

A Reassessment of Pigou's Theory of Unemployment Part I—The Nonmonetary Economy

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Abstract: This paper reexamines A.C. Pigou's Theory of Unemployment (1933), a work which is central to the history of macroeconomics but is seldom read today. Six years after the publication of *Industrial Fluctuations* (1927), Pigou produced a highly abstract analysis of unemployment, which was accessible only to a small group of mathematically trained economists. The Theory of Unemployment was divided into two major portions, containing real and monetary analyses. Keynes held up the Theory of Unemployment as an exemplar of everything that was wrong with classical economics. The Keynes-Pigou controversy has sparked a vigorous debate among historians of economic thought. Is it correct that wage reductions were Pigou's only remedy for the Great Depression? What was Pigou's position on the multiplier? Did Keynes deliberately misrepresent Pigou's theory in order to promote the General Theory as a revolutionary break with the past? To clarify these issues, we undertake a careful, non-ideological reading of the Theory of Unemployment. We begin with the nonmonetary portion of the book, leaving the monetary portion, which appears to have been ignored by Keynes, for future work.

The main contribution of this paper is an in depth analysis of selected issues from the nonmonetary portion of Theory of Unemployment. These are the inverse-L labor supply function, the Wage Goods Fund model, Pigou's position on the multiplier, and Pigou's apparent advocacy of "supply-side" policies. Our central findings are as follows: a. Pigou's inverse-L labor supply is a special case of the labor supply function in the textbook IS-LM model; b. Pigou repudiated Kahn's formulation of the multiplier, but did not reject the multiplier concept completely. c. Pigou's Wage Goods Fund model led to the anti-Keynesian conclusion that private investment could not raise employment. Also, Pigou's concept of government stimulus excluded the possibility of deficit financing. Nevertheless, the differences between Keynes/Kahn and Pigou concerning the multiplier are narrower than previously thought; d. Pigou envisioned cuts in social benefits and/or charity for the poor, combined with cuts in taxes on the wealthy, as a method of boosting employment.

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I. Introduction

This paper begins the formidable task of rereading Arthur Cecil Pigou's *Theory of Unemployment* (1933). As Mark Blaug (1991) has remarked, the *Theory of Unemployment* (henceforth TU) is "highly abstract and profoundly obscure." Michel De Vroey (2008) has similarly described TU as "frustrating...laborious... excruciating."¹ Indeed, TU is marred by typographical errors, lack of clarity in definitions, and unstated assumptions. It alternates between two distinct styles of exposition: the mathematical style and the Marshallian literary style. Like any other cryptic text, TU needs to be read many times to be understood. With repeated readings, the reader achieves greater understanding and is able to discard erroneous interpretations that were arrived at in the course of earlier readings. Even after repeated readings, however, a definitive reading is elusive, so interpretive controversies will always remain.

Previous readings and reconstructions of TU have emphasized in-depth analysis of specific passages (e.g. Aslanbeigui 1992, Cottrell 1994a, 1994b, Brady 1994, Aslanbeigui 1998, Klausinger 1998, 2002, Ambrosi 2003, 2009). We have chosen to take a different approach, by rereading the entire work from beginning to end. Our methodology is one of textual analysis; we do not attempt to reconstruct the mathematical analysis (in places where it is hidden), or to we do not attempt to check the mathematical expressions for typographical errors.²

¹ Allin Cottrell (1994) has remarked, "...a thorough guide to Pigou's *Theory of Unemployment* (1933) would of necessity be, like that book itself, immensely convoluted and tedious." Surprisingly, Roy Harrod (1934) lauded Pigou for the clarity of his writing: "Professor Pigou shows here, as always, a superb command of clear expression. Terms are not used without definition and the definitions are pellucid and precise. Indeed his conscientious care to be unambiguous should be taken as a model at this time when intrinsically obscure economic writing abounds."

² Although the obvious typographical errors were corrected in the 1930's, there may be a few errors that remain unnoticed.

The basic structure of TU is as follows: The real (nonmonetary) portion comprises Parts I, II, and III (ending on p. 182). Part IV (pp. 185-243) contains the monetary analysis and Part V (pp. 247-313) integrates the real and monetary aspects.³ According to Pigou, the real portion is most relevant in normal times, while the monetary portion is most relevant in times of depression. This paper covers only the real portion of the book, leaving the monetary portion for future research.

In the preface to TU, Pigou states that the goal of TU is “to clarify thought, not to advocate a policy.” For Pigou, the most important task of economists is to develop economic theory, rather than work on matters of policy. Therefore, Pigou sees no problem with writing a purely theoretical work in the midst of the Great Depression: “I offer no apology, therefore, for publishing, in a period when the tragedy of unemployment is of unexampled magnitude, a book on that subject strictly academic in tone and content.”⁴ We shall see that despite his declarations in the preface, Pigou does use his theoretical results to assess the desirability of different policies. Pigou also states in the preface that TU is “in some degree” complementary to his earlier work *Industrial Fluctuations* (1927, 1929⁵). Actually, TU is complementary to *Industrial Fluctuations* (henceforth IF) in some places and contradictory to it in other places.

³ An examination of Part V shows a predominance of real (nonmonetary) analysis. Thus, contrary to what Pigou states in the preface (1933, vii), Part V appears to be a continuation of the real portion (parts I-III).

⁴ In their post-publication reviews, Bowers (1934) and JHR (1934; the reviewer is identified only by his/her initials) praised Pigou for doing real economics and avoiding political advocacy.

⁵ In this paper, we cite both editions of IF. In future revisions of the paper, we will choose an edition and standardize our references around that edition.

Pigou credits Dennis Robertson for reading and critiquing the entire work, and Piero Sraffa for reading and critiquing Parts I and II.⁶ The extent of their contributions to TU is unknown; we are unaware of archival evidence that would shed light on this question.⁷

The title Theory of Unemployment is somewhat of a misnomer. TU is almost exclusively devoted to the theory of labor demand; supply considerations merit only a brief discussion.⁸ In fact, Pigou's assumptions regarding labor supply remained a mystery until May 1937, when Pigou, in a letter to Keynes, drew a labor supply function in the shape of an inverse-L (Keynes 1973, 54, reproduced in Aslanbeigui 1992).⁹ This new and unusual specification is only one of many peculiar aspects of TU.

The real portion of TU assumes an industrialized barter economy. This assumption is obviously unrealistic and ahistorical; such an economy never existed and never will exist. We do not mean to question the value of theoretical inquiries into the workings of a barter economy. Indeed, such inquiries are useful for understanding many aspects of monetary economies. But as we shall see, Pigou did not hesitate to draw policy conclusions from the real portion of TU; he often did so without discussing the generalizability of his results to a monetary economy.

⁶ According to Marcuzzo et al (2008), "...[Sraffa] was regarded a most competent critic, and most probably any piece of economic theory produced in Cambridge was submitted to him for detailed criticism. Cambridge highly valued such work, and also appreciated informal contributions emerging from casual meetings and conversations."

⁷ Donald Moggridge, who is working on the papers of Dennis Robertson, reports that these papers contain no new material on the controversy between Keynes and Pigou (Donald Moggridge, personal communication).

⁸ A possible reason for this choice may be found in Pigou's earlier work. In *Industrial Fluctuations*, (1927, 1929), Pigou asserted that labor supply is acyclical, while labor demand is strongly procyclical (Pigou 1929, 20). It follows that a work on cyclical unemployment may safely ignore considerations of labor supply.

⁹ Pigou's letter of May 1937 was a response to an inquiry from Keynes. Keynes had asked Pigou for clarification, in the context of a correspondence between Keynes and Hawtrey regarding TU.

The rest of this paper is structured as follows: Section II discusses Pigou's shift to a mathematical style of exposition, and Section III explains at length why TU is so difficult to read. Sections IV-VII are the core of the paper, consisting of an in-depth analysis of selected elements of TU: the inverse-L labor supply function, the Wage Goods Fund Model (including its open economy aspects), Pigou's complex position on the multiplier, and Pigou's apparent advocacy of "supply-side" policies. Section VIII concludes.

II. Pigou's (Incomplete) Shift from Literary to Mathematical Exposition

TU is a transitional work, in the sense that it marks Pigou's transition from a literary mode of expression to a mathematical mode of expression. This transition did not begin with TU, but it was in the preface to TU that Pigou first announced it to his fellow economists.¹⁰

Pigou had inherited Marshall's method of exposition, in which analytical results that were derived from a mathematical model were explained in a literary manner, while the mathematics stayed hidden in the background. According to Pigou (1933, 1941), Marshall hid the mathematics so that his work would be accessible to nonspecialists. While Pigou did not deny the value of producing broadly accessible works, he believed that by hiding the mathematics, Marshall had sacrificed too much in terms of clarity (Pigou 1933, vi):

¹⁰ An examination of IF and Pigou's *Economic Journal* articles from 1927-1933 shows that most of his works were essentially literary (but not completely without mathematics). However, Pigou did publish two heavily mathematical articles: "An Analysis of Supply" (Pigou 1928) and "The Effect of Reparations on the Ratio of International Interchange" (Pigou 1932). Pigou's inclination towards a mathematical exposition may have been due to the influence of Frank Ramsey, the precocious Cambridge mathematician who died tragically at the age of 26. Pigou and Ramsey collaborated closely during the late 1920's (Duarte 2009). Pigou's article, "Wage Policy and Unemployment" (Pigou 1927) contains a proof by Ramsey, which does not appear in TU.

Marshall, for example, a great part of whose work was built up around a mathematical skeleton, was at extreme pains to keep the skeleton concealed. By doing so, he made his *Principles of Economics*, not only a great work of science, but also a great instrument of general education. None the less, I venture a doubt how far those many readers of Marshall, who leave the skeleton unwrapped—who perhaps are even unaware of its existence—really grasp his thought. Would they not have been better off had mathematical ideas been presented to them in mathematical form: and had they been advised to acquire a mastery of these few and simple tools? However that may be, I have in this book deliberately discarded cotton-wool and said what I had to say in a direct manner.

Redvers Opie (1935) summed up Pigou's approach as follows: "The great weight of Professor Pigou has been thrown on the side of making all serious economists into minor mathematicians."

In a 1941 article in the *Economic Journal*, Pigou elaborates further on the need for explicit presentation of mathematical analysis. Pigou laments the aversion of "persons of good general education" to mathematics. At the same time, he freely admits the disadvantages of mathematical modeling:

"Any mathematical treatment we can reasonably attempt must, necessarily, deal only with highly simplified artificial models. [Marshall's] fear was that we may develop such an affection for these models as to forget that they are only models, and bad ones at that; that we may be led to neglect important aspects of reality which cannot be worked into them; and so may get our

whole picture of actual economic life distorted and wrongly proportioned.

This is a real danger. To spend our lives playing with mathematical toys is not the proper business of economists.”

However, argues Pigou, models are indispensable to economic analysis, because analysis of the real world involves too many variables, and because economists, in analyzing the real world, are bound to make implicit assumptions, “of whose existence we are only half conscious.” The conclusions that the analyst draws about the real world will necessarily be dependent on those implicit assumptions, and are therefore applicable only to specific cases. The analyst fails to realize this, and mistakenly assumes that his conclusions have general applicability. In model-based analysis, this problem is avoided, since all assumptions must be stated explicitly.¹¹

The advantages of models notwithstanding, economists must remember that they are “a second-rate affair, prolegomena to economics, not economics itself, the ballistics of an imaginary vacuum, not real ballistics.”

According to Pigou, Marshall’s approach is useful when writing textbooks for nonspecialists, but is inappropriate for works targeted to professional economists:

To wrap up arguments which are essentially mathematical in such a way as to conceal their true character is extremely cumbersome, greatly swelling up the size of books. Moreover, expert readers are put to unnecessary trouble in unwrapping the arguments; for it is often impossible to test their validity or even fully to understand them until they have been reduced again to symbolic form. Conversation is fostered and knowledge advanced if Hindus

¹¹ As we shall see, Pigou failed to uphold this principle in TU.

are allowed to talk to one another in Hindustani, instead of being obliged, in the interest of listening Englishmen-who, after all, need not listen-to translate their thoughts into another language. Ought not some economists sometimes to have the privilege of these Hindus?"

There is a great deal of similarity between Pigou's sentiments (as expressed in 1941) and Samuelson's famous 1947 statement on the futility of literary economics: "...the laborious working over of essentially simple mathematical concepts such as is characteristic of much of modern economic theory is not only unrewarding from the standpoint of advancing the science, but involves as well mental gymnastics of a peculiarly depraved type" (Samuelson 1947, 6).

As we shall see, Pigou's transition from literary to mathematical exposition was incomplete. In a number of places in TU, he lapsed into the Marshallian literary mode.

III. Why is the Theory of Unemployment so Difficult to Read?

What are the characteristics that make TU so difficult to read?

Typographical Errors: TU is marred by 38 known typographical errors. The publisher (Macmillan) published a one page list of corrigenda, which was included in the subsequent printings of TU. Another 20 were found and corrected by Redvers Opie in his 1935 review. It does not appear that MacMillan had the mathematics checked by a qualified individual.¹² The existence of errors in mathematical expressions, as well as textual errors that are of analytical significance (e.g.

¹² At the time, it would have been difficult to find an economist with the necessary mathematical skills. Had Ramsey lived, Pigou would probably have asked him to critique TU. Presumably, he would have caught the mathematical errors.

“employment” instead of “unemployment”) make TU a rather frustrating book to read, and do not help to convince the reader of the value of a mathematical exposition.

Inconsistency in Expository Style: As we have already mentioned, despite his commitment to making the mathematics explicit, Pigou does not always do so in practice. In many places, he lapses into the old Marshallian mode of exposition.

Hidden Assumptions: TU contains hidden assumptions, such as the inverse-L labor supply function. As Bob Coats explained (Harcourt 1990, note 14), “...the device of concealing assumptions was not peculiarly British but more the characteristic of literary economists, wherever they may have come from...in Marshallian economics . . . the assumptions were hidden not so much for the sake of concealment, but because everybody ‘who mattered’ knew what they were anyway. They were . . . taken for granted. . . .Also businessmen . . . did not want to be given a list of assumptions.” Thus, the existence of hidden assumptions in TU was a symptom of Pigou’s failure to completely abandon the Marshallian style of exposition.

Evenness of Tone/Lack of Emphasis where Necessary: As Harrod (1934) wrote, Pigou does not provide the reader with cues that would help him/her distinguish less important points from more important points. Using Columbus’ voyage to America as a metaphor, Harrod wrote: “The surface of the text is uniform and monotonous...This monotony of surface would call for nothing but praise, if only the subject-matter were not so difficult. Unfortunately, on this particular voyage, the reader does not know beforehand what America is or whether its discovery is of any importance.” Indeed, Pigou had used italics to emphasize key sentences in IF, but he does not do so in TU.¹³

¹³ Although certain words and phrases are italicized in TU, this contributes little to making TU more comprehensible.

Reuse of Symbols: Pigou confuses the reader by reusing symbols; the same symbol is used to represent different variables in different contexts. There is no list of symbols and their meanings.

Discussions of Specific Topics are Scattered Throughout TU: Pigou often revisits topics that were discussed previously and adds further insights. For example, after devoting a chapter to State stimulation of employment (pp. 124-126), Pigou adds further insights on that topic beginning on p. 161.

Excessive Generality: In modern economics, economists derive meaningful propositions under special cases and then look to see if they hold under more general conditions. Pigou sometimes follows this practice (e.g. Pigou 1933, 141-142, 161, 168). However, there are instances in which he discusses numerous cases and possibilities, in an attempt to attain maximum generality at the outset. Thus, the reader gets lost in a maze of technical details before anything really meaningful has been derived. Ironically, when Pigou reviewed Keynes' *General Theory*, he found fault with Keynes for his overambitious attempts to attain a high level of generality (Pigou 1936).

Sudden Changes in Analytical Framework: Pigou surprises the reader by suddenly altering his analytical framework. He switches from two-sector to one-sector analysis and from fixed to variable capital in production. He sometimes introduces monetary factors in the nonmonetary section of TU.

Poorly Defined Concepts: TU is riddled with vague and unclear definitions. Pigou does not define Wage Goods and Non Wage Goods (henceforth WG and NWG) at the outset; only on pp. 145-146 does Pigou define them in passing. The

definitions of “center” (of production)¹⁴ and “short period” are vague.¹⁵ In the case of “center,” Pigou admits (in passing) the vagueness of that concept: “...in whatever way ‘center’ is interpreted” (Pigou 1933, 77). It makes no sense to harness mathematical modeling to attack economic problems in a precise manner, while at the same time failing to define basic concepts clearly.

Criticism of Anonymous Authors: As Harrod (1934) put it, “...[Pigou] wastes no time in barren controversy; it is his purpose to construct and not to destroy. He resists the temptation to use his great powers to lay other economists low. When particular views have to be refuted for the sake of his argument, his victims are almost always anonymous in these pages. If a name is invoked, it is usually to quote with approval.” Although the motivation for this practice is admirable (if Harrod is correct in his assessment),¹⁶ it is obvious that it is difficult to conduct a constructive debate when one’s opponents are anonymous.

Reuse of Borrowed Material from Previous Works: Like many prolific authors, Pigou had a tendency to borrow from himself. In TU, Pigou borrows material from his previous works, mainly Unemployment (1913), Part IV of Wealth and Welfare (1912), the article “Wage Policy and Unemployment” (Pigou 1927) and Industrial Fluctuations (1927, 1929). In the preface to TU, Pigou states that TU is

¹⁴ It is not clear whether Pigou means an industrial sector (as in Pigou 1933, 281), a geographical area in which production takes place, or one of the two sectors (WG and NWG) in Pigou’s theoretical economy.

¹⁵ The latter term has been poorly defined throughout the history of macroeconomics (Sanfilippo 2010).

¹⁶ A reader who is less sympathetic towards Pigou (e.g. Ambrosi 2004, Ch 5) might see Pigou’s practice of anonymous criticism as a device for creating plausible deniability. Pigou could attack someone without mentioning his name, and when asked why, he could deny that he ever attacked that person. We believe this interpretation to be implausible. Pigou’s anonymous attacks in *Economics in Practice* (1935, 22-24) were obviously directed at Keynes; there was no way for Pigou to deny this. (Pigou criticized Keynes for writing a “Treatise”--the *Treatise on Money*--after exhorting his fellow economists to “eschew the treatise.” Also, Pigou condemned Keynes in no uncertain terms for the rough debating tactics that he employed in his disagreement with Hayek over the Treatise.) We believe that Pigou’s intent was to reveal the identity of the target to the Cambridge inner circle, while leaving the general public in the dark.

complementary to IF in many ways, and that the two works should be read together. We shall see that this is only a partially truth; there are significant differences between IF and TU. Pigou often fails to alert the reader when he borrows material.¹⁷

Pigou's Tendency to Forget His Own Ideas: Pigou also had a tendency to forget and even repudiate his own ideas. We shall see that Pigou seemed to repudiate the multiplier in TU, after presenting a version of it in IF. To be fair, it is not at all surprising that such a prolific writer would be forgetful.

IV. The Inverse-L Labor Supply Function

We now turn to the main contribution of this paper, which is an in depth analysis of selected elements of TU. These elements are the inverse-L labor supply function, the Wage Goods Fund model (including its open economy aspects) Pigou's complex position on the multiplier, and Pigou's apparent advocacy of "supply-side" policies (in the 1980's sense of the term).¹⁸

As mentioned previously, Pigou's assumptions regarding labor supply were unclear to both Keynes and Hawtrey, until Pigou drew an inverse-L labor supply function. In the inverse-L formulation, the quantity of labor supplied is a function of the real wage. There is a certain real wage, "the wage for which workpeople stipulate," at which labor supply is horizontal / perfectly elastic. When the economy reaches the point of full employment, labor supply becomes vertical / perfectly inelastic. Although the phrase "the wage for which workpeople stipulate" appears many times in TU, it was apparently not understood by Keynes and Hawtrey. Because

¹⁷ Thus, it is left to the historian of economic thought to locate the original sources for borrowed passages. We leave this task for future research.

¹⁸ We have chosen not to revisit the two-sector model of pp. 88-108. This model was criticized harshly by Keynes in the Appendix to Ch. 19 of the General Theory, and has been analyzed extensively by previous researchers (Aslanbeigui 1992, Cottrell 1994a, 1994b, Brady 1994).

it is such a cumbersome term, we will abbreviate it and use the term “stipulated wage” for the remainder of this paper.

Can we find textual evidence for the inverse-L in TU, or was Hawtrey correct that such textual evidence was lacking (Keynes 1973, 55; cited by Cottrell 1994a and Brady 1994)? The answer is that Hawtrey was partially correct: there is evidence only for the vertical portion of the inverse-L.

In Part I, Chapter I, Pigou states that a rise in the real wage has countervailing effects on labor supply. Therefore, the elasticity of labor supply is close to zero. This implies that “...the number of would-be wage earners and the number of persons employed are in the main independent of one another, so that, if the first decreases or the second increases in a given measure, the number of persons unemployed, in the sense of my definition, will decrease in an approximately equal measure” (Pigou 1933, 6-7). Thus, there is textual evidence for the vertical portion of the inverse-L.

We have been unable to locate textual evidence in TU for the horizontal portion of the inverse-L. However, a full statement of the inverse-L can be found in IF (1929, 127):

So long as the supply of labor is perfectly elastic, a given percentage expansion in the real wages bill implies an equal percentage expansion in the quantity of work done in return for wages. After a certain degree of expansion has been attained, however, practically all the labor power available in the country will be at full work, and the supply in respect of further amounts will have practically no elasticity; so that additions to the wages bill call out no more work at the moment and, therefore, no more produce in the future.

This is obviously an example of poor writing on Pigou's part. He makes a hidden assumption, and expects his readers to reread a previous work in its entirety, in order to find a clear statement of that assumption. It is not surprising that Keynes and Hawtrey had no idea what Pigou's labor supply function was.

We now turn to a substantive discussion of the inverse-L as a model of labor supply. Cottrell (1994) accepts Keynes' contention that the inverse-L is a deficient specification of labor supply. Keynes argued that on the horizontal portion of the inverse-L, the slightest increase in the cost of living would reduce the real wage below the stipulated wage and lead to the immediate withdrawal of the entire labor force.

We offer two comments regarding this contention. First, much of TU is based on the assumption of a two-sector nonmonetary economy, with Wage Goods (WG) and Non-Wage Goods (NWG) sectors. WG are the staple goods consumed by workers. NWG consist of investment goods and luxury consumption goods. All workers are paid in WG, regardless of the sector in which they are employed. Elsewhere in TU, Pigou estimates that the share of WG employment in total UK employment is $\frac{3}{4}$ (1933, 92). Therefore, it is reasonable to interpret the inverse-L in the context of the WG sector rather than the NWG sector. In the WG sector, workers are paid in the very same goods that they produce. Hence, the situation described by Keynes cannot arise in the first place.

Our second comment concerns the role of the inverse-L in macroeconomics. For many years, macroeconomists have accepted the horizontal portion of the inverse-L whether they are explicitly aware of it or not. Today's textbook IS-LM model is basically Modigliani's mid-1950's version of IS-LM (published 1963). In

Modigliani's formulation, the labor market is characterized by real wage rigidity. The labor supply schedule (as a function of the real wage) has a perfectly elastic segment and an upward sloping segment (De Vroey 2000). Thus, Pigou's inverse-L is simply a special case of Modigliani's mid-1950's labor supply function. Although Keynes himself was not bound by Modigliani's later theories, it is important to realize that Keynes' critique of the Pigouvian labor supply function also applies to the textbook IS-LM model. Even if the inverse-L has weak theoretical foundations, one cannot fault Pigou for making use of it, given that a labor supply function with a horizontal portion is still in use today, as an element of the textbook IS-LM model.¹⁹

V. The Wage Goods Fund Model

The Wage Goods Fund model (WGF) is the first model in TU and also the only model in Part I (Ch. V, pp. 21-25). Although Pigou admits that the model lacks realism (Pigou 1933, vi), he continues to develop it in detail throughout TU. Because a full treatment of this model would require a monograph-length work, we shall limit our comments to a few central points.

The WGF model is a two sector, open economy model. The two sectors are wage goods (WG) and nonwage goods (NWG). There are two classes of individuals: workers, who are called wage earners (WE), and entrepreneurs and rentiers, who are called nonwage earners (NWE). WG are staple goods that are consumed by both WE and NWE; wages are paid in WG only. NWG are luxury consumption goods or

¹⁹ The post-Keynesian economist Victoria Chick (2006) faults Modigliani for using the inverse L. According to Chick, "[The Inverse L] was used with devastating effect to the Keynesian project in Modigliani (1944). Does no one realize that in terms of Keynes's definition, the horizontal portion of the curve is completely illegitimate?" Chick refers to Modigliani (1944), which differs from Modigliani (1963) only with respect to the argument of the labor supply function. In Modigliani (1944), the argument is the nominal wage, whereas in Modigliani (1963), the argument is the real wage.

investment goods, purchased only by NWE.²⁰ The model is based on an accounting identity; there are no supply or demand functions. Nevertheless, at later points in TU, Pigou uses it in conjunction with the marginalist labor demand condition (discounted net marginal product = real wage). The model deals with period of one week. Employment is modeled as the Wage Fund (= the flow of WG to WE) divided by the average (weekly) economywide real wage.

The variable definitions are as follows:

Table 1

Variable	Definition
E	Employment
A	labor force
U	unemployment = $A - E$
P	WG output
I_1	claims on WG abroad created by exports
I_2	claims on WG abroad due as interest on previous investments
M	claims on WG abroad that are utilized to purchase foreign NWG or securities
S	flow of WG extracted out of inventories
C	consumption of WG by NWE
G	nonwage payments accruing to WE (income from investment, old age pensions, sickness benefits, Poor Law, charity)
B	contribution of WE towards the components of G
r	unemployment benefit per unemployed man
t	contribution to unemployment benefit per employed WE
F	flow of WG to wage earners = $P + (I_1 + I_2 - M) - C + S - (G - B) + Et - (A - E)r$
w	average economywide real wage

From the condition $E = F/w$, Pigou derives the following expressions for employment and for the unemployment rate (pp. 22-23, equations i, iv):

²⁰ WG and NWG are not defined until pp. 145-146. Keynes, in the appendix to Ch. 19 of the General Theory, incorrectly identifies WG as consumption goods and NWG as investment goods; Aslanbeigui (1992) accepts Keynes' identification. Actually, Keynes' identification is consistent with Pigou's definitions in IF. Apparently, Keynes was misled by Pigou's failure to define his concepts early on, and by Pigou's failure to explain how they had changed since the publication of IF. Unlike Keynes, Hawtrey (1934) identified WG and NWG correctly. While a clean separation between consumption and investment goods makes sense to modern economists who have been trained in the Keynesian tradition, it is not what Pigou had in mind.

$$E = \frac{P + I_1 + I_2 - M - C + S - (G - B)}{w} + \frac{Et}{w} - \frac{(A - E)r}{w}$$

$$\frac{100U}{A} = 100 \left\{ \frac{w - t}{w - t - r} - \frac{P + I_1 + I_2 - M - C + S - (G - B)}{A(w - t - r)} \right\}$$

This implies the zero unemployment condition

$$w - t = \frac{P + I_1 + I_2 - M - C + S - (G - B)}{A}$$

If $w - t$ is larger than the expression on the right hand side, some unemployment must exist.

Pigou does no formal comparative statics. He states that the variables are in fact not independent but interrelated. In particular, P and I_1 are not independent, but are in fact functions of w . He is silent regarding the signs of these relationships. To do comparative statics we also need the signs of $w - t$ and $w - r - t$. On this, Pigou is silent here, but p. 152 he says that $r + t = 1/2 w$, which obviously implies $w - t > 0$, $w - r - t > 0$.

Up to now, Pigou has modeled the WG sector only. On p. 24 he suddenly switches to a two-sector literary analysis, which centers on the case of an expansion in demand for domestic NWG. He does not derive any policy conclusions in this chapter; there are so many complexities that he touches on but does not explore in depth, that policy conclusions cannot be drawn.

Let us turn to the open economy aspects of the WGF. For the modern reader, it is odd that Pigou includes both current account flows (I_1, I_2) and capital account flows (M) in the same equation. The variable M actually includes current account and capital account flows within the same variable. Pigou posits that $I_1 + I_2 - M$ is always negative if the country is a net exporter of WG, but for the UK, $I_1 + I_2 - M$ is always positive. This is not at all obvious and requires explanation.

The modeling of benefits is also peculiar to the modern reader. We have identified two problems with the modeling of benefits. First, on p. 22, the variable r is taken to represent all contributions to the unemployed, from both public and private sources. It is strange that Pigou aggregates publicly funded contributions and privately funded contributions. Under today's modeling practices, there must be a clear separation between public benefits and private benefits/charity; this allows the analyst to measure the flow of WG in either pretax or after-tax terms. But in Pigou's modeling framework, it is not possible to differentiate the pretax flow of WG from the after-tax flow of WG.

Second, the term $\frac{Et}{w} - \frac{(A-E)r}{w}$ appears in the employment equation (as reproduced above). Recall that Pigou's model covers the WG sector only. Hence, it stands to reason that WE must finance the entire unemployment fund (including its private component). This implies that $Et=(A-E)r$, so that the term $\frac{Et}{w} - \frac{(A-E)r}{w}$ cancels out. But Pigou does not cancel this term. The only logical explanation is that Pigou implicitly assumes that NWE also contribute to the unemployment fund. This implies that Pigou had in mind a two-sector model, not a one-sector model. This should not surprise us, because we have already deduced the existence of an implicit two sector model, based in the literary analysis of p. 24.

In summary, Chapter V, with its one-sector WGF model and two-sector literary analysis, is not an exemplar of clarity. It fails to convince the reader of the advantages of explicit mathematical modeling.

Pigou goes on to apply the WGF model to various changes in the economic environment? On p. 143, Pigou states that for aggregate labor demand to increase, the WF must expand. He then argues that an expansion in NWG labor demand, as a result

of higher domestic NWG demand, State stimulation or productivity improvements (under certain conditions), cannot increase the WF and therefore cannot increase aggregate employment. This is because the WG needed to pay the new workers can only be obtained by reducing employment in some other NWG industry. Thus, an increase in private investment would have no effect on employment! This may be the most anti-Keynesian argument in TU.

The argument is as follows: If NWG employment is to expand, new WG must be drawn from somewhere. Which elements of F (the flow of WG) are likely to expand? Pigou argues that C, S, and M are not likely to change in the direction of expanding F. Since Pigou writes that M may be “extremely important,” let us concentrate on that variable.

If home NWG demand rises, imports of NWG and purchases of foreign securities decline. More WG are brought from abroad in order to pay workers to produce home NWG. Since demand for foreign NWG (including securities) is elastic, the decline in quantity demanded will be large. In the UK, in normal times the volume of M is large. So changes in M can adjust to accommodate “considerable” business cycle fluctuations. But it must be remembered that business cycles are often a worldwide phenomenon, so we must study the whole world, not one country in isolation.

Pigou now introduces a new consideration—that of a NWG industry which utilizes imported raw materials. When labor demand rises, so does the demand for imported raw material. If labor demand rises then M rises, reducing the WF; the WF is “inversely responsive.” If this were the only factor, an expansion in labor demand in one industry will lead to a more than one for one fall in labor demand in another

industry, assuming that there are other sectors that do not use an equal amount of imported raw material (per worker).

This perverse result appears to be an artifact of Pigou's modeling of the open economy. Consider the definition of M. If we understand Pigou correctly, domestic NWE may purchase foreign securities and import foreign NWG, but cannot not sell securities to foreigners. In other words, Pigou assumes an open economy with international lending but no international borrowing! This is why the WF contracts in response to an expansion of NWG labor demand. If Pigou would simply allow international borrowing, the domestic country could borrow WG from abroad, so as to expand the WF. An alternative method of obtaining the necessary WG can be provided by international trade. The home country can increase its production of NWG beyond the increase in domestic NWG demand, export those NWG to a foreign country where there they are in demand, and receive foreign WG in exchange. To sum up, it is impossible to rationalize Pigou's assertion that aggregate employment stays constant or falls in the face of an increase in home NWG demand. Pigou's limited conception of the open economy causes him to reach perverse conclusions.

VI. Pigou's Complex Position on the Multiplier

In IF, Pigou developed the idea that employment creation may have multiple repercussions. Discussing (approvingly) Arthur Bowley's calculations of the required magnitude of countercyclical public expenditure to stabilize unemployment at 5%, Pigou (1927, 294, 116) wrote that "It will be noticed that Dr. Bowley takes no account of the secondary effects...the expansion of activity brought about in bad times by 'artificial' creations of demand is likely to be financed in part by the creation of new credit by the banks...In this way secondary influences are set to work that further

enlarge the aggregate real demand for labor. This is a very important matter.” There was, however, “no way of determining conclusively” the magnitude of secondary repercussions that depended on relative price changes.

If the “volume of floating capital used in purchase of labour” was below normal, this deficiency was made up of a primary part, x million bushels of wheat, and a “secondary part, the outcome of reactions set up through the monetary mechanisms, of $(10-x)$ millions. But our artificially stimulated demand will also carry with it secondary effects of the same character as those carried by the primary part of the contraction.” The size of the multiplier would depend on whether the government financed the expansion through monetary policy or through an increase in taxation. Taxation would reduce, but not eliminate, the multiplier. Pigou then worked out the algebra of the multiplier generated by “public spirited producers” expanding their output; concluding that this “cannot accomplish much towards general stabilisation unless [the] product is one for which the demand is very elastic.” Pigou neglected to expand on the relationship between x and the desired counter-cyclical target, simply saying that “unfortunately, we do not know at all how large x is.” But he concluded that “the presumption in favour of *some* creation or transfer [of demand] beyond what comes about ‘naturally’ is very strong” [emphasis in text] (Pigou 1927, 294-296, 298-299).

In 1929, two years before the publication of Richard Kahn’s famous article, Keynes credited Pigou for his original formulation of the multiplier concept (Kent 2007). But in 1930, Kahn’s multiplier analysis was omitted from the report of the Committee of Economists due to Pigou’s opposition (Howson and Winch 1977, 47-8, 59; Clarke 1988, 186). With this historical background, we now examine Pigou’s attitude towards the multiplier, as expressed in TU.

In Part II, Ch. VII, Pigou takes direct aim at Kahn's employment multiplier; Pigou seems to suddenly accept the Treasury View that he had always rejected. Pigou posits that a fall in the real wage in the WG sector leads to higher employment in both the WG and NWG sectors (1933, 73-75). What would happen if wages in the NWG sector decreased? Would employment in WG increase? Pigou gives the following example: Suppose that the number of men employed in road making or other types of capital construction is increased, without offsetting reductions in other NWG good industries. "It is often argued" that these men will consume more WG and create "large mass of further employment" in the WG sector (note that Pigou does not identify the target of his criticism²¹). In other words, new workers in WG industries spend more on WG, which leads to greater WG employment and output, which leads to more spending WG, which leads to greater WG employment and output, and so on indefinitely. If this notion is accepted, writes Pigou, the only reason we do not have an infinite increase in employment is because of leakage from imports; in a closed economy, employment would indeed increase infinitely. This argument is incorrect. With the real (not nominal) wage-rate in WG given, labor demand is determined (subject to certain qualifications) by the productivity functions and rate of interest. Activity in the NWG sector does not lower the rate of interest. What happens in NWG industry cannot benefit the WG industries in the short period, which is the focus of our analysis.²²

In nominal terms, the additional sum spent on road making goes to buy WG which would have been created anyhow, and if they had not been purchased that money would either have employed other labor, would have been consumed by NWE,

²¹ Harris (1935) identified Kahn as the target.

²² Pigou does admit that in the long run, a wage cut in NWG would have expansionary effects by making investment cheaper.

would have been exported, or would have been placed in inventory. So the employment multiplier is an illusion.

Several comments are in order. First, Kahn's employment multiplier process is precipitated by public works. In Pigou's conception, employment increases initially due to either wage reduction or "anything else" (Pigou 1933, 74).

Second, Pigou claims that according to (the unnamed) Kahn, the closed economy multiplier would be infinite, and therefore the notion of the multiplier must be rejected. David Laidler points out that Pigou's criticism of Kahn is unfair (Laidler 1999, 175). In Kahn's 1931 article, there was already the possibility of a leakage, even in the closed economy. In 1932, Jens Warming published his famous clarification, in which he invented the notion of leakage due to the marginal propensity to save. In light of these theoretical developments, Pigou should have removed the invalid criticisms of Kahn from his manuscript.

This is not the end of multiplier-related analysis in TU. In Part III, Ch IV, Pigou analyzes "State stimulation of employment in particular industries" (Pigou 1933, 124).²³ Pigou's notation is as follows: A is the initial number of employed workers, r is unemployment benefit, t is the contribution per employed worker towards unemployment benefits, s is per worker subsidy, E_d is the number brought into employment and E_k is "the number indirectly driven out of employment in other industries."

Pigou's analysis can be summed up in the following table:

²³ Based on this chapter, Kaldor (1936) praised Pigou for being the only prominent economist to give thought to wage subsidies.

Table 2

Policy Option (Listed from Least to Most Costly)	Note	Cost to the State	Sign of Cost to the State
Guarantees of interest		$-(r+t)(E_d-E_k)$	Negative
Wage/output subsidy for additional output/employment only (politically difficult to implement)	Difficult to adopt, for political reasons	$sE_d - (r+t)(E_d-E_k)$	May be negative
Wage/output subsidy for all output/employment	Easier to adopt, for political reasons	$s(A+E_d) - (r+t)(E_d-E_k)$	May be negative
Public works		$wE_d - (r+t)(E_d-E_k)$	Nonnegative if $(r+t) < w$ (According to p. 152, this condition does hold in the UK)

From the last column, it is self-evident that Pigou assumes $E_d > E_k$. In other words, Pigou's employment multiplier is always less than one. But there is a logical difficulty that we must confront: Why must E_k must be positive? Since Pigou does not discuss this issue, we suggest our own explanation, as follows: In the next chapter, Pigou writes that if the State subsidizes the production of a particular good, the output of substitutes for that good declines (Pigou 1933, 127-128). This implies a positive value for E_k . The difficulty with this explanation is that it ignores compliments. Regarding complements, Pigou writes that if the State subsidizes the production of a good, the output of compliments to that good increases (Pigou 1933, 128-129). The existence of complements implies a reduction in E_k . Thus, Pigou can only assume a positive E_k if he assumes (implicitly) that substitutes are quantitatively more significant than complements. This is an arbitrary assumption, because Pigou provides no empirical evidence (or even a guess) that would shed light on this matter.

After analyzing the four policy options, Pigou does a surprising about-face and declares that “From our present standpoint these distinctions are of secondary importance.” He posits (without proof) that for each policy option, there is an equivalent wage subsidy that would produce the same increase in employment. Without a wage subsidy, marginal product of labor equals the real wage (abstracting from raw material costs). With a wage subsidy, the marginal product of labor equals the real wage minus the subsidy. The effect is identical to the effect of reducing the stipulated wage by the same amount. In other words, the subsidy lowers the inverse-L labor supply facing the employer.

In summary, Pigou assumes that the employment multiplier is less than one in a barter economy. He provides no explanation for this assumption. He sees public works as a supply-side microeconomic intervention. Since public works and wage subsidies lower the inverse-L in the same manner, there is no reason to prefer public works.²⁴ It also follows that public works, wage subsidies and wage cuts have equivalent effects on employment.

On pp. 161-162, Pigou revisits the issue of State stimulation, and adds the following insight: State stimulation is financed by taxes; if it is financed by a tax on WG production or on production of NWG that serve as physical capital for WG production, there will be an offsetting effect. This will be stronger (and the overall stimulus effect weaker) the greater the tax. In other words, a subsidy to all employment, as opposed to the less costly subsidy to additional employment, will require a greater tax increase and thus have a weaker stimulative effect. He concludes that a subsidy to additional employment is a more potent policy than a subsidy to all, because it requires less of a tax increase. Clearly, Pigou’s concept of State

²⁴ Kaldor (1936) went further than Pigou, and argued that wage subsidies were likely to be a better policy than public works.

stimulation was limited to tax-financed State stimulation (see also p. 151); he did not envision deficit-financed State stimulation.

Pigou's rejection of the multiplier (and his aforementioned belief that private investment does not stimulate employment) are limited to a barter economy. He admits that in a monetary economy, secondary reactions would indeed occur as a result of lagged adjustment of industrialists' bank balances. In the monetary portion of TU, he reasserts the multiplier concept, arguing that secondary reactions occur due to the effects of price increases on expectations (Pigou 1933, 242-243).

It is well known that the multiplier was an important component of the dispute between Keynesians and their (real and invented) opponents. With respect to theory, empirical size and practical policy, the multiplier was never a matter of (genuine) dispute between Keynes/Kahn and Pigou. There was, however, a difference with respect to the specific process by which the multiplier worked and its precise algebraic formulation.

VII. Pigou's Apparent Advocacy of 1980's-Style "Supply-Side" Policies

In Part III, Ch. X, Pigou discusses the effects of income transfers on aggregate employment. In this context, Pigou appears to advocate cutbacks in private charity and/or government pensions, unemployment benefits and taxes. This position is difficult to reconcile with Pigou's deep concern for the welfare of the poor, as expressed in *Wealth and Welfare* and *Economics of Welfare*.

Pigou (1933, 155) makes the following assertions: a. Transfers of purchasing power from NWE to WE reduce aggregate labor demand, *ceteris paribus*. b. Welfare for the poor and other public social expenditures are socially desirable, but if they are financed by taxes on wealthy NWE, labor demand is reduced. It follows that if the

wealthy cut back on charity and spend the proceeds on NWG, then in the short period aggregate labor demand will rise. Furthermore, the government can achieve a similar effect by cutting pensions and unemployment benefits, and simultaneously cutting the taxes that had financed them.

To strengthen his argument, Pigou adduces an additional consideration. Redistributive taxation has distortionary effects on labor demand. In the long run, there are “slow working, cumulative” expectational effects; if redistributive taxes are announced, NWE will reduce their investment, which leads to a long run reduction in labor demand.²⁵

To sum up, Pigou argues that cuts in social benefits for the poor, coupled with tax cuts for the wealthy, will cause the wealthy to hire more workers. Thus, Pigou can be said to have anticipated certain elements of the 1980’s supply-side economics program.²⁶

VIII. Conclusion

In this paper, we have accepted the challenging task of rereading Arthur Cecil Pigou’s *Theory of Unemployment* (1933), which John Maynard Keynes chose as his main target of attack in the *General Theory*. The *Theory of Unemployment* (TU) was in a certain sense an easy target: Pigou, who was usually a lucid writer, produced a work which is one of the most difficult in the history of 20th century economics. It is therefore not surprising that very few economists read TU today, despite the central role that it played in the Keynes-Pigou debate.

²⁵ The sudden shift to long run considerations may confuse the reader.

²⁶ Pigou did not develop a version of the Laffer Curve. The Laffer Curve can be found in writings of Jonathan Swift, a famous 18th century writer (Bartlett 1992).

In the preface to TU, Pigou announced that henceforth, he would abandon the Marshallian style of literary exposition, in favor of a new, explicitly mathematical mode of exposition. In practice, Pigou's transition was incomplete; his inconsistency in using the mathematical mode contributed to the general incomprehensibility of his work.

Our reading of TU has focused on the nonmonetary portion, which spans the first 182 pages out of 313. We have paid special attention to sections that have not yet been analyzed by historians of thought. Our central findings are as follows: a. Pigou's inverse-L labor supply is a special case of the labor supply function in the textbook IS-LM model; b. Pigou repudiated Kahn's formulation of the multiplier, but did not reject the multiplier concept completely. c. Pigou's Wage Goods Fund model led to the anti-Keynesian conclusion that private investment could not raise employment. Also, Pigou's concept of government stimulus excluded the possibility of deficit financing. Nevertheless, the differences between Keynes/Kahn and Pigou concerning the multiplier are narrower than previously thought; d. Pigou envisioned cuts in social benefits and/or charity for the poor, combined with cuts in taxes on the wealthy, as a method of boosting employment.

In future research, we plan to extend our reading of the Theory of Unemployment to the monetary portion. It is the monetary portion that Pigou saw as most relevant to an economy in depression. We also plan to focus on an interesting phenomenon that occurs often in Pigou's works—the existence of passages in which Pigou appears to have anticipated modern theoretical ideas. The real portion of TU contains a two-sector growth model (Pigou 1933, 140-142) and the idea of an input-output system (Pigou 1933, 68-69). How close are Pigou's ideas to those of Uzawa and Leontief? The monetary portion of TU contains more examples: the central ideas

behind the Harris-Todaro model and the Snower-Lindbeck insider-outsider unemployment model, and some aspects of the “credit view” in macroeconomics. How original were Pigou’s insights? If they were not original, was what their actual source?

We conclude with a brief perspective regarding the shortcomings of Pigou as a theorist (and by extension, the shortcomings of other economists of his era). The phenomenon of unemployment is extremely difficult to explain. Contrary to what many economists believe, Keynes never succeeded in demonstrating the existence of involuntary unemployment in the *General Theory* (De Vroey 1997). Even today, economists have not come up with a theory of unemployment that conforms to what De Vroey calls “Keynes’ program” (De Vroey 2004).²⁷ Thus, the dichotomy between theoretical prediction and practical policy views, for which Keynes excoriated Pigou, is still very much alive in today’s economics profession. We, as modern economists, should acknowledge our inability to escape this dichotomy, and the importance of learning from our predecessors, despite the imperfections of their theoretical formulations and their failure to model many institutional realities. We would do well to follow the example of Robert Solow (1980), who sought and found insights of great contemporary relevance in the works of both Pigou and Keynes.

²⁷ De Vroey (2004) defines Keynes’ program as follows:

“1) demonstrating the existence of involuntary unemployment

1a) with an individual disequilibrium connotation (the reason for this qualification will be explained below);

2) demonstrating that wage rigidity can be exonerated as its cause;

3) giving a general equilibrium or interdependency explanation of the phenomenon

3a) within a perfect competition framework;

4) demonstrating that demand stimulation is the proper remedy to solve the problem.”

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