that an increase in demand may be met by a combination of both price and quantity adjustment. Although the multiplier is implicit in any change of output, the motor is changes in expected prices rather than purely hydraulic changes in quantities of output. The multiplier is best understood as a structural or stability condition governing the division of output between consumption and investment. Accordingly, the authors agree that the standard criticisms of Keynesian economics—as neglecting expectations, lacking micro-foundations in optimising behaviour and assuming fixed or sticky prices—do not apply to the economics of Keynes himself.

Where the authors mainly differ is in their views of how price expectations are formed in Keynes's system. Hayes devotes a lot of attention to the heterogeneity of output and the definitions of income and time periods. For him, the expected prices embodied in effective demand are themselves equilibrium prices determined by supply and demand in each industry. They are best understood as prices struck in forward markets each day between two separate categories of entrepreneur (employers and dealers), with employers producing the orders placed by dealers. Given this understanding, he finds no substantive fault with Keynes's text, although the exposition could certainly be clearer.

Hartwig disagrees, considering that price expectations should appear only in the aggregate demand function and are therefore exogenous to the determination of effective demand. Whereas for Hayes effective demand is a market equilibrium, for Hartwig it is an equilibrium (solely) in the minds of individual entrepreneurs. Hartwig accepts the need to explain how price expectations are formed and cites his earlier work as an alternative in which employers set prices in line with their expectations of the composition of aggregate expenditure, going beyond simply 'taking' a forward market price. Here Hartwig is at odds also with Allain, who agrees with Hayes that Keynes's entrepreneurs do not form individual expectations of aggregate demand.

Allain explains price expectations by postulating a stationary equilibrium (à la Kregel, 1976) in which they are fulfilled, and defining this as the point of effective demand. Hartwig notes and Allain acknowledges that Keynes defines the point of effective demand differently, as the intersection of the aggregate supply and demand functions. While Allain agrees that the latter expectational equilibrium determines entrepreneurs' optimal employment decisions, for him it is not unique since it is contingent upon a state of expectation that may not be correct. The true, stationary equilibrium is reached only when entrepreneurs' expectations are in line with the expenditure decisions of consumers and investors, represented by a global

expenditure function. While price expectations are indeed in the minds of entrepreneurs, they converge over time on the stationary equilibrium prices consistent with expenditure decisions. Hayes raises the difficulty that effective demand (in Keynes's sense) and income (the value of current output, determined by expenditure) have different dimensions in time, making such convergence mathematically difficult, if not impossible. Furthermore, he sees no evidence or need in *The General Theory* for an assumption by Keynes that expectations are fulfilled.

In summary, there is a closure problem, as Allain puts it, in our understanding if not in *The General Theory* itself. Allain's solution is to redefine effective demand so that it becomes the end point of a process of convergence of expectations on outcomes. Hartwig (following Chick, 1992, in particular) requires entrepreneurs to form a view about aggregate demand rather than simply their own industry price. Hayes retains Keynes's definition of effective demand and price-taking firms but introduces a division of entrepreneurs between employers and dealers which is not explicit in Keynes's text.

As a by-product of his main argument, Allain concludes in his original paper that Keynes's claim that 'the logical theory of the multiplier … holds good continuously, without time-lag, at all moments of time' is incorrect once allowance is made for errors in expectations. Hayes demonstrates that Allain's result arises from adopting a different definition of the consumption function from Keynes's. On his own definition, Keynes's claim remains intact.

The title of this Symposium refers to securing the foundations of the principle of effective demand. The authors believe this collaboration takes us some way towards that goal but further work remains to be done.

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Effective Demand: Securing the Foundations

OLIVIER ALLAIN[*]

Université Paris Descartes & Centre d'Economie de la Sorbonne

ABSTRACT *This paper is one of three contributions to a symposium commenting on papers previously published by the other authors. My analysis of Chapter 3 of the General Theory is that it built a bridge between the entrepreneurs' behaviour at the microeconomic level and the closure of the system at the macroeconomic level. I agree with Hartwig (2007) in many respects. The main divergence between us concerns entrepreneurs' expectations which can be related to the overall economic situation (Hartwig's interpretation) or to their own situation (my interpretation). While he put the stress on overlapping production periods, Hayes (2007a) proposes for his part a detailed analysis of the entrepreneurs' behaviour. As a result, it seems to me that he doesn't focus enough on the system closure aspects of the principle of effective demand.*

I thank Mark Hayes who initiated and organized the debate between himself, Jochen Hartwig and me. As I did not mention their articles in mine which was however published two years later, I have to mention that I sent my proposition to the *Review* in 2006 and had no occasion to make any substantial change until its publication. It is therefore interesting to have here the opportunity to comment on these two articles and ask questions of their authors.

Hartwig's (2007) analysis is close to mine in many respects. That explains why I do not have a lot of comments/questions for him. The main divergence is about the uniqueness of the aggregate demand function (according to Hartwig) and a distinction between two separate functions (according to me).

Hayes's (2007a) analysis is much more different. I began by finding it odd. But, having carefully reread some passages of the *General Theory* and other Keynes's writings, I finally concluded that Hayes was right on several aspects, notably on the production period

[*] *Correspondence Address*: Olivier Allain, Centre d'Economie de la Sorbonne, 106–112 Boulevard de l'Hôpital, 75013 Paris, France. E-mail : olivier.allain@parisdescartes.fr

issue. But it seems to me that he doesn't focus enough on the system closure aspects of the principle of effective demand.

1. The production period

Thank to Hayes, it is now clear to me that Keynes's theory rests on production periods of different durations, each one comprising several days: 'on any day in any firm a number of production periods of differing lengths overlap' (Keynes, 1973, p. 180). Today's employment decision then partly depends on what is expected for the following days, hence the definition of *D* as depending on entrepreneurs' short-term expectations where short-term is not restricted to today but takes into account the future days of the production period. More precisely, *D* depends on some receipts which spread over several days. Eventually, today's effective demand is the intersection between today's *Z* and *D* functions.

In addition, because of overlapping production periods, there is 'no definite relationship between aggregate effective demand at one time and aggregate income at some other later time' (Keynes, 1973, p. 179–180) as Hayes himself shows, concluding that '*Y* and *D*** are quite different' (Hayes, 2007a, p. 62).

In short, I think Hayes has made it much clearer. However, let us notice that neither consumption nor investment have been mentioned here.

2. Employers and dealers

Hayes further introduces a distinction between employers and dealers which at first I found odd and cumbersome before realising it makes things more comprehensible. Accordingly, Hayes claims that entrepreneurs' expectations are almost always fulfilled: 'since production is undertaken only against forward orders, the employer's expectations are fulfilled by contract, and can be disappointed only if the dealer defaults upon delivery (this would represent a windfall loss for the employer, which does not affect present or future employment decisions). Whether the dealers' expectations are fulfilled is literally a question

for another day and depends on whether they have correctly judged future demand at the time of delivery in a given state of expectation…' (Hayes, 2007a, p. 67). As a result, if I understand correctly, one can say that unforeseen changes in demand are mainly borne by dealers, through windfall profits or losses. These unforeseen changes affect employers only indirectly, through the impact of *market* prices on *forward* prices. In other words, the multiplier has an effect on current market prices before it affects short-term expectations, and then tomorrow employment.

These developments are stimulating and will fuel my thought. However, it seems excessive to pretend that Keynes suggests this distinction between employers and dealers while quotations in a footnote (Hayes, 2007a, p. 65, footnote 15) do not clearly establish that point. Consequently, I think Hayes departs too much from Keynes's analysis on this point. Indeed, what does remain of entrepreneurs' expectations if these 'expectations are fulfilled by contract' (Hayes, 2007a, p. 67)? My opinion is that Keynes is here more traditional than Hayes in the sense that he does not make the same distinction between market and forward prices. In addition, he clearly assumes that firms' expectations may be unfulfilled (not at the aggregate level but at the disaggregated one): 'when one is dealing with *aggregates*, aggregate effective demand at time *A* has no corresponding aggregate income at time *B*. All one can compare is the expected and actual income resulting to an entrepreneur from a particular decision' (Keynes, 1973, p. 180). Also, 'I now feel that if I were writing the book again I should begin by setting forth my theory on the assumption that short-period expectations were always fulfilled; and then have a subsequent chapter showing what difference it makes when short-period expectations are disappointed' (Keynes, 1973, p. 181).

3. The aggregate supply function

My interpretation of the aggregate supply function (*Z*) is that it is built as an aggregate function from the entrepreneurs' point of view: assuming *m* firms, *Z* is the sum of the *m*

individual supply functions provided that, according to Keynes's adherence to the first classical postulate, the profit maximisation condition is fulfilled (i.e. marginal cost equals price). Consequently, labour (N) influences Z through its impact on marginal cost as well as on production. Z does not include given prices but a condition on prices: in order to hire N, price may equal $w/Q'(N)$.

Hartwig's analysis is broadly the same as mine, for instance when he explains that 'unit supply price will grow with employment under conditions of decreasing marginal returns to labour' (Hartwig, 2007, p. 730).

For Hayes's precise analysis on the Z function, it is necessary to read Hayes (2007b). In the article discussed here, the specification of Z (Hayes, 2007a, p. 73, eq. A2a) is quite allusive. This is not satisfying from my point of view because the closure problem, which is a crucial aspect of the principle of effective demand, depends on the aggregate supply function properties.

4. What do entrepreneurs expect when taking their hiring decisions? The issue about one or two functions on the demand side

The question of entrepreneurs' expectations has its importance in connection with Keynes's definition of D as 'the proceeds which entrepreneurs expect to receive from the employment of N men' (Keynes, 1936, p. 25). According to the (say) 'conventional' approach, expectations are about consumption (D_1) and investment (D_2). On the contrary, my article (among others) rests on a 'less conventional' but necessary distinction between aggregate demand and global expenditures. The reason is it is not possible to specify $D = f(N) = D_1 + D_2$ as an aggregate function from the entrepreneurs' point of view.

Indeed, the only way to specify $D_1 + D_2$ as an aggregate function is to aggregate households' consumption behaviour on the one hand, and firms' investment behaviour on the other hand (or households' behaviour if they hold capital goods). For an entrepreneur who is

taking his hiring decision, $D_1 + D_2$ may have at best an existence at the global level, for the economy as a whole, rather than any reality at the disaggregated level. However, adopting such an approach means that omniscient entrepreneurs compute the global expenditure first, and then deduce the share of this global expenditure received by them. I think it does not match Keynes's entrepreneur picture.

On the contrary, according to the 'less conventional' approach, entrepreneurs should not be omniscient. The individual firm's demand function results from an entrepreneur wondering how many workers to hire for a given or expected price, say p'. For p', each entrepreneur computes his receipts depending on how many workers are to be hired[2]. The aggregation of these individual functions results in D which fits very well with the definition of D, just as *General Theory*'s well-known paragraph ('Now if for a given value of N...', Keynes, 1936, p. 25) fits well with firms comparing their proceeds with a profit-maximisation condition in order to determine N. Several comments must be made here.

Let me first underline that the comparison between Z and this definition of D results in the volume of employment at the aggregate as well as at the disaggregate level (because each entrepreneur can build his own Z and D curves[3]). At the opposite, a comparison between Z and $D_1 + D_2$ results in employment at the aggregate but not at the disaggregate level. On this point, the 'less conventional' approach is better for articulating firms' decisions and macroeconomic outcomes.

As Section I of Chapter 3 focuses on firms' employment behaviour, and also because Keynes clearly defines D from the entrepreneurs' point of view, I still think that the 'less conventional' approach is more relevant, provided that price expectations relate to goods

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[2] Let us recall that a firm can produce and sell any quantity of goods at the market price in a competitive economy.

[3] See Allain (2009, pp. 8–9).

which have different delivery dates. In the other case, it would mean that Keynes refers to a hidden function. I don't think so. Indeed, let us recall that Keynes does not mention consumption or investment in Section I of Chapter 3. To my knowledge, he never relates entrepreneurs' expectations to consumption and investment expenditures. Besides, entrepreneur's decision rests on his realised and expected sale-proceeds (Keynes, 1936, p. 51). Or, when changes are unforeseen, the entrepreneur takes price or stock variations into account (Keynes, 1936, p. 123). To sum up, entrepreneurs' decisions rest on their own business.

It seems to me that Hayes takes the same approach: 'production and employment decisions are reserved to entrepreneurs, by definition, based on their price expectations' (Hayes, 2007a, p. 56). And further: 'each day firms must decide, in a short-period equilibrium process that Keynes calls 'the principle of effective demand', how much employment to offer today based on their expectations of the market prices they will receive for the heterogeneous finished output that will emerge at the end of the various production periods' (Hayes, 2007a, p. 60). Employment does not depend on entrepreneurs' expectations about propensity to consume or investment. On the contrary, changes in consumption or investment entail changes in market and forward prices, and then changes in entrepreneurs' behaviour. To sum up, what Hayes calls the aggregate demand function (i.e. $D_1 + D_2$) does not refer to 'the proceeds which entrepreneurs expect to receive from the employment of N men'. On the contrary, it seems that Hayes makes an implicit use of 'my' specification of D.

For his part, Hartwig seems to share my interpretation when he writes, without any mention of the propensity to consume, that 'if an entrepreneur takes the demand price as exogenously given, total expected sales proceeds will be a linear function of the quantity produced, and hence a concave function of the level of employment if decreasing returns to labour are assumed. Aggregation of the individual entrepreneur's expected demand curves

leads to an aggregate demand curve (*D*) ...'. But, the continuing citation is really puzzling as he asserts that '[*D*] is concave as long as the marginal propensity to consume is smaller than one' (Hartwig, 2007, p. 733). From my point of view, Hartwig makes confusion between the two distinct functions because the propensity to consume has nothing to do here. Moreover, one can wonder why he questions the concavity of *D* while he gives a clear explanation two lines above. In some sense, in his interpretation, the *D* function is *over determined*.

Then, Hartwig omits to mention that Casorosa's criticisms do not concern some inconsistency in the construction of *D*, but the conventional approach according to which 'the expected demand function [is] the entrepreneurs' expectation of the expenditure function' (Casarosa, 1981, p. 192). On the contrary, Casarosa pleads for an accurate distinction between the two functions, as I do in my article.

5. The closure of the system, temporary equilibriums and convergence

Assuming that individual firms do not directly expect $D_1 + D_2$ raises the core question about the closure of the system: it should be proved that these firms adjust their production in order to respond to exogenous changes in consumption or investment. My feeling is that Keynes did not give a formal proof but was sure that firms respond properly[4]. It was the main goal of my article to make explicit such formal proof while Keynes just gives some hints in Chapters 5 and 10 (Section IV).

Hayes presentation about overlapping production period shows the complexity of the issue: 'aggregate effective demand and income are not commensurable because they do not have the same dimensions in time' (Hayes, 2007a, p. 62). This perhaps explains why the system closure is not formally specified in Chapter 3.

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[4] Someone told me that Joan Robinson said she had to be compared to a horse (laboriously digging her furrow) while Keynes was a tiger (brilliant but not really interested in details). If someone knows the reference, I would be happy to have it.

I admit confusion in my article because I wrongly assumed that each production period lasts only one day. But, because *General Theory* is a general theory, it has to correctly work under this simplifying assumption as well as in a more complex framework. My analysis should then not be considered as wrong, just as incomplete.

As a result, the temporary equilibrium analysis in my article (macroeconomic changes induce today price or stock adjustments which affect tomorrow firms' behaviour) remains relevant. The analysis is also consistent with several quotations from *General Theory*. For instance, in the case of unforeseen expansion in the capital goods industries, 'the efforts of those newly employed in [these] industries to consume a proportion of their increased incomes will raise the prices of consumption-goods until a temporary equilibrium between demand and supply has been brought about partly by the high prices causing a postponement of consumption, partly by a redistribution of income in favour of the saving classes as an effect of the increased profits resulting from the higher prices, and partly by the higher prices causing a depletion of stocks' (Keynes, 1936, p. 123–124).

This approach seems also consistent with Hayes's analysis of the multiplier: 'the multiplier is a market period (*ex post*) relationship between the realised values of consumption and investment output, which may well influence the state of expectation, but is not directly itself a causal element of the principle of effective demand' (Hayes, 2007a, p. 70).

In short, I think that, in the 'theoretical world', an unforeseen variation in investment results in the following outcomes.

a.   The principle of effective demand holds provided that employment is determined by today's entrepreneurs' expectations.

b.   As the variation in investment is unforeseen, it results in market adjustments on prices and/or on stock of inventories (temporary equilibrium).

c.   Entrepreneurs take these market adjustments into account when formulating their expectations the next morning, hence the convergence toward an equilibrium where expectations are fulfilled[5].

It seems to me that Hartwig agrees with this interpretation, for instance as he writes that: 'the quantity reactions do not take place within the production period but – if at all – in the transition from one period to the next' (Hartwig, 2007, p. 736). On the contrary, Hayes's approach diverges at least in two ways. First, he restricts the principle of effective demand to the first item (a), while I include the three items. Secondly, according to Hayes, the causation runs from, say, yesterday evening outcomes to today expectations. Then, these expectations will be fulfilled today evening because production is undertaken against forward orders. To my standpoint, today's expectations may be unfulfilled this evening because production is not undertaken against forward orders.

Eventually, I would like to ask Hayes if he thinks that, in the *General Theory* (as a whole, if not in Chapter 3), there is a theoretical step by step adjustment of the type I describe above. Moreover, I think his distinction between employers and dealers allows him to artificially avoid the adjustment problem out of the story.

6. The specification of the consumption function and the two demand functions once again

Considerations about temporary equilibriums lead to many questions about the consumption function specification. Indeed, N being given, the value of firms' receipts (R) may change

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[5] Things are of course more complex in the 'real world' where entrepreneurs have to take into account many parameters and changes at the same time.

because of market prices adjustment. For convenience, let us assume that the whole receipts are distributed to households (through wages and profits) and that consumption behaviour only rests on a given marginal propensity to consume (c). Under these assumptions, the value of consumption expenditures (D_1) depends on the price level as well as on employment:

$$D_1 = c.R = c.p.Q(N)$$

In other words, for any given N, an increase of the current market price entails a rise of R and then of D_1, although consumption remains unchanged in real terms. Many important implications should be underlined.

Households are indifferent to the price level when they take their consumption decision. They just take the market price as given, without any effect on their real consumption. This outcome echoes the interpretation of many Keynesians who claim that prices are set (or proposed) by entrepreneurs. It reinforces also my own interpretation about the D function. Accordingly, I think that Hartwig and Hayes are wrong when they put a demand price in their demand function ($\mathbf{p^d}$ in Hayes's model, p. 73).

More precisely, one can still think that prices are set on the market. But, at the macroeconomic level, the buyers' price is not independent from sellers' price. Everything happens as if sellers propose their own price. If it is too low, the closure of the system entails an excess demand (which may be solved by an increase of the price or by a drawing from the stocks of goods)[6].

As a crucial result, D_1 (in nominal terms) does not exist before a price has been proposed to households. Then the function ($D_1 + D_2$) cannot be drawn on the *N/Z* diagram. Consequently, there is no possibility for a unique intersection point between ($D_1 + D_2$) and *Z*.

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[6] At the microeconomic level, the rules remain those of handbooks: the income and general level of price being given, relative prices determine the composition of the basket of consumption goods, and changes in relative prices entail substitutions between goods.

Effective demand cannot be defined in the way which has been taken by Hartwig and Hayes among many others.

The main criticism I address to the Hayes and Hartwig articles may be that they do not take this closure difficulty into account. How do they specify the demand price $\mathbf{p^d}$? Do they think that D_1 can be defined independently of Z, and how?

One can eventually argue Keynes specifies D_1 as a function of N rather than R, that is $D_1 = \chi(N)$. Does it mean that Keynes made a mistake? I do not think so. My interpretation is that the two first sections of Chapter 3 have different goals

In Section I, Keynes focuses on firms' production behaviour. Consistently with his adherence to the first classical postulate ('the wage is equal to the marginal product of labour', Keynes, 1936, p. 5), he explains that he will not depart from competitiveness and profit-maximisation hypotheses even when the analysis refers to the whole economy.
In Section II, he summarises the main properties of the macroeconomic theory which is further developed, in Books III and IV.

Indeed, Keynes gives the impression that issues of competitiveness and profit-maximisation are definitely solved at the end of Section I. That allows him to adopt another point of view in Section II which begins as follow: 'A brief summary of the theory of employment to be worked out in the course of the following chapters...' (Keynes, 1936, p. 27). Above all, that allows him to put p' (resulting from Section I) in the consumption function which therefore only depends on employment level: $D_1 = c.p'.Q(N) = \chi(N)$.

7. Conclusion

My present position may be summarized as follows :

(1)   I am still convinced that *The General Theory* faces a closure difficulty between the

        macroeconomic outcomes and the microeconomic behaviour of firms. In short,

individual firms' behaviour could not directly depend on consumption and investment expenditures because they do not initially have any reality at their level, hence the necessity to make a distinction between the global expenditure and the aggregate demand functions.

(2)   Did Keynes have the same concern? Nobody knows. But two points must be emphasised in the event of a negative answer:

    a. A function such as $D = D_1 + D_2$ cannot be built as an aggregate from the entrepreneurs' point of view.

    b. Owing to a problem of price determination, D_1 cannot be determined independently from Z. One can perhaps skip 'my' interpretation of D, but only if the link between D_1 and Z is made explicit.

(3)   I still think that employment is always at equilibrium, provided that equilibrium refers to the intersection between Z and D.

(4)   However, resulting from a closure necessity, expectations may be unfulfilled (at the end of the day as well as later). The topics of temporary equilibrium and convergence toward fulfilled expectations then remain relevant.

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Effective Demand: Securing the Foundations

JOCHEN HARTWIG[*]

KOF Swiss Economic Institute at ETH Zurich

ABSTRACT *This paper is one of three contributions to a symposium commenting on papers previously published by the other authors. I basically agree with Allain's (2009) reconstruction of Keynes's model of effective demand from chapter 3 of* The General Theory, *except that I think that entrepreneurs take the overall economic situation into account when forming expectations as to how much demand will be forthcoming to them. I also agree with Hayes (2007a) on the most important – and most controversial – issues surrounding the principle of effective demand. Some disagreement remains on the merits of the 'Swedish' method of comparing ex ante expectations with ex post results and on the 'nature' of the equilibrium represented by the point of effective demand: for Hayes, it is a market equilibrium while I regard it to be an expectational equilibrium in the minds of entrepreneurs.*

In Christopher Nolan's 2008 film 'The Dark Knight' a lot of fake 'Batmen' are trying to emulate the real one. The 'Joker', who is searching after his enemy, issues playing cards challenging 'the real Batman to stand up'.

I must have still been under the impression of that film when I first read Olivier Allain's article 'Effective demand and short-term adjustments in the General Theory' (Allain, 2009) which came out in January 2009 in the *Review of Political Economy* together with an article by Alfonso Palacio-Vera titled 'Capital accumulation, technical progress and labour supply growth: Keynes's approach to aggregate supply and demand analysis revisited'. These two adjacent articles struck me by their dissimilarity. Allegedly applying the same modeling framework – Keynes's aggregate demand/aggregate supply (D/Z) model from chapter 3 of

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[*] *Correspondence Address*: KOF Swiss Economic Institute at ETH Zurich, Weinbergstrasse 35, 8092 Zurich Switzerland. E-mail: hartwig@kof.ethz.ch

the *General Theory* – the two papers present that model in irritatingly different ways. I reckoned that someone not well-acquainted with the D/Z model who reads the two papers in a row would be puzzled to an extent that would induce him to reject that model outright. So I decided to submit a comment on the two papers to the *Review of Political Economy* which, paying tribute to the 'Joker', I called 'D and Z in ROPE – Will the real Keynes please stand up?'. In that paper – a revised version of which has in the meantime been published as Hartwig (2011) – I set myself the task to demonstrate in which aspects the two articles contradict each other and then to offer an evaluation of which of the two interpretations is more in line with Keynes's own suggestions. To start with the result: I basically agree with Allain. Here I will underline the aspects on which we agree plus my remaining squabbles with his interpretation. I will remain silent on my disagreement with Palacio-Vera.

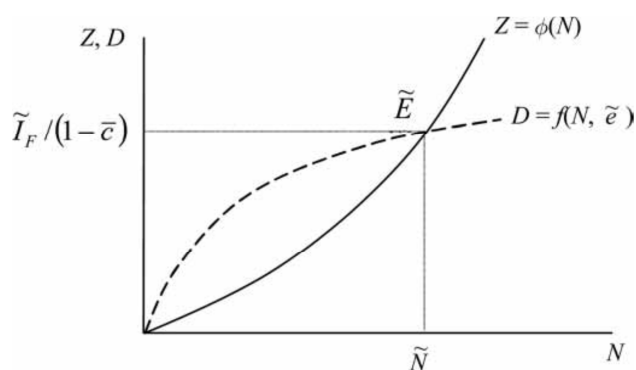Allain (2009, p. 9) draws the D/Z diagram like this:

Figure 1. Aggregate supply and demand functions

I agree with him on the following points:

(1) The aggregate supply function Z is a convex function of aggregate employment.

(2) The aggregate demand function D is a concave function of aggregate employment plus an expectation parameter $\tilde{e}$. Importantly, D shows aggregate demand as expected by the entrepreneurs for different levels of employment, not the demand contemplated by the buyers.

(3) The concavity of D is derived from the decrease of marginal returns, in other words, from the concavity of the aggregate production function.

(4) The aggregate functions build on thought experiments of individual entrepreneurs, i.e. on d_i and z_i functions.

(5) Price and quantity components can be distinguished in d_i and z_i (and also in their macroeconomic counterparts D and Z). The price component in z_i is the Marshallian 'supply price' resulting from profit maximization, in other words, it is equal to the wage rate divided by the marginal product of labour.

(6) Which price – from the multitude of conceivable profit-maximizing prices – an entrepreneur actually expects is determined by the d_i function. $\tilde{p}_i^e$ (which I call the 'demand price', the price that an entrepreneur expects the market to accept for his or her product) is the price component implicit in the d_i function. In other words, there is a different $\tilde{d}_i$ function for each $\tilde{p}_i^e$. Through intersecting with z_i, $\tilde{d}_i$ picks, so to speak, the 'right' n_i on the z_i function.

(7) Effective demand $\tilde{E}$ is the point of intersection of D and Z. It gives the expected proceeds (on D) that are profit-maximizing (because they are also on Z). Therefore, the corresponding output will be supplied; and employment will thus be determined.

I disagree with Allain's account of the D/Z model and principle of effective demand in three (relatively minor) points:

(1) In his Figure 1 (not reproduced here), Allain draws d_i functions as concave, just like their macroeconomic counterpart (D) in Figure 1 above. But the question is why. The intuition that a constant demand price level multiplied by a production quantity that is subject to diminishing returns will yield a concave function is correct for the macro level. But let us not forget that for the individual firm, the d_i function is supposed to show how much demand in money terms the entrepreneur can expect. The horizontal axis of the diagram is labeled n_i, which is the employment in his or her firm. So does the demand an entrepreneur can expect for his or her output really depend on the number of people he or she employs – as a concave d_i function would imply? Probably not outside very large enterprises – Henry Ford is sometimes reported to have hired workers because their income would allow them to buy Ford cars. Therefore, Parrinello (1980, pp. 68-70) and Wells (1987, p. 512) draw the firm's D function (d_i) as a horizontal line. If it cannot be established that the firm's D function (d_i) is concave, it follows that Allain (2009, p. 9) is too rash to assert that the firms' functions can simply be summed to yield a concave macroeconomic D function. Also, he may be too rash to assert that "it is absolutely useless to assume that entrepreneurs form expectations about the global expenditure of the economy; the assumption that they concentrate on their own affairs is amply sufficient" (Allain, 2009, p. 21). I think that this is not correct. In chapter 20 of the *General Theory* (p. 280), Keynes explicitly recognizes that the employment individual firms will give is a function of *total* effective demand. This is only natural. When an entrepreneur forms an expectation about how much demand will be forthcoming to his or her firm, he or she will have to consider whether times are good or bad for the overall economy. Therefore, the employment decision of individual firms will depend on total effective demand (which is an expected magnitude). In several contributions (Hartwig, 2000, 2004a, 2004b, 2006, 2007) I have tried to establish that when entrepreneurs relate

employment in their own firms to expected overall employment, concave d_i functions will emerge. These could then indeed be summed to yield a concave macroeconomic D function.

(2) Recognizing that entrepreneurs do not 'concentrate on their own affairs' but are concerned with the state of the macro-economy also solves another problem of Allain's reconstruction of the D/Z model, which is the missing intercept of D. In chapter 3 of the *General Theory*, Keynes distinguishes between two components of D which he calls D_1 and D_2. D_1 designates expected consumption demand and is, according to Keynes (*General Theory*, pp. 28-29) a function of employment $\chi(N)$. Although he does not say it directly, from what he writes on p. 30 of the *General Theory* it is clear that Keynes regarded expected investment demand (D_2) *not* to be a function of employment (see also Chick, 1983, p. 67). This means that if we draw D_2 in the Z/D, N space, it should be a horizontal line – with the concave D_1 function set on top of it.

(3) The definition of the term 'effective demand' adopted by Allain is not in line with Keynes's own definition. Keynes calls the point of intersection of D and Z '*the effective demand*'. Since Z is a notional and D an expectational function, effective demand is so to speak an expectational equilibrium. The D/Z model is designed to explain how, under conditions of uncertainty, entrepreneurs arrive at their decision how much to produce and how many workers to employ. It is a model of supply, rather than demand. Therefore, Victoria Chick (1983, p. 65) was right to point out that "(e)ffective demand is an unfortunate term, for it really refers to the output that will be *supplied*; in general there is no assurance that it will also be demanded". Allain, however, uses the term more in the sense of 'actual demand', as is evidenced by the aim he sets himself for his paper, namely to "verify that *The General Theory* provides a coherent framework to analyse the short-term dynamics … which lead entrepreneurs to produce the level of output consistent with

effective demand" (Allain, 2009, p. 4). In Keynes's sense of the term, 'effective demand' is *always* consistent with the level of output.

Mark Hayes and I have been corresponding for some time now on Keynes's theory – also on the paper I was invited to review for this symposium: 'The point of effective demand' (Hayes, 2007a). When Mark kindly sent me an early draft of this paper in 2005, I replied: "I do not find much fault with what you write". I still hold that view today.

Hayes's paper has a different focus than Allain's and mine. While Allain and I spill a lot of ink on establishing the shapes of the D and Z functions and explicitly take issue with the (Weintraub-Davidson) interpretation of D as signifying actual demand, Hayes takes these things more or less for granted. Instead, he focuses on two things: (i) the 'nature' of the point of effective demand (irrespective of the form of the functions) and (ii) the identification of various 'periods' in the *General Theory*. These differences in focal points might obscure the fact that all three of us seem to agree on the most important – and most controversial – issues surrounding the principle of effective demand (PED), namely that it has nothing to do with actual demand; that it is not about quantity reactions of real output and the multiplier process; and that the PED is, so to speak, a model of the boardroom economy: a model of how entrepreneurs take output and employment decisions which they believe to be profit-maximising in a world governed by uncertainty. If this symposium drives this home then it can indeed be called a success.

More specifically, I agree with Hayes on the following points:

(1) The PED "relates exclusively to 'supply'" (Hayes, 2007a, fn. 14).

(2) The PED does not depend on the fulfilment of expectations (Hayes, 2007a, p. 65).

(3) The only role of 'true' or actual demand in the PED is to induce revisions of short-term expectations on the part of the entrepreneurs (Hayes, 2007a, p. 68).

(4) D$_2$ is independent of N (Hayes, 2007a, p. 73).

(5) The conventional multiplier process should be deemphasized. The multiplier is rather a relationship between consumption and investment output (Hayes, 2007a, p. 70; see also Hartwig, 2004a).

My main dissatisfaction with Hayes's paper – or actually I should say some of his papers – is that they focus on issues from the *General Theory* which in my view are of minor importance and then tend to blow them out of proportion. In Hayes (2007a), the issue is periods.[7] Hayes draws attention to two passages from the *General Theory*. On p. 47, fn. 1, Keynes defines the 'day' as the "minimum effective unit of economic time". On p. 287, he defines the 'production period' as a number of time-units (or days). So the production period is longer than a day. Fine. Now entrepreneurs revise their employment decisions daily, according to Hayes, based on the PED, knowing that their decisions trigger production processes which will be terminated at different points in time in the future. So their demand price expectations will reflect different demand prices: one for each day on which a specific production period ends. This complicates things.[8]

I think it is welcome that Hayes has pointed this out. However, personally I am not much interested in this issue. I do not believe that entrepreneurs re-evaluate their employment decision every day. Also, contrary to what Hayes attributes to me (Hayes, 2007a, p. 59, fn. 6), I do not believe that Keynes's day and production period coincide and correspond to a Hicksian week. In fact, I am quite indifferent about how long a production period is. For me it is merely an analytical construct that is necessary to understand the PED. If the PED is a

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[7] Elsewhere it has been the heterogeneity of output and the alleged inadmissibility of measures of aggregate output in Keynes, see Hayes (2007b), the comment by Hartwig and Brady (2008) and Hayes's reply (Hayes, 2008).

[8] It complicates things only when demand price expectations are volatile. I see no compelling reason why they should be in the short run.

model of how entrepreneurs make output and employment decisions – and we all seem to agree on this – then one has to break the continuous flow of time into periods. At least one has to define a point in time at which an entrepreneur uses the model to make a decision. There seems to be disagreement between Hayes and me (and Allain) about the importance of the endpoint of the period. Hayes's position seems to be that the endpoint is relatively unimportant. The PED is about what happens at the beginning of the period; the endpoint has no influence on that. This is of course correct. Also, Hayes points out – and he has got Keynes's letter to Ohlin (Keynes, 1937) in support – that the production periods of individual firms are all of different length and overlap one another so that a common endpoint does not exist. I have advertised the idea of an endpoint of a macroeconomic production period at which ex ante expectations can be compared with realised results. Hayes calls that a 'Swedish' misinterpretation of Keynes. Fair enough. However, I believe that such a comparison is very interesting and useful to find out what happens next. Also, I plead for common sense on this issue in my paper for this symposium (Hartwig, 2007, p. 729) quoting Nell (1998, p. 205) who writes that "(e)ven under Mass Production the seasons, traditional holidays and social customs provide a framework that sets definitive marketing dates toward which manufactures aim. ... So, while under continuous production there need be no common starting and finishing points, these will often exist, nevertheless". Important real-world production periods are the quarter and the year.

The section I clearly disagree with in Hayes's paper is section 5 titled 'The Nature of the Equilibrium Represented by the Point of Effective Demand'. The background for this section is that Hayes sees a lacuna in the literature on the PED. This lacuna is the determination of what I call demand prices: the price expectations of entrepreneurs entering the D function. Hayes has a point here. In the most comprehensive treatise on the PED so far, Amadeo (1989) treats demand prices as exogenous. This is unsatisfactory.

However, the solution Hayes offers is unsatisfactory, too, in my view. He separates the entrepreneurs into producers and dealers. (In his Appendix A the dealers become households.) Prices somehow result from interactions between dealers and producers in forward markets and are therefore market prices. Hayes introduces production to order in this context, which seems odd because the first ten pages of his paper deal with expectations; and now he discards them. I see no textual basis for all this in the *General Theory*.[9]

To conclude, what is the difference between Hayes's and my view on 'The Nature of the Equilibrium Represented by the Point of Effective Demand'? For Hayes, effective demand is a market equilibrium while for me it is an equilibrium formed in the heads of the entrepreneurs: a point where the entrepreneurs' expectations and aspirations concerning different things, e.g., prices, costs, profits, demand etc. are mutually consistent (see Hartwig, 2007, pp. 734-735). Hayes challenges interpretations along these lines asking how the entrepreneurs' demand price expectations are determined (see above). I agree that this question has to be answered. I put forward an explanation for the demand price level in Hartwig (2006). To reiterate it here would go beyond the scope of this symposium.

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[9] Maybe, this reinterpretation of Keynes in an Arrow-Hahn framework is a remnant of the earliest stage of the paper, which – as Hayes told me in 2005 – started out as a mathematical comparison between Keynes's *General Theory* equilibrium and Walrasian general equilibrium.

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Effective Demand: Securing the Foundations

M. G. HAYES[*]

University of Cambridge, UK

ABSTRACT *This paper is one of three contributions to a symposium commenting on papers previously published by the other authors. Allain (2009) argues that Keynes elides a distinction between aggregate demand and global expenditure that is necessary to explain the formation of price expectations by individual entrepreneurs. Allain's conclusions depend upon redefinitions of aggregate and effective demand and the consumption function. Hartwig (2007) argues that entrepreneurs must take into account the state of the economy as a whole, in order to form price expectations independently and not as a market equilibrium determined by aggregate supply and demand. This leaves demand price expectations to be determined outside the principle of effective demand. Neither author does full justice to Keynes's own treatment. We still need to agree by what mechanism individual entrepreneurs form a collective and mutually consistent state of expectation in* The General Theory.

Keynes's *General Theory* (Keynes, 1936, hereafter *GT*) is difficult, there is no doubt about that. Even for those of us, such as my colleagues Olivier Allain and Jochen Hartwig, who have spent many hours carefully reading and pondering the text, differences of interpretation remain possible, as over 75 years of literature attest. This is not a satisfactory state of affairs, particularly as regards such a fundamental proposition as the principle of effective demand, and I believe we must continue to try and resolve these differences. Nevertheless it is all too tempting for any one of us to claim to have seen the solution and not to listen to the critics who point out the defects in their claim. My criticism will focus on the extent to which other interpretations conform, in one sense or another, with Keynes and not on their lack of conformity with Hayes.

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[*] *Correspondence Address*: Dr M. G. Hayes, Robinson College, Cambridge CB3 9AN. Email: mgh37@cam.ac.uk

The central issue is the nature of the equilibrium represented by the point of effective demand, as set out by Keynes in *GT* Chapter 3. The critical paragraphs are on p. 25:

> Let *Z* be the aggregate supply price of the output from employing *N* men, the relationship between *Z* and *N* being written $Z = \varphi(N)$, which can be called the *aggregate supply function*. Similarly, let *D* be the proceeds which entrepreneurs expect to receive from the employment of *N* men, the relationship between *D* and *N* being written $D = f(N)$, which can be called the *aggregate demand function*.

> Now if for a given value of N the expected proceeds are greater than the aggregate supply price, *i.e.* if *D* is greater than *Z*, there will be an incentive to entrepreneurs to increase employment beyond *N* and, if necessary, to raise costs by competing with one another for the factors of production, up to the value of *N* for which *Z* has become equal to *D*. Thus the volume of employment is given by the point of intersection between the aggregate demand function and the aggregate supply function; for it is at this point that the entrepreneurs' expectation of profits will be maximised. The value of *D* at the point of the aggregate demand function, where it is intersected by the aggregate supply function, will be called *the effective demand.*

Let me first try and summarise the common ground between these papers and my own (Hayes, 2007). Aggregate demand is about entrepreneurial expectations. Effective demand corresponds to a state of expectation, embodied in a set of expected prices. Entrepreneurs operate Marshallian firms under perfect competition, and are concerned with industry and factor prices and with individual convex production functions. There is no radical uncertainty in production at micro-level, so that entrepreneurs can maximise expected profits. Expectations are binding for a period called by Keynes the 'day'. There are differences between expectations and outcomes (realised results).

Now for the points of difference. Allain claims that Keynes 'assumes that entrepreneurs' short-term expectations are fulfilled' (2009, p. 3) and that the difficulties in reading *GT* Chapter 3 stem from Keynes's 'double inconsistency' in reasoning (2009, p. 4). He argues that Keynes refers to separate aggregate demand and global expenditure functions

(2009, p. 8). Finally, he finds an exception to Keynes's claim that the logical theory of the multiplier holds continuously.

Hartwig argues that the definition of Z should exclude expectation (2007, p.730). For him, aggregate demand alone, not effective demand, embodies the expected prices (2007, p.733). He is silent on the determinants of demand prices, which are semi-exogenous (2007, p.737) and insists on the Swedish method (2007, p.729).

1. The text

Somehow I doubt that I will be able to dispose of the argument simply by the analysis of a single sentence! Nevertheless I do think that Keynes's exact words do not support the interpretations put on them by Allain and Hartwig. Thus in the passage quoted above, we read

> Now if for a given value of N the <u>expected</u> proceeds are greater than the aggregate supply price …

Allain reads the passage to mean that equilibrium is reached in practice by a process of convergence of short-term expectations over time, by trial and error. If Allain's reading were correct, we would expect to find instead

> Now if for a given value of N the <u>realised</u> proceeds are greater than the aggregate supply price …

Allain argues that this passage 'leads the reader towards the question of trial-and-error procedure by which entrepreneurs discover where [the point of equilibrium] lies' (Allain, 2009, p. 4). However a close reading indicates a comparison, not between outcome and expectation, but between expectation and requirement.

The passage clearly describes a procedure for finding equilibrium. However a sequence of causation is not a sequence in time, even though as teachers we often find it

necessary to describe the process of reaching static equilibrium step by step, often using a diagram, and students readily confuse this with a dynamic process.

Thus Keynes is describing an instantaneous process of adjustment, in which somehow entrepreneurs collectively choose the amount of employment they wish to offer. Allain is too good a scholar of Keynes not to recognise this possibility (Allain, 2009, p. 20) and reads in a tacit assumption by Keynes that short-term expectations are fulfilled in order to square the circle. He recognises that Keynes does not make such an assumption explicitly but argues that Keynes is inconsistent in suggesting a trial and error procedure but then supposing it to be unnecessary to specify it (Allain, 2009, p. 4).

Hartwig notes that Keynes is referring to a difference between expectation and requirement, rather than expectation and outcome, and argues that clarity requires the removal of the two words 'expectation of' from the definition of aggregate supply price, which reads:

> … the aggregate supply price of the output of a given amount of employment is the expectation of proceeds which will just make it worth the while of the entrepreneurs to give that employment (*GT*, p. 24)

Hartwig writes 'For Keynes, the supply price is not the market price level an entrepreneur expects, but the proceeds he must have … to satisfy the profit maximising condition' (Hartwig, 2007, p.730). For Hartwig, it is the demand curve alone which embodies expectations and these are, at least to some extent, exogenous (i.e. not deducible from the level of employment).

The weakness of Hartwig's position is that by removing expectation from the supply side, we lose the possibility of explaining the expectation, i.e. expected price. As he acknowledges, expectations must come from somewhere and if they are not to come from a process of trial and error, as Allain suggests, and are to be embodied in the demand curve

alone as Hartwig argues, they must be partly exogenous. This is inconsistent with Keynes's claim to offer a general theory of employment, based on the equilibrium of supply and demand.

The alternative is that Keynes means exactly what he says and that there is no inconsistency. Yet by what mechanism can individual entrepreneurs form a collective and mutually consistent state of expectation? That is the question that has plagued all of us who have thought deeply about it and to which all our papers are addressed. In an interesting sentence, Hartwig writes of the point of effective demand that 'one might conceive of this point as an equilibrium, but it is not some kind of "market equilibrium" ' (Hartwig, 2007, p.734). The latter point is precisely where we differ.

2. Equilibrium

A significant difference between Allain and Hartwig is that Hartwig follows Chick (1983) in holding that the point of effective demand refers to the *ex ante* expectation of proceeds and not to the 'true' equilibrium that may be revealed to be different, *ex post*, if expectations are in error. Allain, by contrast, follows Kregel in holding that it is the true (or 'stationary') equilibrium that is the unique point of effective demand.

On this I support Hartwig, up to a point. The implication of Allain's analysis is that employment is generally in disequilibrium except in the unlikely event of expectations being fulfilled. In such models, the principle of effective demand does not determine employment at any time (unless we make the tacit assumption that expectations are fulfilled) but only the equilibrium position towards which employment would tend if individual expectations were stable enough to converge. By contrast, Keynes claims to offer a theory of actual employment at any time (*GT*, pp. xxxiii, 4, 245–7) based on the equilibrium of supply and demand (*GT*, pp. xxii–iii, xxxiv–v, 3, 27–30), such that 'today's employment can be correctly

described as governed by today's expectations' (*GT*, p. 50). Yet he himself refers to this as a 'theory of shifting equilibrium' (*GT*, p. 293).

Here I believe Allain (among many others) has been led astray by Kregel (1976) (Allain, 2009, p. 5n) and I have written a critique of Kregel's paper now published as Hayes (2013) . Although Kregel's construction is elegant and has undoubtedly been persuasive I do not think it has been helpful as a basis for understanding Keynes.

3. Time and the production period

Different treatments of time are at the root of much of the dispute over the interpretation of *The General Theory*. This in turn relates to the meaning of Keynes's day and period of production (which are explicitly defined, *GT*, pp. 47n, 287) and the production period (which is not defined in the *GT* itself, only in drafts), and Keynes's use of the words period, term, short and long. This is the most difficult area in which to persuade others, since it involves looking at the problem in a novel and quite unfamiliar way.

Both Hartwig and Allain share a commitment to the Swedish method of *ex ante* and *ex post*, despite Keynes's repudiation of this approach, which Hartwig acknowledges. It is curious that Hartwig then writes that 'this [Swedish] approach is nevertheless essential for the principle of effective demand …' (Hartwig, 2007, p.735). Although Allain mentions only Kregel and not Hicks and the Swedes, their method is the basis of his entire paper.

It is common ground between us that expectations are binding for a period called by Keynes the 'day' (Allain, 2009, p. 2; Hartwig, 2007, p.729), meaning 'the shortest interval after which the firm is free to revise its decision as to how much employment to offer. It is, so to speak, the minimum effective unit of economic time'. I call it Keynes's quantum unit of time.

Allain links Keynes's day to his own definition of an 'elementary period … defined by the succession of three operations: hiring precedes production which precedes the sale of output on the market' (Allain, 2009, p. 2). Temporary equilibrium is struck in the market (either by price or quantity adjustment) at the end of each elementary period and if expectations have not been fulfilled, hiring and production are adjusted for the next period. 'Several periods are necessary to converge towards a stationary equilibrium' (Allain, 2009, p. 5). In similar fashion, Hartwig follows Chick in linking Keynes's day to the production period, of which the essence is that 'it is characterized by the length of time that an entrepreneur is bound by his employment decisions taken at the beginning of that period' and 'plans made at the outset of the period are compared with results realized at the end' (Hartwig, 2007, p.729). Both Allain and Hartwig here adopt, whether consciously or otherwise, the 'week' of Hicks (1939).

Hartwig acknowledges that Keynes attempted (in 1931–32) to create a 'contraption of formulas of process of all sorts of lengths depending on technical factors with income emerging at a given date corresponding to input at an earlier date' (Keynes, 1971–89, hereafter *CW*, Vol. XIV, p. 215), in order to permit a comparison between input and output (expectation and outcome)—and discarded it. Nevertheless Hartwig argues that Keynes's day is an alternative solution to the problem of dividing 'time into periods so that plans can be compared with realized results' (Hartwig, 2007, p.729).

Yet on p. 287 of *The General Theory* Keynes defines the period of production as having a length n 'if n time-units of notice of changes in the demand for it have to be given if it is to offer its maximum elasticity of employment'. Given Keynes's earlier definition of the day as the time-unit, it cannot be correct to equate the day with a period of production lasting n days. It is clear, both from the *GT* itself and the later notes and correspondence, that Keynes remains of the view that production processes 'are all of different lengths and overlap with

one another' (*CW* XIV, p. 185). Consider Chapter 5 and the detailed discussion of processes of different length in section II of Chapter 16. The equation of the day and the production period is tantamount to assuming a uniform production period for all processes.

Yet in what sense is an entrepreneur not bound by his employment decisions at the beginning of a particular process of production? In what sense can the economic distinction be made between the day and the production period? This is much of the burden of *GT* Chapter 5. Thus Keynes writes

> the original expectations [are not] relevant, which led the firm to acquire the capital equipment and the stock of intermediate products and half-finished materials with which it finds itself at the time when it has to decide the next day's output. Thus, on each and every occasion of such a decision, the decision will be made, with reference indeed to this equipment and stock, but in the light of the *current* expectations of *prospective* costs and sale-proceeds. (*GT*, p. 47)

> In the case of short-term expectations … changes in expectation are not, as a rule, sufficiently violent or rapid, when they are for the worse, to cause the abandonment of work on all the productive processes which, in the light of the revised expectation, it was a mistake to have begun; whilst, when they are for the better, some time for preparation must needs elapse before employment can reach the level at which it would have stood if the state of expectation had been revised sooner. (*GT*, p. 48)

> Let us consider, first of all, the process of transition to a long-period position due to a change in expectation, which is not confused or interrupted by any further change in expectation. We will first suppose that the change is of such a character that the new long-period employment will be greater than the old. Now, as a rule, it will only be the rate of input which will be much affected at the beginning, that is to say, the volume of work on the earlier stages of new processes of production, whilst the output of consumption-goods and the amount of employment on the later stages of processes which were started before the change will remain much the same as before. In so far as there were stocks of partly finished goods, this conclusion may be modified; though it is likely to remain true that the initial increase in employment will be modest. As, however, the days pass by, employment will gradually increase. (*GT*, p. 48–49)

> It is evident from the above that the level of employment at any time depends, in a sense, not merely on the existing state of expectation but on the states of expectation which have existed over a certain past period. Nevertheless past expectations, which have not yet worked themselves out, are embodied in the to-day's capital equipment with reference to which the

> entrepreneur has to make to-day's decisions, and only influence his decisions in so far as they
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> are so embodied. (*GT*, p. 50)

Chapter 5 has been neglected for many reasons, not least the insistence on misreading a change in expectations as disappointment in expectations. There has been a further insistence at least since Hansen (1953) on misreading the dynamics of Chapter 5 in terms of the convergence of expectations instead of the adjustment of a heterogeneous capital stock to a new state of expectation. This is despite the text and the accepted Marshallian usage of 'long-period' to refer to capital adjustment.

4. The global expenditure function

As fuel for his application of the Swedish method, Allain draws on Casarosa (1981) and others to make a distinction between the aggregate demand (*D*) and global expenditure (*E*) functions. This is motivated, quite properly, by the puzzle as to how the individual expectations of entrepreneurs can lead to a unique macroeconomic state of expectation. Here I agree with Allain *contra* Hartwig that in *GT* Chapter 3 the employing entrepreneurs are concerned with expectations only of their industry price and not of the state of the economy as a whole.

Allain constructs the *D* function with reference only to the information available to the individual entrepreneurs, which includes only the expected price and the firm's Marshallian production function. This allows him to construct a curve of demand proceeds (in *D*, *N* space) without reference to the propensity to consume. The intersection of concave *D* and convex *Z* defines the effective demand for the output of each individual firm and in aggregate. However, *contra* Keynes, this point of effective demand is not unique, since it depends upon (rather than determining) the state of short-term expectation. There are for Allain as many points of effective demand as there are individual expectations of price. Hence his motivation to find a solution for the state of expectation.

On closer inspection this *D* function (or specifically, the individual d_i functions of which it is the summation) is not what Keynes means by aggregate demand. Hartwig is correct to insist that *D* is somehow a direct function of *N*, aggregate employment. Allain's d_i functions (2009, p. 7) are identifying the transformation from price to proceeds of an individual firm (assuming zero user cost).

$$d_i^e = p_i^e(q_i/n_i).\,n_i$$

$$z_i = (w/q'_i)(q_i/n_i).\,n_i$$

In (p_i, n_i) space the expected price p^e is a horizontal line, independent of n_i. In (d_i, n_i) space, the expected price maps onto a concave curve. The reason why d_i and z_i are not the same is that the slope of d_i tracks the average product of labour while the slope of z_i tracks in addition the (inverse of the) marginal product. However the d_i curve contains no more information about demand than the expected price alone. Allain's Figure 1 identifies in the point of intersection the value of z_i consistent with the expected price. The analysis cannot explain the expected price, that is why Allain insists on the need for a global expenditure function and process of convergence through time.

Yet I agree with Allain that employers base their decision solely on the expected price. So how does the macroeconomic translate into the microeconomic? How does aggregate expenditure on consumption and investment express itself as a single expected price for each industry and firm involved? I agree with Allain that there is a closure problem, in our understanding if not in *The General Theory* itself. So we have between us identified the right question.

At this point Allain makes some dubious claims about the text. He states:

> 'When [Keynes] introduces [the notions of propensity to consume and inducement to invest] in Section II of Chapter 3, he does not write that their sum corresponds to the D function. These two notions are thus of no use in building the aggregate demand function' (Allain, 2009, p. 8–9).

'In section II of Chapter 3, Keynes elaborates another function without naming it: the global expenditure function. This one is based on the concepts of propensity to consume and inducement to invest' (Allain, 2009, p. 10).

'Keynes defines effective demand as the intersection between the aggregate supply and demand functions. This definition raises a double difficulty: on the one hand there are as many intersection points as states of expectations; on the other hand, the intersection between Z and D does not take into account the behaviour of consumers and investors' (Allain, 2009, p. 11).

On the contrary, Keynes writes (*GT*, section II, Chapter 3, pp. 28–29):

This theory can be summed up in the following propositions:

(1) In a given situation of technique, resources and costs, income (both money-income and real income) depends on the volume of employment *N*.

(2) The relationship between the community's income and what it can be expected to spend on consumption, designated by D_1, will depend on the psychological characteristic of the community, which we shall call its *propensity to consume.* That is to say, consumption will depend on the level of aggregate income and, therefore, on the level of employment *N*, except when there is some change in the propensity to consume.

(3) The amount of labour *N* which the entrepreneurs decide to employ depends on the sum (*D*) of two quantities, namely D_1, the amount which the community is expected to spend on consumption, and D_2, the amount which it is expected to devote to new investment. *D* is what we have called above the *effective demand.*

(4) Since $D_1 + D_2 = D = \varphi(N)$, where φ is the aggregate supply function, and since, as we have seen in (2) above, D_1 is a function of *N*, which we may write $\chi(N)$, depending on the propensity to consume, it follows that $\varphi(N) - \chi(N) = D_2$.

(5) Hence the volume of *employment* in equilibrium depends on (i) the aggregate supply function, φ, (ii) the propensity to consume, χ, and (iii) the volume of investment, D_2. This is the essence of the General Theory of Employment.

I do not see how these two sets of statements can be reconciled. Keynes simply does not make the distinction between *D* and *E* attributed to him. Allain cannot find a mandate within the text for his solution to the formation of the state of expectation.

What does find support in *GT* Chapter 5 (but not Chapter 3) is the idea that expectations are based on realised results, which Allain refers to as 'conservative expectations' (Allain, 2009, p. 2). Keynes writes:

> it will often be safe to omit express reference to *short-term* expectation, in view of the fact that in practice the process of revision of short-term expectation is a gradual and continuous one, carried on largely in the light of realised results; so that expected and realised results run into and overlap one another in their influence. … For, although output and employment are determined by the producer's short-term expectations and not by past results, the most recent results usually play a predominant part in determining what these expectations are. … Accordingly it is sensible for producers to base their expectations on the assumption that the most recently realised results will continue, except in so far as there are definite reasons for expecting a change. (*GT*, pp. 50–51)

The causation here runs from realised result to expectation, not the other way. Expectations conform to realised results, not realised results to expectations.

The global expenditure function (*E*) is the *ex post* aggregate demand of Old Keynesian economics, which generally avoided the problem of expectation formation by assuming fixed prices. It is based on Book III (Chapters 8–10) of *The General Theory* in which Keynes undoubtedly discusses income (an *ex post* concept, discussed at length in *GT* Chapters 6 & 7) rather than effective demand (an *ex ante* concept). The connection between *D* and *E* is made by Keynes, not through sleight of hand in *GT* Chapter 3, but through the above statements in *GT* Chapter 5 about the relationship between expected and market prices (expectations and realised results).

The global expenditure function (*E*) has no place in *GT* Chapter 3 or in the principle of effective demand. Where Allain incorrectly states that 'After section I of Chapter 3, Keynes refers to *E* because he focuses on ensuring coherence on a macroeconomic level' (Allain, 2009, p. 12), he should write something like 'After Chapter 5, and for the purposes of

Books III and IV, Keynes focuses on income and expenditure rather than effective demand and employment. Effective demand reappears in Book V.'

5. The multiplier

Allain claims (2009, p. 16) to refute Keynes's statement that 'the logical theory of the multiplier … holds good continuously, without time-lag, at all moments of time' (*GT*, p. 122). This conclusion is reached as the by-product of a model of convergence in expectations that occupies nearly half the paper and which Allain regards as clarifying a gap in *The General Theory* (Allain, 2009, p. 21).

The proposed refutation arises from examining the value of the multiplier in the case (considered by Keynes, *GT*, pp. 122–123) where consumption-goods firms do not anticipate the increase in demand for their goods as a result of an increase in employment in the capital-goods sector. Allain considers two cases where temporary equilibrium is struck either by inventory adjustment at fixed prices or by market clearing prices. I will address both cases in turn.

Inventory adjustment

If it is assumed that cash received from the sale of inventory is not expended on consumption, Allain notes that the reduction in the value of inventories equals the increase in fixed investment multiplied by the normal value of the marginal propensity to consume. So the equation reads:

$$\phi(N_A) - \phi(\tilde{N}) = \frac{\left[I_F^* - \bar{c}\left(I_F^* - \tilde{I}_F \right) - \tilde{I}_F \right]}{1 - \bar{c}} \tag{1}$$

This equation is consistent with the 'logical theory of the multiplier'. Allain then argues that in the inventory adjustment case, if the cash received from the sale of inventory is directly or indirectly expended on consumption, the inventory reduction captured by the term

$$\bar{c}\left(I_F^* - \tilde{I}_F\right) \tag{2}$$

in the above equation will be increased, thus breaking the equality. He does not put a value on the revised inventory reduction but based on his diagram (Figure 4) it will be

$$\bar{c}\left(E^* - \tilde{E}\right) \tag{3}$$

However, the apparent refutation confuses receipts (which Allain incorrectly calls 'money income') with income ('total income') (2009, p. 14–15). E^* represents the level of effective demand (total income, in Allain's terms) when the multiplier has fully 'worked itself out'. Allain is arguing that sales receipts permit consumption at the normal level consistent with E^*, so that the depletion of inventories equals the equilibrium increase in total income at the 'fully worked out' level, multiplied by the normal value of the marginal propensity to consume. This is quite possible, but it does not undermine the logical theory of the multiplier.

The refutation fails because Keynes's propensity to consume is defined as a relation between consumption and income, not between consumption and receipts. Allain defines receipts (R) as equal to sales (S). Note that receipts (R) differ from income (Y) by the value of user cost (Allain considers only inventory adjustment, I_L, since all inter-firm purchases are considered fixed investment, I_F, 2009, p. 6n) but receipts (R) can also differ from sales (S) through borrowing. While Keynes finds it possible to postulate a function linking aggregate consumption to aggregate income (i.e. the value of aggregate output) without reference to changes in inventories or borrowing or the degree of integration of industry, no such function can exist between unique values of consumption and unique values of either sales or receipts. Certainly Keynes does not suggest the latter. Furthermore while a stable functional relation between consumption and income has some behavioural plausibility, this cannot be said for a link between consumption and sales or bank balances.

Thus what Allain is capturing is the possibility of a temporary increase in the value of the marginal propensity to consume (out of *income*) which may be written as

$$c = \bar{c}\frac{\left(E^* - \tilde{E}\right)}{\left(I_F^* - \tilde{I}_F\right)}$$

This is perfectly consistent with Keynes's statement (just preceding the quotation given by Allain in a footnote, 2009, p. 16n) that 'so far as the balance is restored by a postponement of consumption there is a temporary reduction of the marginal propensity to consume, i.e. of the multiplier itself' (*GT*, p. 124)—albeit Keynes is in this quotation considering the opposite case. Indeed Keynes's presumption has greater behavioural plausibility since one would expect pressure on inventories to lead to price increases or shortages, either of which would tend to defer consumption. It is only Allain's assumption in this section of unimpeded quantity adjustment at fixed prices that leads to his particular permutation.

Whether or not receipts from sales of inventory are expended on consumption, the multiplier of the initial increase in fixed investment is unaffected and remains at unity since there is no employment response from the consumption industries in this case. Restating Allain's equation (1):

$$\phi(N_A) - \phi(\tilde{N}) = \frac{\left[I_F^* - \bar{c}\left(I_F^* - \tilde{I}_F\right) - \tilde{I}_F\right]}{1 - \bar{c}} = \frac{\left(1 - \bar{c}\right)\left(I_F^* - \tilde{I}_F\right)}{1 - \bar{c}} \tag{4}$$

so that the multiplier can be written:

$$\frac{\phi(N_A) - \phi(\tilde{N})}{I_F^* - \tilde{I}_F} = \frac{1 - \bar{c}}{1 - \bar{c}} = 1 \tag{5}$$

Price adjustment

In section 6 of his paper, Allain considers adjustment to equilibrium through price adjustment during market clearing at the end of each elementary period. There is therefore no change in inventories so by definition $I_L = 0$ and $Y = R$ (2009, p. 20n).

The text is a little confusing here since it refers to states of expectation $e_A{}'$ and $e_A{}''$ which appear to correspond to e_B and e_C in Figure 5. Nevertheless, since in this case there is no difference between R and Y, Allain finds in support of Keynes that the logical multiplier holds both in temporary and stationary equilibrium.

In summary, Allain's purported correction of Keynes and refutation of the logical theory of the multiplier depends on a redefinition of the consumption function into something that cannot be uniquely defined and lacks behavioural plausibility.

Acknowledgments

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