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How Pigou Solved a Fundamental Theoretical Problem

Kepa Ormazabal

ABSTRACT

In this paper, the author critically analysed a unique passage of Pigou's 1933 *"The Theory of Unemployment"*. Here he is faced with a fundamental theoretical problem in the definition of the national dividend or national income, which has far-reaching consequences on the comprehension of the circulation of money. Pigou is one of the few economists who have noticed this problem and discussed it in the history of economics. The problem can be stated as follows: the part of the value of output that makes up for depreciation; is or is not up for division? Does or does not it become income (that is, wages and profits) in the aggregate? The passage analysed in this paper is exceptional in the history of economics. It is so, first, because it faces the problem. Secondly, but no less important, because Pigou, despite his hesitations, holds the nowadays minoritarian position that the value of the part of the output that makes up for depreciation does not become income for any economic factor. This view implies that this part of the output is not up for division and, therefore, is not a part of aggregate income.

Keywords: national income; GDP; capital depreciation; Pigou; national dividend; unemployment

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ОРИГИНАЛЬНАЯ СТАТЬЯ

Как Пигу решил фундаментальную теоретическую задачу

Кепа Ормазабал

АННОТАЦИЯ

Статья посвящена критическому анализу уникального отрывка из «Теории безработицы» Артура Пигу, изданного в 1933 г. Здесь Пигу сталкивается с фундаментальной теоретической проблемой определения национального дивиденда, или национального дохода, которая имеет далеко идущие последствия для понимания денежного обращения. Пигу — один из немногих экономистов, которые заметили эту проблему и обсудили ее в истории экономики. Методом текстуального сравнительного анализа автор проанализировал следующие проблемы: чем является часть стоимости выпуска, которая компенсирует амортизацию? подлежит она распределению? становится ли это доходом (т. е. заработной платой и прибылью) в агрегированном виде? Автор указал, что анализируемый отрывок является исключительным в истории экономики. Во-первых, потому что Пигу обнаружил эти проблемы, а во-вторых, потому что Пигу, несмотря на свои колебания, занимает в итоге сегодняшнюю миноритарную позицию. Автор сделал вывод, что согласно Пигу стоимость той части выпуска, которая компенсирует амортизацию, не становится доходом ни для одного фактора экономики. Следовательно, эта часть выпуска не подлежит распределению и не является частью совокупного дохода.

Ключевые слова: национальный доход; ВВП; амортизация капитала; Пигу; национальный дивиденд; безработица

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Introduction

This paper intends to critically analyse a unique passage of Pigou's 1933 "*The Theory of Unemployment*" where Pigou runs into a fundamental theoretical problem in defining the "national dividend" or national income. Pigou is one of the few economists who have discussed this problem in depth in the History of Economics after the Physiocrats inaugurated modern National Accounting. The problem can be stated as follows: the part of the value of output that makes up for depreciation is or is not up for division? Does it become income (that is, wages and profits) in the aggregate or not? Is it part of the "national dividend" or not? This question is of fundamental importance because the first question that any inquiry into the distribution of wealth should answer is: what is up for distribution? What exactly is the national dividend? What exactly constitutes the income of the nation, which is what is to be distributed?

This paper does not want to survey Pigou's definitions of the national dividend or the different terms that he used to refer to it. Pigou was no outsider of the Economics profession, and there is nothing very much in his treatment of national income or of capital that might surprise a modern economist. All this notwithstanding, I have found out a passage in his 1933 "*The Theory of Unemployment*" which is exceptional and, therefore, represents a chapter in the History of Economics that deserves to be on record; a passage where Pigou raises the problem about the relationship between depreciation and income, a problem that not many economists have discussed in detail in the History of Economic Thought ever since the Physiocrats introduced the gross product-net product distinction.

Neither does this paper intend to catalogue or question the conceptions of capital that can be found in the writings of Pigou nor to discuss the meaning of the controversial expression "maintaining capital intact". To pose and discuss the issue in this paper, it is enough to know that production involves depreciation and that this depreciation must be made good out of production itself. As I said, the question is: the value of the part of the output that makes up for capital consumption is or is not up for division? Pigou poses and discusses this question in a chapter of his "*The Theory of Unemployment*" without refusing to come to grips with the problem and arriving, not without hesitations and ambiguities, at a view that is at variance with current macroeconomics.

Pigou was not the first economist to ask the basic question about what part of the output of a nation or any other economic unit is up for distribution. It is well-known fact, the first one who did it in a systematic way back in the 18th century was Dr Quesnay; indeed, the distinction gross-net was introduced by "the Economists" to tell the part of the national produce that is up for distribution as income from that which is not. Quesnay provided a clear-cut answer to the question and held that the value of the part of the output that makes up for capital consumption (which, in his theory, included wages and profits in addition to the replacement of used up intermediate goods) is not up for division. Accordingly, it does not become income for anybody in the economy. To put it in his terminology, the part of the "*produit brut*" that makes up for depreciation does not represent "*produit net*". The only part of national production that is up for division and can be consumed or saved without impairing the productive capacity of the economy is the "*produit net*": in the system of Quesnay, the rent of land (for a more detailed discussion of Quesnay's ideas, check Ormazabal, 2007). In a word: national income is not equal to GDP.

In the 19th century, Say contested "the Economists", rejected the distinction "*brut-net*" at an aggregate level and claimed that nations only have "*produit brut*", or, in other words, that there is no difference between gross domestic product (GDP) and net domestic product (NDP). The Physiocratic notion of "*produit net*" is a non-existent entity, an error of the Physiocrats that is to be purged from Economic Theory and National Accounting:

"The term net produce applies only to the individual revenue of each separate producer or adventurer in industry; but the aggregate of individual revenues, the total revenue of the community, is equal to the gross produce of its land, capital, and industry. Which entirely subverts the system of the economists of the last century, who considered nothing but the net produce of the land as forming revenue, and therefore concluded that this net produce was all that the community had to consume; instead of admitting the obvious inference, that the whole of what has been created, may also be consumed by mankind." (Say, 1821 [2001], 171)

Note that Say's complaint against "the Economists" is not that the rent of land is not revenue or that there are other revenues in addition to the rent of land, but that the whole produce of a nation resolves itself into wages, profits and rents. The whole

of gross produce becomes income in the aggregate, which implies that the Physiocratic gross-net distinction does not exist at the aggregate level: a nation's "produit brut" is equal to its "produit net". In current terminology, there is no distinction between gross domestic income (GDP) and net domestic income (NDP) because the whole of GDP becomes NDP. Say, thus, agrees with the view that prevails in standard Macroeconomics, which is also the view that prevails in Smith's *Wealth of Nations*, though it must be noted that Smith, in contrast to Say, hesitates and at times leans towards the Physiocratic view (albeit in a rather confused way; I have also discussed this in another paper, Ormazabal, 2003c).

"In every society, the price of every commodity finally resolves itself into some one or other, or all of those three parts." (Smith, 1776 [2003], 71)

So the price of commodities has three parts and no more: namely, wages, profit and rent, and all of them are incomes. But Smith goes on and writes:

"In the price of corn, for example, one part pays the rent of the landlord, another pays the wages or maintenance of the labourers and labouring cattle employed in producing it, and the third pays the profit of the farmer. These three parts seem either immediately or ultimately to make up the whole price of corn. A fourth part, it may perhaps be thought, is necessary for replacing the stock of the farmer, or for compensating the wear and tear of his labouring cattle, and other instruments of husbandry. But it must be considered that the price of any instrument of husbandry, such as a labouring horse, is itself made up of the same three parts; the rent of the land upon which he is reared, the labour of tending and rearing him, and the profits of the farmer who advances both the rent of this land, and the wages of this labour. Though the price of the corn, therefore, may pay the price as well as the maintenance of the horse, the whole price still resolves itself either immediately or ultimately into the same three parts of rent, labour, and profit." (Smith, 1776 [2003], 71–2)

Here Smith admits that the price of corn has a fourth part which does not represent any income for any factor engaged in farming. However, he ends up admitting that the whole produce of an economy ultimately resolves itself into income. He thus distances himself from Quesnay, but he sometimes senses that Quesnay is right and tries to get back in line with him. Smith senses that his initial view that the value of commodities resolves itself into incomes has a serious problem because the price of

the horse, just like that of corn, must have a fourth part to replace the used up capital. This value cannot represent any income for anybody. It, of course, implies, first, that the price of commodities, in particular as well as in the aggregate, has a fourth part which does not represent income and, secondly, that the part of the value of aggregate output that makes up for capital depreciation does not become income for anybody in the aggregate. Thus, Smith ends up tilting towards Say in the main (and with today's standard Macroeconomics), but at times, he tilts towards "The Economists"; for instance:

"It has been shown in the first book, that the price of the greater part of commodities resolves itself into three parts, of which one pays the wages of the labour, another the profits of the stock, and a third the rent of the land which had been employed in producing and bringing them to market. Since this is the case, it has been observed, with regard to every particular commodity, taken separately, it must be so with regard to all the commodities which compose the whole annual produce of the land and labour of every country, taken complexly. The whole price or exchangeable value of that annual produce must resolve itself into the same three parts, and be parcelled out among the different inhabitants of the country, either as the wages of their labour, the profits of their stock, or the rent of their land." (Smith, 1776 [2003], 363).

It is entirely in line with Say. However, shortly after, Smith writes:

"But though the whole value of the annual produce of the land and labour of every country is thus divided among and constitutes a revenue to its different inhabitants, yet as in the rent of a private estate we distinguish between the gross rent and the net rent, so may we likewise in the revenue of all the inhabitants of a great country. The gross rent of a private estate comprehends whatever is paid by the farmer; the net rent, what remains free to the landlord, after deducting the expense of management, of repairs, and all other necessary charges; or what, without hurting his estate, he can afford to place in his stock reserved for immediate consumption, or to spend upon his table, equipage, the ornaments of his house and furniture, his private enjoyments and amusements. His real wealth is in proportion, not to his gross but to his net rent." (Smith, 1776 [2003], 363–4).

Here Smith is trying to recover the gross-net distinction of Quesnay. He takes two reference points in

this text to define net income: production cost and consumption. In terms of production cost, net income is the part of the output that can be released from production maintenance (or expansion). In terms of consumption, net income is the fraction of the annual output that can be consumed without “encroaching upon capital”. As we know from Quesnay, the two definitions ultimately refer to the same thing, namely, to income or “*produit net*”. Note, by the way, that the definition of net income in terms of *consumption* is, actually a definition of income in terms of *surplus-value*, in line with Quesnay, as Smith takes it for granted that the *consumable* part of the yearly output is that which remains free after making up for aggregate production cost because it represents a surplus over production cost. According to this, net revenue/net income is the *surplus-value* of the yearly output over the value of the yearly production cost or capital depreciation. Now Smith distances himself from Say and embraces “The Economists”. However, in what follows, I will take Quesnay and Say as the reference points of my discussion, as their position is neatly defined and opposed.

Marx’ schemes of reproduction in “*Capital*” vol. 2 are of great help to discuss the issue tackled in this paper, as the schemes take into account in an explicit way the maintenance (simple reproduction) and increase (extended reproduction) of “constant capital”. Although the distinction *bruit-net* is not the explicit theme of Marx’s reproduction schemes, his treatment of capital in them implicitly provides the basis for an answer to the question discussed in this paper.

According to standard macroeconomics, aggregate income is GDP minus depreciation (and indirect taxes, but this latter element can be safely left aside for the purposes of this paper). Thus, in a first moment, depreciation is kicked out of the house of net income through the door; however, in a second moment, and this is what troubles Pigou, it comes back through the window, when it is stated that the part of the value of output that makes up for depreciation becomes income because the factors that make up for depreciation must receive their corresponding wages and profits, mustn’t they? As the part of the value of output that makes up for depreciation becomes income in the aggregate, we have to conclude that the full value of output becomes income in the aggregate and, therefore, that aggregate income, the “national dividend” in Pigou’s terms, is equal to GDP which, in the end, is equal to NDP. Thus, in standard

macroeconomics, the distinction between GDP and NDP ultimately vanishes and Say prevails over “The Economists”.

I was surprised that such a classical master as Pigou held the Physiocratic view Smith struggled to adopt. That is at odds with standard Macroeconomics and another classic such as Say. On the belief that somebody would have criticised such an outstanding economist as Pigou on such a fundamental question, I searched the literature on national accounting, but I found nothing. Since the Physiocratic view seemed to me to rest on a very solid basis, unlike the opposite one, I decided to examine in detail the exposition of Pigou to fill in the gap. The result is this paper.

Pigou defends his controversial view in one of his better-known and most important works, “*The Theory of Unemployment*” of 1933. In another book entitled “*Income*” of 1945, he holds the same view, destined to a non-professional audience. Pigou had already taken up the question in his classic book “*The Economics of Welfare*” (1932), but his treatment was not as systematic as in 1933. On these grounds, I have chosen to focus my analysis of Pigou’s conception of the National Dividend on the presentation contained in his classic of 1933.

Pigou’s discussion is similar to Smith’s in that its logical structure is unclear. However, unlike Smith, he finally ends up holding a position that can fairly be labelled as Physiocratic, even though, at times, his words suggest that he is tilting towards Say. Perhaps this is why Pigou’s controversial definition of the “national dividend” in his 1933 “*Theory of Unemployment*” has gone unnoticed, as far as I know: though his conclusion was at odds with the standard theory, sometimes he makes statements that seem to place him on Say’s side.

However it may be, the analysis of Pigou’s discussions on the concept of “national dividend” is very instructive. It provides an excellent clue to identify a problem that is basic in Macroeconomic analysis. The examination of Pigou’s texts is extremely helpful to identify the premise that is causing trouble, which is the view that every flow of money represents a flow of income. Here I want to argue that the Physiocratic gross-net distinction is better than Say’s rejection of it and that Pigou’s places himself, in the end, in line with Quesnay, because the definition of the “national dividend” that prevails in the texts that I am going to analyse implies that a part of the circulation of money does not represent any flow of income, but the cyclical flow of capital as invest-

ment and amortisation. Besides, if we started from the tacit assumption that there is no such thing as a flow or circulation of *capital*, how good would be our Macroeconomic analysis?

I would like to make some cautionary remarks to avoid misunderstanding before proceeding any further.

First, the problem as to whether the value of the part of the output that makes up for depreciation does or does not become income in the aggregate is logically independent of the obvious changes in stocks that have to take place when current sales are not equal to current output. The discussion about whether the money flows associated with the amortisation of depreciation do or do not represent income in the aggregate has nothing to do with these obvious adjustments.

Secondly, the problem as to whether the value of the part of GDP that makes up for depreciation does or does not become income in the aggregate is totally unrelated to the trivial requirement of avoiding double counting. The problem in Pigou's conception of the "national dividend" does not consist in any double counting.

Thirdly, the Fisherian conceptions of capital as stock and income as flow (see Fisher, 1906 [2007]) are fine as far as they go. Still, they provide a very limited framework for Economic analysis that is strongly prone to error. Of course, I do not purport to deny that there are stocks of capital or income flows. In contrast to Fisher, I would like to emphasise that capital, in addition, to being *stocked*, does *flow*, and that income is generated in so far as capital flows, nor in so far as capital is stocked. This flow of capital has two moments, namely, investment (advance) and amortisation (return). In this paper, I intend to determine the place of the flow of capital in micro and macroeconomic analysis. Therefore, I show that a part of the aggregate flow of *money* represents a flow of *capital*, not of *income*.

Fourthly, the problem discussed in this paper is logically independent of the Sraffian problem as to whether capital can be reduced to dated labour or to labour only at all; accordingly, it is independent of the question as to the origin of capital, be it whether or not capital can be traced back to some "original factors", Austrian style, or whether or not there was some "original accumulation", Marxian style. Indeed, and in more general terms, for the subject of this paper, the question about the nature of value is not relevant, and the problem discussed in this paper

arises no matter whether one holds a labor theory of value, a marginal utility theory of value, a "matter" theory of value Physiocratic style or any other view on this subject.

The structure of the paper is very simple. First, I analyse Pigou's relevant texts to determine the exact premises of his argument, his conclusion and the inference. The second section is devoted to conclusions.

1. A Critical Analysis of Pigou's Key Texts on the "National Dividend"

Pigou examines the notion of "national dividend" in the chapter of his 1933 book entitled "*The Relation Between Real Output, Real Income and Money Income*". He begins by defining what he calls "real output":

"The net fruit of economic services, as rendered by all the factors of production appertaining to a community, that emerge in a unit of time, I call the *real output* of that unit of time. By net fruit is meant what is left over after the depreciation of existing capital associated with the work performed on it has been made good. The real output thus defined comprises (1) the inflow of consumption goods and (2) the net new creation (which may be negative) of fixed, working and liquid capital. These two parts of real output I call respectively A and B and the total O. Thus $O=(A+B)$." (Pigou, 1933 [1999], 190)

Real output is, thus, the "net fruit" of the productive activities of the economy in a period of time, or in today's terminology, net output or net income. Thus, Pigou, with today's standard macroeconomics, is saying that net output is equal to gross output minus depreciation, so that, in principle, he is in agreement with Quesnay in drawing a real distinction between gross and net output, such that the part of the aggregate output that makes up for capital depreciation is neither consumed nor added to the capital stock of the economy because it is required to make up for capital consumption. Therefore, this part of the output is not up for division and is not part of the "national dividend". Just in case, let me make it clear that I am not going to question the proposition that net output is gross output minus depreciation. The question that I think that Pigou's definition of "national dividend" raises is totally different, namely, whether or not the value of the part of the output that makes up for depreciation becomes income in the aggregate and is, therefore, up for division. Having clarified this, let us carry on.

According to Pigou, net output has two parts: first, the output of consumption goods and, secondly, the net output of intermediate goods (in today's terminology, net investment). This means that if the output of intermediate goods were just sufficient to make up for depreciation, the "net new creation of fixed, working and liquid capital", B , would be zero and, therefore, real or net output, O , would be equal to A , that is, to the output of final goods. Pigou, accordingly, is posing the problem of what is up for division or distribution in an economy in the context of a non-stationary economy whose capital stock may change.

We have two sets of factors in the economy: first, the factors that produce final goods, and, secondly, the factors that produce the intermediate goods required to produce final and intermediate goods. The overall consumption of intermediate goods is depreciation or capital consumption.

As Pigou's text stands, the value of the part of the output that makes up for depreciation is excluded from the real or net output. It means that it is not part of the "national dividend" if the economy's capital stock is, at least, to be maintained: in a word, this part of the output is not up for division. However, and here comes the problem, the producers of the intermediate goods that make up for depreciation must receive wages and profit on exactly the same basis as those who produce final goods or new intermediate goods, which seems to imply that the output of intermediate goods that makes up for depreciation is up for division among the factors of the economy. After all, the factors that produce the goods that make depreciation good must get their corresponding wages and profits and, thereby, their corresponding share in real or net output, particularly in A , which is the output of consumable goods. Let me provide an alternative formulation of the problem.

Pigou defines net output as $A+B$, where B stands for the total output of intermediate goods minus the part of that output that makes up for depreciation. The point I want to stress is not that the Pigovian notion of net output excludes depreciation from it, but that it excludes the fresh output of intermediate goods from net income that makes up for depreciation. According to this, and in line with Quesnay, there is a real distinction between gross and net output: some part of gross output cannot be distributed as wages and profit without "encroaching upon the capital of the economy" to use Smith's expression. However, the factors that produce that part of output

that is excluded from net output receive that value in the shape of wages and profit. But then, one may conclude with Say that Quesnay was wrong and that there is no distinction between gross and net income, and that the whole of aggregate output is up for division as wages and profits.

As Pigou defined it, B is what today would be called "net investment"; " B +replacement of depreciation" would be a gross investment. Correspondingly, gross saving would be the part of output not consumed, and net saving is the part of output not consumed and not used to make up for depreciation. The question is: do the payments to the factors that produce the goods that make up for depreciation become income in the aggregate?

"A portion of the services of factors of production is devoted, neither to making consumption goods nor to adding to capital stock, but to replacing wear and tear of capital stock, in such wise as to maintain it intact. The factors, whose services are devoted to this purpose, plainly receive payment just as the other factors do. They do not, however, produce real output." (Pigou, 1933 [1999], 190)

Because they produce neither final goods nor intermediate goods in excess of depreciation requirements, however, they share in real output ("receive payment just as the other factors do") despite being said not to produce real output. To say that the factors engaged in making up for depreciation receive payment on the same footing as the rest of the factors of the economy means that the capital and labour employed in the making up for depreciation receive wages and profits on the same basis as the capital and labour employed in producing any other goods. Note, however, that the factors that make up for depreciation and the factors that produce the goods added to the economy's capital stock are the same: the factors that produce intermediate goods. Therefore, Pigou is saying that the part of the output of this sector that just makes up for depreciation is not part of real output, whereas the part of the output of this sector that exceeds depreciation is part of real output. Despite this difference, every factor receives payment.

"Hence it seems *prima facie* that those factors which do produce real output are somehow mulcted, in the interest of the others [KO: the only remaining "others" are those who make up for depreciation], of a part of what they produce. It is difficult to see how this can happen: and a paradox results. The explanation is, however, simple. The factors that are engaged

in producing real output in that act destroy part of the existing capital equipment. Their net product, therefore, is not the total flow of consumption-goods and creation of new capital, but this flow *minus* the associated destruction of existing capital. They hand over to the other factors such a part of their product as is required to pay for these factors' work in making good this destruction. What is left to them is the whole of their net product when this negative element is, as, of course, it should be, taken into account. They are thus not mulcted of any part of it." (Pigou, 1933 [1999], 190–1)

In contrast to Pigou, I do not think that his explanation of why the factors that produce real income are not cheated by the factors that make depreciation good is so "simple". How do the factors that do not produce real output share what they do not produce? I fully agree with Pigou that the factors that produce real output are not cheated: they receive the equivalent of what they give out in the shape of freshly produced production means. In other words: the factors that produce real output exchange final and intermediate goods with the factors that make up for depreciation in order to maintain or increase their capital. The problem is about the factors that do not produce real output, those that make up for depreciation. Do they hand over a part of their output to pay to themselves for that output?

Let us simply call C the industries that produce consumption goods or the factors engaged in producing consumption goods. Let us call K the industries that produce capital goods or the factors engaged in producing production goods.

Pigou says that the factors engaged in producing real output "hand over to the other factors such a part of their product as is required to pay for these factors' work in making good (depreciation)". This statement, taken at face value, means that C hands over some part of its output to K to make up for depreciation and that some part of K's output is handed over to K to make depreciation good in K itself. This collides with Pigou's definition of B. The reason is not that K industries do not exchange among them capital goods for capital goods -they certainly do. The reason is that B was defined as the part of the output of K in excess of depreciation, that is, of *total* depreciation all over the economy, which includes both C and K. If B is the surplus produce of K over total depreciation, Pigou cannot say that some part of B is required to make up for depreciation in K, because a capital good belongs to B as far as it is *not*

required to make up for depreciation. In other words: Pigou is starting the house by the roof: real output is what remains after deducting depreciation from the aggregate output, and not the other way round, as in Pigou's text: depreciation is not deducted from the real output, that is, from A+B.

The exchange of part of A for its equivalent in capital goods to make up for capital depreciation is an exchange of consumption goods for production goods and shows that not the whole value of the output of final goods, A, is up for division. C must hand over part of its output to K in order to be able to maintain or increase its capital. However, the value of the goods exchanged between C and K is not equal to the whole value of depreciation, but a part of it: there remains the depreciation of the capital goods engaged in producing capital goods, that is, the value of the goods exchanged between K and K that makes up for depreciation. This means that some part of the output of the K industries must make up for depreciation in these industries, but bear in mind that those capital goods cannot be consumed outside production.

As we saw, Pigou defined B as the net output of capital goods, and after having done so, he proceeds to deduct from B and A the value of the part of the output of K that is required to make up for depreciation. In contrast to B, A is not defined in net, but in gross terms: there is a part of A that C exchanges with K for capital goods so as to make depreciation good and, eventually, increase its capital. The problem is that the definition of B as the net output of the K industries together with the view that all factors of the economy, engaged in producing no matter what, receive wages and profits, implies that the whole output of the economy is up for division. However, this implies that depreciation expenses also become income in the aggregate, so that gross output and net output are, in the end, equal. Suppose the whole of the produce of the economy is distributed as wages and profits and, therefore, can be consumed or saved. In that case, either depreciation is zero, or it is made good by spontaneous generation.

The factors that produce real output would be cheated if they handed over some part of their output to the factors making up for depreciation in exchange for nothing. Pigou says that this is not the case, and clearly, he is right because the factors producing real output do receive something in exchange, namely, the production goods that they destroyed in producing real output. Therefore, there is no cheating in this exchange.

Pigou says that the net product of the factors engaged in producing real output is the flow of consumption goods and additions to capital *minus* the destruction of capital. This means that the destruction of capital is being deducted from the flow of consumption goods *plus* additions to capital. According to him, the output of the factors that produce real output is their output plus negative production or destruction of goods (concretely, production goods). It means that some part of either A, the output of consumption goods, or either B, the addition to the capital stock of the whole economy, must be devoted to making depreciation good. It collides with the definition of net output as gross output minus depreciation; as I said, Pigou is starting the house by the roof, but this should not prevent us from telling the dilemma he is faced with when maintaining, on the one hand, that depreciation is not up for division and, on the other hand, that the factors that make up for depreciation get wages and profits (income) on the same basis as the rests of the factors of the economy, so that depreciation is up for division. His confused definition of net output diverts his attention from this dilemma: was Quesnay right or was Say right?

It is clear that no part of the output of consumption goods can make up for depreciation because depreciation can be made good only by means of production goods: consumption goods, by definition, do not serve as means of production and cannot make depreciation good. It is true that part of the *value* of the aggregate output of consumption goods must be devoted to making up for depreciation, but this is not what Pigou has said. The point is that the productive means destroyed by the industries that produce consumption goods cannot be replaced by them simply because these industries produce goods that cannot be used as production means.

"Real income is customarily defined as everything that is produced *minus* capital depreciation. If, therefore, capital depreciation were equal to the destruction of capital by work done upon it, (...), real income would be the same thing as real output." (Pigou, 1933 [1999], 191)

And., according to what we saw above, to net output. Therefore, in principle, real income is the same as real output. If the real output is the same as net output, then it follows that real income is the same as net income. Pigou has thus told us that net income is "everything that is produced" *minus* depreciation; that is to say: gross output minus depreciation. By "destruction of capital by work done upon it", Pigou

means physical consumption of intermediate goods: "capital consumption" in current terminology. He makes this precision because, as we shall presently see, he points out that there is a second element of depreciation, which is obsolescence, as distinct from capital consumption. Let us leave aside obsolescence for the time being and let us assume that depreciation is equal to capital consumption.

Pigou has introduced a new concept, namely, that of "real income"; actually, he also introduces the concept of gross output when speaking of "everything that is produced", which is but the total output of consumption goods and capital goods of the economy. The question explicitly taken up by Pigou is the relation of the new concept of real income with the previous concept of real or net output.

If the "customary definition" of real income is accepted, then capital depreciation is not a part of real income. Therefore, GDP *minus* depreciation is equal to real or net income (we may call it NDP), in accordance with standard Macroeconomics. Thus, some part of GDP is not real or net income because depreciation is excluded from it, which means that the part of the aggregate output that makes up for depreciation is not up division and, therefore, is not part of the "national dividend". It, in turn, implies that the value of the part of the aggregate output that makes up for depreciation does become income (wages or profits) for anybody in the economy. This would imply that some part of GDP is not income at all. This is at loggerheads with standard Macroeconomics; see, for instance, the well-known textbook by Dornbusch and Fischer:

"In this section we show that *income is equal to the value of output* because the receipts from the sale of output must accrue to someone as income. The purchaser of bread is indirectly paying the farmer, the miller, the baker, and the supermarket operator for the labor and capital used in production and is also contributing to their profits." (Dornbusch and Fischer, 1981, 31)

Pigou said that income is equal to real or net output only, not to output without qualifications (aggregate output), because, as we have just seen, according to him, the part of the output that makes up for depreciation is not up for distribution as wages and profits. However, he also said that the factors that make depreciation good receive payment and thus share in real output on the same basis as the rest of the factors of the economy, a proposition that implies, in accordance with the passage by Dorn-

busch and Fischer just quoted, that the whole, of aggregate output, becomes wages and profits and is, therefore, up for division, for distribution as wages and profits. Though Dornbusch and Fischer (and standard Macroeconomics) seem to take sides with Quesnay in drawing a distinction between gross and net income, we see that, ultimately, they end up taking sides with Say and rejecting the gross-net distinction of “The Economists”: if “income is equal to the value of output”, the distinction between gross and net output vanishes. The value of the part of the output that makes up for depreciation, expelled in a first moment from income through the door, comes back into income through the window. The question is: does this happen again in Pigou’s conception of the “national dividend”?

It is clear that Pigou counts the output of capital goods that makes up for depreciation as part of gross output. The question is not whether this output is part of the gross output but whether its value becomes income, wages and profits, in the aggregate. For the time being, we have been told that it does not accrue to any factor as net income.

“The money income of the community in any unit of time I define as the sum of money received by factors of production (including, of course, entrepreneurs) in payment for services. (...) We thus have, for any unit of time, a real output –or income- O , representing the net fruit of the services rendered by factors of production that emerge in that unit of time [KO: note how here Pigou equates “income” and “net income”], and a money income I [KO: not Y , as in contemporary notation], representing the money paid over to those factors of production in that unit of time for services rendered. If it were the custom to pay for the services of factors of production on the instant that their fruit emerges, this would imply that in any unit of time I is the money income received by the factors of production in payment for the services (whenever performed) that are embodied in the real output of that unit of time. Thus, if we write O_t for the real output of any instant t , e_t for the money payment for the service of producing a unit of O_t , and I_t for the corresponding money income, we should have $I_t = e_t O_t$.” (Pigou, 1933 [1999], 191–2)

I leave aside the necessary payment from C to K for K to produce the surplus output of capital goods which constitutes B ; as I said, this is not the subject of this paper.

The money income of the economy is the sum of all the payments to all the productive factors of the

economy, that is to say, the sum of aggregate wages and aggregate profits. Thus, money income is the sum of all the incomes of the productive factors, no matter whether they are employed in C , or K . Pigou says in this text that aggregate money income is equal to *net* output; note: not to *gross* output, but to *net* output, that is, to “ O ”, which was said to be equal to “ $A+B$ ” and, thus, excluded the part of the aggregate output that makes up for depreciation. It is at variance with standard Macroeconomics, according to which aggregate money *income* is equal to *gross* output and *net* output, as the gross-net distinction is ultimately rejected, as we have seen in the text of the handbook by Dornbusch and Fischer quoted above. The question is: where does Pigou stand on this issue? Whom does he take sides with in the end, Quesnay or Say?

It is difficult to tell, but the texts clearly suggest that, on the whole, Pigou adopts the Physiocratic view that aggregate income is net income and that the part of gross income that makes up for depreciation does not become net output or aggregate income: it is not thus up for division. To the extent that he clings to his initial statement that the income of the economy is O , he is clinging to the Physiocratic gross-net distinction and is thus taking sides with “the Economists”. But then he would have to admit, with Quesnay, that part of the flow of money in the economy represents the flow of capital, not of income, and that to the extent that the capital of the economy is, at least, to be maintained, this part of the output is not up for division and is not part of the national dividend or aggregate income, in opposition to standard macroeconomics.

However, he has not qualified his thesis that all factors receive payment on the same basis by pointing out that this does not mean that whole produce can be sold to the factors of the economy. His statement that income consists in net income implies that the part of the aggregate output that makes up for depreciation cannot be paid out as wages and profits because it cannot be sold to anybody without diminishing the capital of the economy, however much the intermediation of money effects the replacement of depreciated goods and however much every factor gets paid for its services. Pigou is at variance with standard Macroeconomics in that aggregate income is not equal to gross income but to net income. The part of the gross output that makes up for depreciation does not come back through the window as income. To the extent that Pigou does not

qualify his statement that all factors receive payment on the same basis, he leaves the door open to holding that the whole produce of the economy is sold to the factors and, thereby, rejecting the gross-net distinction. This amounts to taking sides with Say as against “the Economists”, and holding that the whole produce of the economy is up for division as wages and profits.

Pigou’s statement that money income is equal to net output amounts to saying that the part of the output that makes up for depreciation is not up for division (if the capital stock of the economy is, at least, to be maintained), which in turn means that it is not distributed as wages and profits, that it is not part of the “national dividend”. Without this fundamental qualification, his previous statement that “the factors, whose services are devoted to making up for depreciation, plainly receive payment just as the other factors do” (Pigou, 1933, 190, previously quoted) is seriously misleading and, taken at face value, implies a rejection of his own definition of aggregate income as net income. If the factors that make depreciation good receive payment like the rest of the factors of the economy, why should the payments to them be excluded from aggregate income?

Pigou had the key to answering this question: the fact that part of aggregate output must be devoted to making up for depreciation implies that not the whole aggregate output is up for distribution as wages and profits. Suppose the statement that all the factors of the economy receive payment on the same basis (which, in this context, poses no problem) is not accompanied by the qualification that the whole of what the factors receive as payment is not equal to the whole value produced by them, because part of their produce must be devoted to making up for depreciation and, therefore, is available neither for consumption nor for net investment. In that case, the implication is that the whole annual produce is divided into wages and profits and can be either consumed or devoted to increasing the economy’s capital stock.

However, the texts of Pigou do not point in this direction, for, as we have seen, he defines income as net income or as gross income minus depreciation. It implies that not the whole produce of the economy is up for division and, thus, does not become wages and profits in the aggregate. If this is not explicitly pointed out, and if one adds the premise that production cost is the payments to the factors, it follows that aggregate production cost is, by definition,

equal to aggregate income: the gross-net distinction collapses, because, by definition, there cannot be any difference between gross income and aggregate production cost. The gross-net distinction implies that the income of an economy is the excess of its gross income over aggregate production cost (the element of production cost that we consider in this paper is depreciation): in Pigou’s terms, that O is a surplus over aggregate production cost (depreciation). Pigou is closer to “the Economists” than to Say.

In order to illustrate his position, we can resort to an example.

Let us consider the case of an electric power station. It consumes some of the electricity it produces itself to produce electricity. Without this electricity consumption, the production of electricity would stop or, at least, be impaired. The activity of the power station adds value, among other things, to its consumption of electricity, which has value itself. It is clear that some part of the electricity output is not up for division among the labourers and the entrepreneurs as wages and profits. If the full value of the output of electricity were up for division and became wages and profits, there would not remain any electricity for usage within the power station itself. The part of the output of electricity that is not income for any of the factors engaged in the production of electricity represents the capital invested in the production of electricity, a value that has to be amortised and re-invested as the plant undergoes wear and tear. Even if the power station purchased electricity from another power station, this flow of money would not represent a flow of income but a flow of capital.

The same can be said about a refinery, for instance. If we were to measure the value of the power station and the refinery’s output together, we have to conclude that not the whole output is up for division as wages and profits. The part of the aggregate output that is not up for division is the power station’s capital and the refinery. If the whole of the economy comprised these two industries only, their capital would represent the aggregate capital stock of the economy.

The validity of this example is not impaired if the power station purchased electricity from other stations or if the refinery proceeded in the same way. It remains true that some part of the output of electricity and oil cannot ever abandon the sphere of production without “encroaching upon capital” because it represents the capital of those industries,

a capital which must be re-produced on a continuous basis because of neither electricity nor oil fall from Heaven. This capital is the value to which the labour of the workers and the talent of the entrepreneurs add value. It is the part of the aggregate output that is net output and is up for division. If the “national dividend” were the whole output of the economy, the economy would be consuming its capital. In the next period, it would have no productive means to produce any electricity or oil. Therefore, gross income is not equal to aggregate money income because some part of gross output can never become an income for any productive factor if the capital of the economy is, at least, to be maintained.

However, in principle, a power station does not need to purchase electricity, nor does a refinery need to purchase oil because both industries produce these goods themselves. Let us, however, examine what would happen in an economy in which electricity and oil are exchanged for each other.

The price of electricity pays for the profits of capital and the wages of labour employed in producing electricity. But it must also pay for the price of the oil consumed to produce electricity. Likewise, the price of oil pays for the wages and profits in the oil industry, but it must also pay for the price of the electricity consumed to produce oil. The price of electricity must include the value of the oil consumed to produce electricity; the other part of the output of electricity can be consumed or invested by the labourers and the entrepreneurs of the economy and constitutes their income. Likewise, the oil price must pay for the electricity consumed to produce oil; the rest of the oil output represents the income of the labourers and entrepreneurs of the oil industry. Suppose we add the total value of electricity to the total value of oil. In that case, the result is that the value of electricity and oil together cannot be equal to the incomes received by the factors. Some part is the incomes of the factors, but there must be another part which is the capital of the economy. Therefore, we can conclude that in an economy in which no producer is immune to depreciation, aggregate money income cannot be equal to gross output and must be equal to net output, as Pigou stated in his initial definition of real income. It is but the basic principle of “the Economists”.

We saw that Pigou pointed out that depreciation need not be equal to capital consumption; the reason is that in addition to consumption of goods

and services, production means become obsolete and, consequently, lose value:

“Capital depreciation, though is not usually taken to include damage inflicted on capital by an act of God or the King’s enemies, is always so defined as to include loss of value consequent upon obsolescence. It follows that real income falls short of real output by whatever portion of the latter is required to offset obsolescence. (...) In modern conditions, where machinery often becomes obsolete very quickly, this difference may be substantial.” (Pigou, 1933 [1999], 191)

The problem of the amortisation of depreciation is, therefore, made worse by obsolescence. The money (or goods; in this case, there is no significant difference) required to replace obsolete equipment is deducted from real income. Thus, real income falls short of real output if the equipment that works fine but has become obsolete replaced. In other words, Pigou holds that net output is greater than net income if obsolescence is taken into account. The reason is that some of the money accruing to the factors as income must now be diverted to replacing obsolete equipment. This money no longer flows to the factors and causes thus a gap between money income and the income accruing to the factors, also called net income.

Again, there is a logical inconsistency here. That real output is larger than real output when obsolescence is taken into account means that part of what seems to be real output is not actually such because it is required to make up for that kind of depreciation called “obsolescence”. If depreciation as capital consumption is a part of gross output but not of net output, the fact that obsolescence is disconnected from the physical consumption of the productive means does not imply that obsolescence is to be deducted from the net output; it is to be deducted from the gross output to arrive at the net output, which is the “national dividend”. As a variety of depreciation, obsolescence is to be deducted from gross income for the same reasons as for physical depreciation. Pigou’s “real output” in the previous text is not actually “real output” yet, because not the whole of depreciation has been subtracted from the gross output. Once we subtract the whole of depreciation (not only capital consumption) from the gross output, we arrive at Pigou’s own real output, which, now, is equal to real income because there remain no more deductions to be made.

A productive means becomes obsolete when it is substitutable for another productive means which is

more productive. To be more productive is the same as being more profitable. Usually, the increase in productivity of the productive means is a consequence of technological improvements.

As the very word clearly suggests, depreciation implies a fall in market price; it refers to a fall in the market price of a piece of productive means not because the device does not work, but because another and new device is more profitable. Even though a piece of equipment is in perfect working order, its value will fall if another new and more profitable piece of equipment is marketed. A fall in productivity always tends to diminish the price of capital goods; however, this loss may be absolute or relative: the first is depreciation as capital consumption; the second is depreciation as obsolescence. The reason is that the price of a capital good is, by definition, the discounted present value of the flow of its future profits. If productivity falls and, thus, the amount of the stream of prospective profits diminishes, the price of that piece of equipment must fall, assuming that the discount rate remains unchanged.

When the value of a machine falls as a consequence of wear and tear, the machine is being literally consumed. There is an absolute loss of profitability because the machine does not work as properly as it did when it was new. But a machine also may lose profitability in a relative, not the absolute way. It happens when a more profitable machine comes to the market. Even though the absolute productivity of a machine may even increase in time, if a more efficient machine happened to become available in the market, the former machine would become less profitable than the latter one and, thus, less valuable, even if this deficit were partly covered by the increased absolute productivity of the old machine. Employing the old machine instead of the new one involves an opportunity cost, namely, the profit that the firm ceases to make.

Thus, it could be the case that a firm must discard a machine that is in perfect physical condition simply because its opportunity cost is higher than the price of some new machine that is more productive than the old machine. Certainly, the old machine has not been physically consumed: its productivity might have even increased in absolute terms. If it had become completely useless, then its residual value would be zero, and depreciation would be due to physical consumption, not to obsolescence. If the old machine could be put to some use or sold to somebody else, then the amount of depreciation

would be equal to the initial price of the machine over its sale price.

I want to stress this point — that obsolescence is not essentially different from physical consumption as long as the calculation of depreciation is concerned. If physical consumption makes it necessary to devote factors to make up for it, relative depreciation or obsolescence does not imply a change in the definitions of macroeconomic magnitudes. If obsolescence comes over quickly, then more resources would have to be employed in producing productive means. Still, the increased productivity of machinery capital must more than offset the increment in the number of factors devoted to building machines in relation to a situation in which there are no technological improvements. There is simply physical consumption of machinery. The output of the factors that make good obsolescence is a part of gross output, and it does not make sense to deduct it from the net output.

Pigou's texts are confusing; for instance, right after saying that in modern conditions obsolescence charges are substantial, he writes:

"For rough approximations it may, however, be safely ignored [KO: obsolescence]; and in the discussion that follows the terms real output and real income will be treated as synonyms." (Pigou, 1933 [1999], 191)

An approximation in which the substantial is ignored can be properly labelled as such? Otherwise, as we stick to the definition of "net" as what remains after having made all the corresponding deductions from the "gross", it is logically inconsistent to make a deduction from the "net".

Conclusions

Here, I have critically analysed the coherence of Pigou's conception of the "national dividend" or aggregate income. His fundamental contention is that aggregate money income is equal to *net* aggregate output, a view that rests on the principle that *gross* and *net* aggregate output are different. The analysis of Pigou's defence of Pigou's texts shows, however, that his views on the relationship between the flow of money and the flow of income are less than clear; sometimes, the flow of money is the same as the flow of income, but, when it comes to the analysis of depreciation, part of the total flow of money is not any flow of income. Pigou, in the end, leans towards the Physiocratic view that national income is the value of *net* output. However,

his texts leave the door open to the view that aggregate income is the value of *gross* output, which is the view that prevails today in standard Macroeconomics.

Pigou is troubled by the commonly accepted view that every transaction that gives rise to a money flow gives rise to an equivalent *income*. As I have tried to argue in the preceding discussion, this view ignores the fact that capital must flow to produce income. Not all money flows are a flow of income: a part of the aggregate flow of money is capital, not income. Pigou is not aware of this, but he is on the right track on this subject, and to point out this is one of the main conclusions that one may draw from this paper. The analysis of the money flows associated with depreciation shows that replacing the capital consumed in production gives rise to flows of money that do not represent any flow of income. In addition to the exchange of consumption goods for consumption goods and to the exchange of consumption goods for production goods, it is necessary to consider the exchange of production goods for production goods. The output of producing goods that makes up for the consumption of production goods is, certainly, a part of the total value produced in the economy but does not represent any income in the aggregate.

In contrast with Say, Pigou and standard Macroeconomics show a certain awareness of this fact, though standard Macroeconomics ends up rejecting the Physiocratic basic distinction and taking sides with Say against “the Economists”. Pigou leaves the door open to this change of course but, on the whole, remains closer to “the Economists” than standard Macroeconomics, which ends up against them.

The ultimate source of confusion is that the replacement of capital depreciation is typically carried out by means of money flows. From this indisputable fact, some jump to the conclusion that, as those flows of money must accrue to somebody, they must represent flows of income. This conclusion fails to consider the economy in the aggregate; when one does it, one realises that not every flow of money represents a flow of income, as capital must also flow, as investment and amortisation. To put it otherwise, the flow of money corresponding to the replacement of depreciation cannot give rise to the equivalent income in the aggregate. This flow of money cannot ultimately accrue to labor as wages or capital as profit. This paper intends to argue, by the hand of Pigou’s analysis, that we should pay more attention to the circulation of money in Macroeconomic analysis.

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ABOUT THE AUTHOR

Kepa Mirena Ormazabal Sanchez — Doctor of Philosophy, Professor (Full), Department of Economic Analysis, School of Economics and Business Administration, University of the Basque Country (Universidad del País Vasco / Euskal Herriko Unibertsitatea)
Barrio Sarriena s/n, 48940 Leioa, Bizkaia Campus, Spain
kepa.ormazabal@ehu.eus

ОБ АВТОРЕ

Кепа Ормазабал — доктор философских наук, профессор (полный курс) департамента экономического анализа, Школа экономики и делового администрирования, Университет Страны Басков, Лейоа, Испания
kepa.ormazabal@ehu.eus