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# Modigliani's 1944 wage rigidity assumption and the Neoclassical Synthesis*

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Abstract

Modigliani's 1944 "Econometrica" article is considered one of the most important efforts to reconcile Keynes with classical economic thinking through the wage rigidity hypothesis. The aim of this paper is to reconstruct the genesis of Modigliani's article and to reexamine its place in the construction of the Neoclassical Synthesis. Modigliani introduced the wage rigidity hypothesis to show how monetary factors influence real variables such as the employment level and the interest rate. Modigliani's attention to the monetary origin of and solution to unemployment is in stark contrast to the neglect in the Neoclassical Synthesis of the monetary side of the system and its inclination towards fiscal policy.

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> More than 40 years ago, when Modigliani was only 25, he wrote a seminal article setting Model-T Keynesianism on its modern evolutionary path and probing its microfoundations in rigid, nonmarket clearing prices (SAMUELSON 1987, 29)

## Introduction

In his autobiography Modigliani recalled that his influential 1944 *Econometrica* article was read by the academic world as a refutation of Keynes' revolution and a defense of the classical system (2001, 55). Since the beginning the article has been in fact considered one of the most important efforts to reconcile Keynes with traditional economic thinking, suggesting that the only difference between Keynes and classical economics was that, in Keynes' system, money wages did not fall as unemployment rose, which is what the classical economists theorized would happen—wages remained rigid or sticky[1]. Thus, involuntary unemployment, in Modigliani's interpretation of Keynes, was still consistent with classical theory: it was simply brought about by workers who were unwilling to accept a pay cut in order to remain employed. Through its integration of Hicks' IS-LM model with the labor market, Modigliani's article entered in the literature as a fundamental contribution to the construction of the neoclassical synthesis (Blanchard 1987; Howitt 1987, Samuelson 1987, 2007, Snowdon, Vane, 1999) and a first step towards a restoration of the pre-Keynesian view (Roncaglia, Torvernachi, 1985, De Vroey, 2000). But did Modigliani introduce wage rigidity to reconcile classical and Keynesian economics? Was the relation between wage rigidity and unemployment the original focus of Modigliani's article as his interpreters would have it? The aim of my paper is twofold: to reconstruct the genesis of Modigliani's 1944 *Econometrica* article, and to reexamine its place in the foundation of the neoclassical synthesis. My suggestion is that Modigliani introduced this hypothesis not to reconcile the two systems rather as a convenient analytical device and a realistic assumption to show the working of a monetary economy in which real variables depends on the quantity of money. Through wage rigidity he also demonstrated the consistency of unemployment with a stable equilibrium position to avoid, in the "Keynesian case" (liquidity preference), an indefinite deflation process. In other words, Modigliani's focus was not merely on the relation between employment and the labor market conditions, rather on the crucial role of money in the determination of real variables and the explanation of unemployment equilibrium. Modigliani's attention to the monetary origin of and solution to unemployment appears in stark contrast to the neglect in the neoclassical synthesis of the monetary side of the system and its inclination towards fiscal policy. Furthermore, the standard reading of Modigliani's contribution to it assumes a link between wage stickiness and short run disequilibrium/long run equilibrium (the so-called "schizophrenia" in neoclassical synthesis, - see Hoover), a link not discussed by Modigliani, at least in 1944. On the contrary, in subsequent readings of his paper he will refer to unemployment as a systematic feature of an economy relying on money to carry out transactions (Barnett and Solow 2000, 229)[2].

[1] See Blaug 1996, Colander 1986, Leijonhufvud 1968, McCallum 1987 among others.

[2] «Modigliani (1944) had shown how Keynesian results could be derived from an otherwise classical model if the money wage rate were fixed. Since it was widely believed that wages were less than fully flexible in the short run, it seemed natural to see Keynesian theory as applying to short-run fluctuations and general equilibrium as applying to long-run questions in which adjustment problems could safely be

To show the difference between Modigliani's use of wage rigidity in 1944 and the view on it prevailing in subsequent literature I also refer to Modigliani's PhD dissertation and to Modigliani's correspondence, especially with Patinkin, in which he clarified the significance of his Keynesian model with respect to Patinkin's interpretation of it.

The paper is organized as follows. Sections 1 and 2 are devoted to the intellectual context in which Modigliani developed the ideas of «The Liquidity Preference» article and his PhD dissertation (an extended version of the article). This context is of particular relevance to reconstruct Modigliani's early aims. Section 3 makes it explicit that the significance Modigliani attached to wage rigidity was different from that assigned by Patinkin, which reflects the canonical reading of the "Liquidity Preference" article. Points of difference between them are revealed in their correspondence. Section 4 discusses the connection between Modigliani's article andd the neoclassical synthesis; section 5 ends.

## 1 The New School background: The genesis of Modigliani's 1944 paper

The "Liquidity preference and the Theory of Interest and Money" was the first article Modigliani published since his arrival in US in 1939. It was part of his PhD dissertation on Keynesian and classical economics he wrote under Marschak's supervision and defended at the New School for Social Research in June 1944, after the publication of the paper[3]. Modigliani first approached Keynes' "General Theory" by his reading of Hicks, thanks to seminars organized by Oskar Lange, to long discussions with Abba Lerner, and especially to Jacob Marschak's teachings, an intellectual debt Modigliani honored in his Nobel lecture. Modigliani initiated the New School with no training in mathematical economics (he had a degree in Law) therefore they certainly influence his reading of Keynes' theory within a general equilibrium system of equations, on which I will return later. All of them were very familiar with Keynes' theory. Lerner was at Cambridge in 1934-35 where he came in contact with the Cambridge Circus. Marschak

ignored. This view came to be known as the 'neoclassical synthesis'» (Howitt, 1987, 274).

[3] Modigliani received a scholarship from the *New School for Social Research* thanks to the renowned antifascist refugee Max Ascoli (Barnett and Solow, 2000, 223; Pasinetti, 2005, 25, fn). Modigliani was Marschak's student at the Graduate School from 1939 to 1942. Regarding Marschak's influence Modigliani recalled: «Jasha Marschak was my mentor, we studied Keynes and the *GT* in classes with Marschak…In addition [I] received a lot of advice and support from him. He suggested me readings and persuaded me of the importance of mathematical tools …» (Barnett and Solow, 2000, 225, Breit, Hirsch, 2009, 118).

was up at Oxford when the University hosted the famous Econometric Society symposium[4], while Lange's 1938 *Economica* paper was at the time (1936 to 1948) the most cited article, second only to Keynes's *GT* (Moggridge 2000, 232). However, Modigliani's earliest interests were in monopoly and welfare economics, as evidenced by his student notes and his correspondence with Marschak. Marschak encouraged the young Modigliani to carry on his studies: «I should like to know whether you are making some progress with your thesis. Your future will very much depend on your ability to concentrate and publish something really new. I am sure you can do it» (Marschak to Modigliani, January 22, 1941, in Modigliani Papers, henceforth MP). They maintained very close relationships even after Marschak left the New School to join, in January 1943, the University of Chicago and the Cowles Commission. Marschak was replaced by Lerner in 1942. It emerges from the correspondence, and it is recalled by Modigliani (2001), that his attention shift from welfare to Keynesian economics was in part related to his lengthy discussions with Lerner, which represented the departure point for his *Econometrica* article. The paper was intended as Modigliani's answer to Lerner's purely monetary theory of interest, his focus on the investment function and his support to fiscal policy (the so-called Lerner's functional finance)[5]. Modigliani's and Lerner's early discussions revolved around the role of saving and investment schedules in the determination of the interest rate. Modigliani rejected Lerner's monetary theory of interest according to which a change in the propensity to save did not affect the rate of interest. To Modigliani, in the classical system (with the demand for money only function of money income) to any rise in saving corresponds an increase in the investment schedule by a reduction in the interest rate. Following Hicks' IS-LM model, Modigliani distinguished between classical and

[4] During the 1930s Marschak was part of a very active movement: the Kiel-Heidelberg group, against the wage cut policies, which had a leading role in the Weimar debate. According to Marschak, 1930 wage cuts at first implied no reduction but a reallocation of purchasing power from workers to entrepreneurs: «Such a reallocation of purchasing power naturally is associated with a change in the structural composition of production… a reallocation of purchasing power in favor of workers, which is associated with higher wages, will stimulate production since the goods consumed by workers are subjected to the law of mass production at higher degree than those goods consumed by the capitalist» (quoted from Hagemann, 2005, pp. 16-17).

[5] In a letter to Marschak, Modigliani wrote about his relationship with Lerner: «we have been talking much about you with all our common friends, Lange, Halasi, Loewe and especially Lerner. There seems to be a good deal of understanding between me and Lerner and genuine friendship is gradually developing with him of which I am very happy. I think more and more that Lerner is an exceptionally good economist and I am often amazed at what he manages to do without using calculus. I have the impression that he is very often too extreme in his theories or rather too 'logically extreme' but this very fact makes discussion with him very fruitful because one always knows what one is talking about» (July 16, 1943). See also Barnett and Solow (2000), and Modigliani (2001).

Keynesian economics on the basis of the interest rate elasticity of liquidity preference (rather than the shape of labor supply, as he will do in his 1944 paper). High levels of interest are in line with the classical theory (the price of liquidity is too high) therefore, any small shift in the propensity to save will cause the interest rate to fall in order to induce borrowers to borrow more, leaving income and employment unchanged. Nonetheless, if in the relevant range the LM curve were moderately bent, then an increase in the propensity to save requires some adjustment to money wages to maintain full employment:

Even though [the classical economists] did not foresee that a change in the propensity to consume might require a cut in money wage, they were perfectly right in maintaining that a cut in wage would lead to full employment. And this continues to hold true until the range of 'low' interest rate is reached where the LL [LM] curve becomes perpendicular to the interest rate axis. It is at this point that Keynes's analysis becomes really relevant … you wanted to deny that any change in investments could occur unless people changed their desire to hold cash (Modigliani to Lerner: June 2nd 1943, MP).

In his reply Lerner pointed out that Modigliani was ascribing to the classical Keynes' reasoning based on the effect of a fall in income on interest rate, through a reduction in the need for cash, «so that the investors have a signal that they should increase investments» (Lerner to Modigliani, June 2nd 1943, MP). Lerner also specified that the classical conclusions did not hold «whenever the liquidity preference is less than infinite but only when this elasticity is zero» (ibid). In this case an infinitesimal decrease in employment is sufficient to bring about any necessary fall in the rate of interest. When (the) liquidity preference is not vertical:

It is possible for investments to fill the gap made by the increased propensity to save only when wages and prices have fallen as much as is necessary to reduce the rate of interest. I deny that this is the classical argument, because it differs from it not only in the mechanism but also in the conclusion. … The similarity [among the two systems] is only in that both arguments finally show full employment with less consumption and more investment. The differences are that the classical theory did not indicate any necessity for wages and prices to fall while it is essential (except for the limiting cases) and that the classical theory did say that the real wage must be less, which is not necessary at all … Some minor points…when you say the classical economists are perfectly right in saying that a cut in money wages would lead to full employment, you are disregarding the reasons they gave for it but notice that the conclusions are right for reasons given by Keynes. Is this kind of "super functional theory of knowledge", by which one could argue that medieval monks were right when they said that ground bones of saints in hot water is good for bellyache because we now know that hot water is good for bellyache? … (ibid, emphasis added)[6].

Although Modigliani's rejection of Lerner's interest theory, discussed in the last part of the 1944 paper, they agreed about the theoretical equivalence of wage deflation and expansionary monetary policies, around which the first part of Modigliani's article was constructed. Both also denied any practical efficacy of wage cut once its effects on income distribution and expectations were taken into consideration, as discussed in Lerner (1939) and in Modigliani's PhD dissertation.

That Modigliani's early studies on Keynes's *GT* were especially devoted to monetary and interest theory is apparent also from his correspondence with Marschak and Lange. In a letter to Marschak dated July 1943, Modigliani wrote:

*I have just finished to write an article on the theory of the rate of interest which, you may perhaps remember had been in my mind for a long time. I don't believe it is any great achievement but it may help to clarify a few points;* in any event it is very important for me because it is the first time since I am in this country that I manage to carry a research to the end … I would like to mail you a copy of the manuscript and to ask you for your advice on one or two mathematical points which I would like to include in the paper but of which I am not sure (July 16, 1943, emphasis added).

Few months later, Lange asked Modigliani – probably at Marschak's suggestion - to send «one or more articles for *Econometrica* … I know you have been working on several subjects like consumer surplus, the Hotelling theory, Says's law, interest, etc» (October 5, 1943)[7].

Contrary to later writing based on Modigliani's 1944 article, which concentrated on the relation between wage rigidity and Keynesian unemployment, Modigliani

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[7] Modigliani's article was referred by Leonid Hurwicz who at that time was Lange's research assistant at the University of Chicago. From 1942 he was at the Cowles Commission working with Marschak and Koopmans.

considered the last section of his paper, devoted to the construction of a «general theory of the rate of interest and money», his original and most relevant contribution. In sending the manuscript to *Econometrica* he «recommend[ed] especially … attention [in the editing of the English parts] to the last chapter of the paper, *which I feel is the most important of all*» (Letter to Mr. Leavens, Managing Editor of *Econometrica*: December 14, 1943)[8]. He did not equally emphasize the wage rigidity assumption probably because he knew that the interpretation of Keynes's unemployment equilibrium in terms of a perfect elastic labor supply was not new to the literature.

That a mere discussion on the relation between wage behavior and involuntary unemployment as such did not represent Modigliani's main object of investigation is also suggested by his decision to omit, from the overly long draft of the article, the section devoted to the analysis of wage cutting and unemployment policies since «the chapter is not necessary for the main argument. If Prof. Lange and the referee feel it is worthwhile, it could be published in some future issue of Econometrica» (Modigliani's correspondence with Mr. Leavens: December 14, 20, 29, 1943, MP).

## 2 Wage rigidity and unemployment equilibrium

As explicitly stated in the beginning of the article, Modigliani's aim was to construct a general theory of interest and money in contrast to Lerner' and Hicks' purely monetary explanation of it. He outlined his interest theory in the last part of the paper presenting it as the logical outgrowth of his previous analysis on the working of classical and Keynesian systems. Therefore, his interest theory was closely related to the analysis carried out in the first part of the article devoted at specifying the properties of systems in which one or both Keynesian hypotheses, liquidity preference and money wage rigidity, are abandoned. The dichotomy of real and monetary economics is also tested for logical consistency. Modigliani's crucial point was to show the dependence of real variables (output, employment and interest rate) from the quantity of money by wage rigidity rather than liquidity preference.

From a reduced system of equations, taken in part from Hicks (1937) and Lange (1938), Modigliani distinguished between a «crude classical system» with quantity theory of money and wage flexibility, a «general classical model» with liquidity preference and

[8] Solow recalls that «the 1944 article was … mostly about Keynes's theory of interest … it is interesting then, that the main influence of the paper lay elsewhere» (2005, 12).

classical labor supply and the «Keynesian» model characterized by liquidity preference and money wage rigidity. Following Lange's definition (1938, 31), he considered the wage rigidity assumption as equivalent to a perfectly elastic labor supply as long as the demand for labor is less than full employment, accepting the market clearing definition of equilibrium implicit in Lange's representation of labor market (see Rubin, 2004). According to Modigliani in the Keynesian system the interest rate was simultaneously determined by the IS-LL model, that is to say by the demand for and supply of money to hold, and by the propensities to invest and to save defined in terms of inflow and outflow of cash (see Rubin, 2002)[9]. In contrast with Hicks 1937, in which the IS-LL represented the equilibrium of real and monetary sectors, in Modigliani both curves belong to the monetary side of the system. The LL curve denotes the equilibrium between demand for and supply of stock of money to hold (he defined the short run equilibrium in the money market), while the IS denotes equality and constancy in time of inflow and outflow of cash, that is the long run equilibrium in money market. Their intersection leads to a position of «full equilibrium», where both short and long run monetary conditions are satisfied (Modigliani, 1944, 60-62)[10].

Modigliani aimed to extend the validity of the IS-LM with respect Lange's and Hicks' focus on the liquidity trap, shifting the attention from the role played by liquidity preference to that of wage rigidity (a more general and realistic hypothesis), in the explanation of unemployment equilibrium. In particular, with respect to Hicks (1937), who assumed exogenously fixed nominal wage in both systems (classical and Keynesian), Modigliani explicitly introduces the labor market and confronted the real and monetary mechanisms underlying respectively the two models as a result of different wage behavior. Therefore, the introduction of wage rigidity versus classical flexibility did not meant an attempt to reconcile the two systems. On the contrary, Modigliani intended to make clear the working of a monetary economy (by the wage rigidity) in respect to the economy analyzed by classical theory[11].

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[9] Under this point of view Modigliani's conclusion that the equilibrium rate of interest depends both on monetary variables (demand for and supply of cash) and real factors (psychological and technological) seems to contradict his definition, in the first part of the article, of saving and investment schedules as belonging to the monetary side of the system.

[10] On Modigliani's use of IS LL to describe the monetary equilibrium see Rubin, 2004. According to Modigliani, if the liquidity preference is replaced by the quantity theory, which is sufficient to determine money income, the saving and investment schedules reduce to the orthodox supply and demand for saving schedules which intersection determines the interest rate. Since, in this case, the quantity of active money is fixed, they have no part in the determination of the employment level (1944, 67).

[11] For «monetary economy» Modigliani intended an economy in which money is used for transactions and speculative motives and wages are rigid.

From the mere counting of the number of unknowns and equations he demonstrated that under flexible wages the classical dichotomy holds - the real part of the system forms a determinate sub-system - therefore, the rate of interest, output and employment level only depend on real factors. While the money equation (either quantity theory or liquidity preference) determines the price level[12]. In contrast, under wage rigidity the classical dichotomy breaks down. The monetary side of the system (liquidity preference, the supply and demand for saving schedules, and its equilibrium condition) determines the equilibrium level of money income and the rate of interest on which al real variables depend. To show the monetary transmission mechanism Modigliani focused on the effects of a reduction in the marginal efficiency of investment, followed by a reduction in the equilibrium rate of interest, upon the liquidity preference. According to Modigliani, a fall in the rate of interest leads to an excess demand for money as an asset. If the supply of money is not properly increased, money income has to fall (to decrease the transaction demand for money) to restore the equilibrium in the money market. Under condition of flexible wages, this means a fall in money wages and prices without affecting real variables. Under wage rigidity instead:

> The reduction in money income made necessary by the fall in the rate of interest becomes a reduction in real income and employment as well. The effect of a shift of the investment schedule is now to start a typical process of contraction so frequently described in Keynesian literature. As producers of investment goods make losses, they have no other choice than to dismiss workers, even though their physical productivity is unchanged … The fall in money income increases the supply of money to hold; the fall in real income decreases saving and rises its marginal efficiency above the level $r_1$ … this double set of reactions leads finally to a new equilibrium, with a smaller money and real income, less employment, higher real wages and a rate of interest somewhere below $r_0$ and above the new "full employment" interest $r_1$ … (1944, 73).

Differently from Lange and Hicks, who concentrated on the effects on investment of a fall in its marginal efficiency, Modigliani looked at the monetary side of the system, that is on the effects of a fall in interest on the demand for money to hold[13]. His focal

[12] Modigliani defended the validity of the classical dichotomy on the basis of wage flexibility against Lange's dismissal by the rejection of the Say's Law (see Modigliani, 1944, 67-68 and 70-72 and LANGE).

[13] Modigliani did not explain possible reasons of a fall in the marginal efficiency of investment – whose factors are technological and psychological, such as expectations (1944, 59 fn17). In his handwritten

point was the disequilibrium in the money market which starts the «typical» Keynesian process: a reduction in real income and employment to clear the money market[14]. Modigliani rejected the «commonplace» that explained unemployment as caused by lack of investment, an explanation valid only in the Keynesian case. To him, unemployment originated in the money market, while a change in the marginal efficiency of investment has no direct influence on employment, as shown by the classical case in which the above change affects the rate of interest but not the employment level. Therefore, the reduced levels of employment and investment are «not the result of causal relationship» but «a symptom of monetary disturbances»: investments are low because employment is low and not the other way around (1944, 77). In other words, a fall in the marginal efficiency of investment decreases employment only because it decreases the interest rate and quantity of money available for transactions. Consequently, through an increase in the quantity of money (or "at worst" reducing wages) employment will rise in «every field of production including investment» (ibid)[15]. Modigliani deeply discusses the theoretical equivalence between monetary and wage policy in his PhD dissertation on: «The general theory of employment, interest and money under the assumption of flexible prices and fixed prices», where he better clarified the role of money supply with respect to wage rigidity. In his dissertation Modigliani also introduced an alternative representation of unemployment in terms of an excess labor supply.

Despite the crucial role he ascribed to the hypothesis of wage rigidity, it was not supported by a rigorous explanation. He simply defines nominal wages as the result of history or economic policy or both. It entered in the literature as an *ad hoc* hypothesis

notes on Keynes'*GT,* ch. 21 on *Incentive to liquidity,* Modigliani underlined that «the difficulty of full employment follows 'from the association of a conventional and fairly stable long-run rate of interest with a … highly unstable marginal efficiency of capital'» (in *Keynes –General Theory, Notes and Remarks*, MP). The fact that with fixed wage employment and output was determined by the quantity equation had been already been recognized by Pigou (1941) and Lange (1938) among others. Modigliani, however, put it at the fore front of the distinction between classical and Keynesian economics …

[14] In his interview with Barnett and Solow (2001) Modigliani explains the transmission mechanism he had in mind as follow: «Keynes' unique achievement consisted not only in showing that unemployment is the variable that clears the money market; he also elaborated the mechanism by which an excess demand for money causes a decline of output and thus in the demand for money, until the demand matches the given nominal money supply … And this starts the chain leading to lower output through a fall in investment, a fall in saving, and thus in income and employment. It is this fall, together with the rise in interest rates, that reduces the demand for money till it matches the supply (228).

[15] «When the over-all level of employment is low there will be a reduced level of investment as well as reduced level of consumption. And the level of investment is low because employment is low and not the other way around …» (1944, 77).

(see Patinkin 1948, 1956; Solow 1984; Tobin 1971, among others)[16].

*2.1 Modigliani's Ph.D dissertation*

In his dissertation, defended after the publication of the article, Modigliani, added a section devoted to a graphical representation of the determinants of real equilibrium under flexible and rigid wages, partly different from the analysis carried out in the article. Modigliani represented in a price-employment plan an increasing demand for and a decreasing supply of labor (under the assumption of fixed money wage). He argues that their intersection only determines «what level of employment would be 'full employment' under the technical and institutional conditions» (), to which the actual equilibrium values of employment and prices have no necessary connection. In fact, to any given price equal to the marginal labor cost corresponds, on the demand curve for labor, the equilibrium level of employment, that is the solution only lies in the demand curve. In other words, the employment level depends on the price level consistent with active money and there is no economic mechanism that automatically assures its adjustment to full employment. Then, as in the article, Modigliani defined involuntary unemployment as the difference between the desired level of employment, expressed by the supply curve of labor, and its equilibrium level on the demand curve (rather than on its intersection with the labor supply), abandoning Lange's market clearing interpretation.

Modigliani's dissertation also contains a section on fiscal policy and a final section on the efficacy of wage cuts and monetary policy (the ones omitted from the article). These sections help to clarify the central role ascribed to the monetary sector and the instrumental use of the wage rigidity hypothesis: «in stressing so much the monetary aspect of the unemployment problem we are not only interested in a more correct theoretical formulation, for this formulation has also important implications concerning the concrete forms of economic policies indicated to relieve unemployment» (PhD, 52). In «Some Considerations on Unemployment Problem» Modigliani criticized public investment programs since unemployment was explained by the scarcity of money in

[16] Modigliani was aware that the distinction between the Keynesian and the classical systems on the basis of wage rigidity was a simplification of Keynes's *GT*: «We should add that, even in the 'Keynesian' system, it is admitted that the wage will begin to be flexible downward before employment has reached the zero level: but in order not to complicate equation 9 [the supply of labor] still further we can, without serious harm, leave the hypothesis in its most stringent form» (1944, 48).

relation to the liquidity preference schedule. Programs financed by borrowed money tend to increase the rate of interest thus, «Government expenditure will be partly offset by a fall in private investments» (PhD, 53). In the concluding section, «Notes on the Effect of Wage Cuts and Changes in the Quantity of Money on the Level of Employment and on the Distribution of Income», Modigliani discussed the effects of cuts in money wages compared to those of an expansionary monetary policy. In spite of their theoretical equivalence, Modigliani endorsed the latter and rejected the former whose efficacy – in a macro-static approach and under conditions of perfect competition - depends on the elasticity of demand for money to hold with respect to the rate of interest. He also pointed out that the relevance of his analysis especially concerns the effects of wage deflation on income distribution and expectations. In particular, its effect on profits leads to «the most interesting conclusion»: if the fall in price level «is considerable, entrepreneurs may very well find that having deducted the fixed interest payments, their real net profits are actually reduced»[17]. Thus, the class that asked for wage cut as the «only sound way of reducing unemployment» would be the only one to lose out. According to Modigliani, the negative effect on profit is even worsened by expectations: wage cuts may become a dangerous source of entrepreneurial losses and thus lead to further contractions: «Realized losses are sure to create a mood of pessimistic expectation and thus adversely affect the level of economic activity ... » (PhD, 75-76). Thus Modigliani was among the first who recognized the negative distribution and expectations effects of wage deflation[18]. He considered expectations as the most important argument against wage cuts: «a fall in the price level may lead to the expectation of a further fall and thus create a speculative demand for money. If this

[17] «The likelihood of this outcome depends on the relation between the production function, the share of income going to fixed income receivers and the elasticity of the demand for money to hold … the likelihood of losses is increased and approaches certainty as $L_r \rightarrow \infty$ [the demand for money as an asset tends to infinite]» (PhD, 74). Regarding workers, Modigliani argued that the real wage bill would not necessarily fall as employment increased, on the contrary, when there is much unused plant and organization capacity, the marginal product of labor will be high and will be not greatly affected by a small increase in employment. As long as the level of employment remains rather low the increase in employment will be accompanied by an expansion in the real wage bill. Modigliani also refers to Tarshis' «Changes in real and money wages», in the *Economic Journal* (1939). On this, see the wage debate involving Tarshis, Dunlop and Keynes on the relation between real and money wages.

[18] The role of fixed money supply wages in the determination of the employment level and the theoretical equivalence between wage and anexpansionary monetary policy had been already discussed by Meade 1937, to whom Modigliani did not refer. Meade also discussed the role of ews well as the role of expectations, had already been discussed by Meade (1937). It would be possible that Modigliani knew Meade's work but, as he wrote to the Managing editor in submitting the paper to Econometrica: «the quotations are in general not sufficient. I am well aware of this fact but I don't have a Library well supplied at my disposal and so I did as well as I could» (December 20, 1943).

happens, a cut in money wages is likely to cause a fall rather than an increase in employment» (ibid). Nonetheless, he did not develop the argument since, being dynamic, it was excluded by his simplifying assumption of unity elasticity of expectations.

Few years later, in his classes on mathematical economics at Carnegie, in discussing classical and Keynesian systems, he explained that wage rigidity was most important with respect to downward movements. However, a wage deflation policy would worsen the situation since a corresponding decline in consumption and, thus, in the entrepreneurs' expectations:

> If changes in the wage rate are allowed … you can have full employment. Let wages fall. Then income will fall and less money will be needed for transaction. More money will then be available for investment, the interest rate will fall, and investment will increase. The proposal that might be made on the basis of the preceding paragraph is that wages should be lowered in the time of downturn. This lowering of wages, however, cause a decline in consumption which may affect the expectations of potential investors … A policy of lowering wages to fight deflation must be seriously questioned (1952, «Notes in Mathematical Economics III», by W. Hartigan, W. Holter, MP).

Modigliani's discussion of monetary and wage policies helps to clarify that, in contrast with subsequent interpretations of his unemployment theory, his focus on wage rigidity did not meant that falling wages automatically restore full employment. There is a logical gap between wage rigidity as the cause of unemployment and the effect of wage cut on employment, due to its negative feedbacks. This gap, as well as the connection between Modigliani's wage rigidity and the analysis of Keynes' monetary theory with respect to the classical one, appears still more evident in his correspondence with Patinkin.

## 3 The wage rigidity interpretation of Keynes's unemployment (Patinkin-Modigliani correspondence)

Since its appearance Modigliani's article has been read as a reassessment of the importance of Keynes' revolution. The comparison of classical and Keynesian models on the basis of different wage behavior especially capture the attention of neoclassical economists, who read it as an attempt to bring Keynes' theory in line with mainstream economics.

Leontief, in a letter to Modigliani, defined the paper as «one of the best expositions of the Keynesian theory in its relation to a Classical theory … You might be interested that in his answer to my discussion of the homogeneity assumption in 1936 *QJE* Mr. Keynes acknowledged the existence of his non-homogeneity assumption» (July 3th, 1944, MP). Haberler as well, referred to Modigliani's analysis as a «remarkable demonstration of the crucial role of wage rigidity», to deny the novelty of Keynes's theory (1946, 190, fn11)[19]. Schumpeter even considered the article as one of the highest examples of anti-Keynesianism:

> It is really an injustice to Keynes's achievement to reduce it to the bare bones of its logical structure and then to reason on these bones as if they were all. Nevertheless, great interest attaches to the attempts that have been made to cast his system into exact form. I want in particular to mention: W. B. Reddaway's review ... 1936; R. F. Harrod … 1937, J.E. Maeade … 1937, J.R. Hicks … 1937; O. Lange … 1938; P.A. Lerner 1938… In the hand of economists less in sympathy with the spirit of Keynesian economics, some of the result presented in these papers might have been turned into serious criticisms. This is still more true of F. Modigliani "Liquidity Preference … (1946, pp. 510-11, fn 26).

On the other hand, the main developments of Keynesian economics during the 1940s and 1950s were essentially devoted to investigate the relation between effective demand, real output and employment[20]. Klein (1947), Hansen (1946, 1949, 1952), Samuelson (1948) did not explicitly refer to Modigliani's monetary analysis or to his wage rigidity assumption (which remains implicit) as being the origin of unemployment equilibrium. Hansen (1946, 186, fn10) rejected the possibility that an orderly reduction in wages, «which are relatively rigid», could promote an increase in employment via a fall in the interest rate criticizing, however, in a short footnote, Modigliani's excessive emphasis on expansionary monetary policy, focusing on the limited investment opportunities. In his *Economics* textbook – probably the main vehicle of diffusion of

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[19] In some handwritten notes on Haberler's «Prosperity and Depression» (1939) Modigliani rejected Haberler's support of wage deflation policy to increase employment arguing that «all argument is a non-sense» (in MP, undated).

[20] Although Modigliani's 1944 article entered the literature as a fundamental step in the construction of the neoclassical synthesis, it initially received little attention from scholars: Modigliani's «Liquidity preference» was not among the most cited of the articles published between 1936 and 1948 (ten or more citations, in Moggridge 2000, 232).

Keynes's theory (in the Neoclassical Synthesis's version) Samuelson concentrated on the crucial role of investments: «ALL modern economists are agreed that the important factor in causing income and employment to fluctuate is investment» (1952, 224). Thus, his representation of Keynesian theory trough the income-expenditure model concentrated on effective demand and multiplier, and supported fiscal policy.

Klein's influential «The Keynesian Revolution» (1947) - although suggesting an interpretation of Keynes' involuntary unemployment in terms of a perfectly elastic labor supply (1947, 74) - denied that wage rigidity was necessary to explain its emergence: «with the assumption of various frictions, imperfections, and rigidities of the real word, an explanation of unemployment is not difficult, either in the classical or the Keynesian system … the numerous remarks throughout the recent literature that Keynes relied upon wage inflexibilities to obtain his result are entirely unsubstantiated» (1966(1947) 83, 87-90)[21]. In order to show that full employment is not automatic in a world subject to Keynesian conditions, it is sufficient to make plausible assumptions about «the interest-elasticity of certain basic relationships» (ibid). Klein shifted his attention from the mere counting of equations and variables to the shapes of functions. He then adopted the IS-LM scheme to reject wage cuts as «an easy-money policy» (1947, 88): if the liquidity preference schedule was elastic and/or the marginal efficiency schedule inelastic, wage cuts will not raise the level of output and thus employment via the production function. However, Klein distinguishes between the cause of unemployment and unemployment equilibrium, maintaining the necessity of wage rigidity to explain the consistency of unemployment with an equilibrium position, to avoid a cumulative depression process.

Klein's approach was especially developed by Patinkin[22]. Although Patinkin's and Modigliani's common background, at least with reference to Marschak's and Lange's early teaching, Patinkin was one of the major critics of Modigliani's interpretation of Keynes' unemployment theory in terms of wage rigidity. Under Marschak's suggestion, he embarked on a correspondence with Modigliani on March 18, 1947 asking for a copy of the «Liquidity Preference» article, since he was concluding a «theoretical study on unemployment which will appear in Econometrica». After reading Patinkin's work, sent to him by the Cowles Commission, Modigliani replied to his criticisms. First, he agreed

[21] Klein never referred to Modigliani's 1944 paper.

[22] Regarding Klein's influence on Patinkin, see Patinkin (1956, 234 fn.4); see also Rubin (2002, 205-225) and Boianovsky (2006, 193-249). According to Rubin Patinkin's problem became that of removes Klein's …

with Patinkin's critics to his homogeneity assumption: «I had already found out for myself that there was some inconsistency in the homogeneity assumption made by myself, Lange, as well as by practically all writers», since «I had worked on the subject for sometime and have a half completed manuscript dealing with partly overlapping topics» (August 8th, 1947, MP). In January 1948 Patinkin wrote again to Modigliani asking for the references in the *GT* from which he – as well as Lange - had taken the perfectly elastic labor supply function, «because I have never been successful in finding an explicit statement in the *General Theory*» (January 22, 1948, MP). Modigliani's first answer was quite vague: «my labor supply function was based on the general impression left from the *General Theory*. The stickiness of money wages, if not their absolute rigidity, seemed to me to be essential in the Keynesian system…» (February 6, 1948). A month later Modigliani gives precise references [Ch. 2, Section III, pp. 14 and 15 for downward rigidity - the same reference quoted by Lange, 1938, and Ch. 21, Section IV, p. 303, for upward flexibility]. Modigliani also pointed out that it was not necessary for his analysis to assume complete rigidity as employment fluctuate below full employment, as already admitted in the 1944 article (Modigliani to Patinkin: March 1st, 1948). Since he was interested in the monetary implications of this hypothesis he assumed complete rigidity, which simplified the model without changing the result:

Even if wage may fall, to some extent, as unemployment become widespread, they do not fall sufficiently to make the real wage rate equal to the marginal disutility of the existing level of employment. I know that, at this point, you might say that it may, in fact, be impossible for worker to reduce the real wage rate to this extent, operating through money wage. This is of course an entirely different argument, which I have already discussed in my paper (Keynesian case) and you have discussed in yours» (ibid).

Patinkin considered Modigliani's references and explanation «ambiguous» and «very artificial», insufficient to support his formulation[23]. In fact: «If the supply curve has even the slightest elasticity before $N^0$ then $N^0$ can no longer function as the definition of full employment, for then you will no longer be able to say that at the prevailing money wage rate less people are working than desire to …» (April 7, 1948).

[23] Patinkin claimed that «the passages on page 14 and 15 of Keynes' General Theory state primarily that the labor supply function is not homogeneous. In other words, if we let $N^S$ represent the amount of labor supplied, then the function is not $N^S= F(W/P)$, but $N^S=G(W,P)$. … It is very difficult for me to accept these statements as equivalent to your formulation that the supply of labor is perfectly elastic at the ruling wage until full employment, $N_0$…» (April 7th, 1948). The same argument was developed in Patinkin ().

Their correspondence helps to understand their different approaches to Keynes'unemployment theory. Modigliani was less interested in explaining involuntary unemployment per se, his focus was on the effects of the monetary side of the system on real one, using the wage rigidity as a link, and in demonstrating the consistency of involuntary unemployment with a situation of equilibrium in which there are not economic forces leading to full employment[24]. His approach was essentially static, he moved to dynamics only to discuss the policy implications of his model (in his PhD dissertation), rejecting the efficacy of wage cuts if expectations and distribution effects are taken into account. In contrast, Patinkin's starting point was the study of the consistency of involuntary unemployment with the Walrasian framework, and the dynamic path towards full employment. This leads him to move from an equilibrium (in terms of market-clearing prices) to a disequilibrium approach (see Rubin, 2010). Patinkin, opposed to Modigliani's quotes, taken exclusively from ch. 2 - on the resistance of workers to money wage cuts of the *GT*, the famous ch. 19 in which the effects of falling wages were discussed:

… It is hard for me to believe that wage rigidity is the essence of the Keynesian system when one of his major points seems to be that the amount of unemployment and the real wage rate is determined completely apart from the actions of workers (cf. p. 13 and Chapter 19) … It seems to me obvious that we cannot have a situation of unemployment equilibrium unless there are rigid wages. Here I agree with your statement of section 12 ["Underemployment equilibrium and Liquidity Preference] of your paper … However, I do not think it is necessary to prove this by an elaborate exposition. One need merely point out that if there is flexibility of wages then by definition the wage rate will change unless there is full employment. Hence, there cannot be equilibrium if there is unemployment. Now, if the whole purpose of Keynes is to say that with rigid wages we can have unemployment 'equilibrium', I really do not see his contribution … The position I would like to take now … is that the major contribution of Keynesian economics is not in pointing out that there may be an unemployment equilibrium but in stressing the dangers of unemployment <u>*dis*</u>equilibrium. In other word, Keynes emphasized that the policies advocated by the Classical school (flexibility of all kinds of prices and wages) might work very slowly … This seems to me essentially his argument in chapter 19. And this argument can be maintained without assuming any type of wage rigidity (Patinkin to Modigliani: April 7, 1948).

[24] At the beginning of his paper Modigliani specified that «all theories we examine or formulate in this paper are concerned with the determinants of equilibrium» (1944, 46), rather than business cycle theory. It has also to be noticed that Modigliani refers to unemployment as "involuntary" only once with reference to Keynes' theory. Instead, he mainly referred to unemployment equilibrium, this is also emblematic of their different perspective.

In opposing to Modigliani's analysis of unemployment equilibrium Keynes' ch. 19 on the effect of wage cut, Patinkin jumped from the explanation of unemployment to its remedy. As already noticed, Modigliani's agreed that in a dynamic framework wage reductions do not necessary leads to full employment.

In his reply, Modigliani clarified that he did not consider the wage rigidity hypothesis as such the novelty of Keynes's theory, rather the workings of a monetary economy as a whole and its influence on real variables, through a combination of liquidity preference - whose role is more explicitly recognized in their correspondence – and wage rigidity. Modigliani also pointed out the theoretical equivalence between monetary and wage policy that followed from his (static) analysis. In Modigliani's words:

All I tried to do was to schematize what appeared to me the basic system underlying most of the reasoning of The General Theory. *I do not maintain that my supply of labor equation, as such, is "the essence of the Keynesian system". Indeed, on the one hand, I have stated that this equation does over simplify the matter and on the other hand I have laid great stress on the liquidity preference* … It would be perfectly possible to introduce into my system the hypothesis that wages tend to fall when there is much unemployment, and to rise as unemployment falls; and to define then unemployment as the point beyond which wages rise in full proportion to prices … But while this would complicate the system … it would not change the conclusions in any fundamental sense … *It was, by no means, my intention to show that the purpose of Keynes is to say that with rigid wages we can have unemployment equilibrium. What I tried to show was that all the essential conclusions of the General Theory follow from a combination … about the nature of the wage bargain and about liquidity preference. It follows from this primarily that wage policy (under unity elasticity of expectations) is strictly equivalent to monetary policy* … (Modigliani to Patinkin: July 2, 1948, italics added).

Patinkin finally rejected Modigliani's definition of unemployment equilibrium in the Keynesian case: «… you state that in the Keynesian case there could be unemployment equilibrium. This is not correct … What would be true … is that the unemployment disequilibrium would continue for an indefinitely long time. What I mean by unemployment disequilibrium is that the amount of unemployment, the wage rate, and other variables in the system would continuously be changing» (Patinkin to Modigliani: April 7, 1948). Modigliani once again insisted that even if not necessary for the emergence of unemployment, the wage rigidity assumption has to be introduced to describe «a reality … which does not know processes of infinity deflation … As I would like to put it, this assumption must be introduced to explain the stability of the price level not under employment of factors» (Modigliani to Patinkin: July 2, 1948)[25].

In this long letter, which concludes their exchange on Keynes' unemployment theory, Modigliani wrote that he was not sure «as to what you were driving at». He did not really understand the meaning of Patinkin's criticisms because their different starting point. Modigliani analyzed separately classical and Keynesian theory as the result of different wage beahavior, while Patinkin aimed at integrating the two models.

### *3.1 Modigliani's and Patinkin's contributions to the neoclassical synthesis*

As already noticed by Rubin in regards to Modigliani's and Patinkin's use of the IS LM model, their research programs were different. Modigliani aimed «to extend the scope of IS-LM …. The emphasis was put on the pragmatic applications of IS-LM». Instead, Patinkin's method called for a synthesis between the macroeconomics inspired by the *General Theory* and the Walrasian theory of price, with the emphasis put on the logical consistency of the general apparatus» (2004, 211) [26]. Curiously enough, their different research programs originated from a common background, at least with reference to Lange's and Marschak's early teaching. In *Price flexibility* Lange suggested two alternative reading of Keynes' involuntary unemployment: in terms of an equilibrium phenomenon, through the perfect elastic labor supply (as in 1938) and a disequilibrium phenomenon, that is an excess of labor supply that implies an excess of demand in some other markets (1944, 6 fn4), considering the two notions equivalent - «the choice is merely a matter of convenience» (Lange 1945, 6, fn4). While Patinkin rejected the former, which he associated to the wage rigidity hypothesis, and endorsed the latter (see Boianovsky, 2006, 204), in Modigliani both notions of unemployment equilibrium

[25] Modigliani also explained that in the Keynesian case the wage rigidity hypothesis is necessary to avoid over-determinacy of the system, «to which you refer on p. 51 of your Cowles Commission manuscript and which you treat at great length in ch. 6 and 7…» (ibid).
[26] Modigliani's and Patinkin's different readings of the wage rigidity assumption also reflects their different approaches to economic analysis. Where there was a choice between rigor and convenience, Modigliani chose the latter (see for example 1944, 46), thus he introduced wage rigidity since it «oversimplified the matter», while Patinkin, chose analytical rigor. On different approaches to macroeconomic analysis see Mankiw 2006. Regarding Patinkin's effort to differentiate his own approach from that of Modigliani, see Boianovsky (2006, 217). On Patinkin's search for a microfoundation see Boianovsky, 2006, Rubin, 2010, De Vroey, Duarte, 2012.

coexist. He referred alternatively to a market-clearing definition (implied in his use of the perfect elastic labor supply) and to Keynes' definition of equilibrium in the sense that there are not automatic forces leading to full employment (i.e. consistent with an excess labor supply). Since Modigliani did not adopt a Walrasian perspective (see in the beginning of his article) his equations were not microfounded[27]. Therefore, he did not see any inconsistency in the notion of unemployment equilibrium. According to him involuntary unemployment meant workers inability to fulfill their desire due to wage rigidity: «in a free capitalistic economy production is guided by prices and not by desires and since the money wage is rigid, this desire fails to be translated into an economic stimulus» (1944, 66).

The inconsistency between laborer's desire to work and unemployment (equilibrium) represented, instead, Patinkin's starting point in his study of Keynes theory in relation to the classical one, which led him to define involuntary unemployment as the situation in which workers are off of their labor curve supply.

Modigliani only refers to the rational behavior hypothesis implied in the homogeneity assumption and thus on the non-rational behavior assumed in his labor supply function. This hypothesis represents precisely what distinguishes classical from Keynesian economy. He did not discussed possible reasons for such rigidity in the article (institutional and historical) while, in his correspondence with Patinkin, he introduced money illusion: «The hypothesis that workers bargain primarily for money and not for real wages, that they will resist money wage cut even if there is unemployment … all these seem to me an essential part of the reasoning of the General Theory» (Modigliani to Patinkin: July 2, 1948, italics added).

The role of money illusion to reach classical or Keynesian results had been discussed by Marschak in 1943, and in the 1947-48 Chicago classes (Marschak, 1951)[28]. For both Modigliani and Marschak, money illusion implied non-neutrality of money, even if through different analysis. In Modigliani money illusion meant wage stickiness or wage

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[27] In his (unpublished ?) reply to Hahn's (1955) Modigliani explained that his model was not stated in general equilibrium language «as it become fashionable since that time of its appearance» (MP). Modigliani restated the 1944 model in Walrasian form in 1963 to reply to the so-called Patinkin controversy. Modigliani had clarified his methodological approach at the beginning of his 1944 paper: «As first step … we must set up a system of equations … In doing this we are at once confronted with a difficult choice between rigor and convenience; the only rigorous procedure is to set up a complete 'Walrasian' system…but this system is cumbersome…The alternative is to work with a reduced system» (1944, 46).

[28] Marschak's influence on Modigliani's wage rigidity hypothesis can be traced only indirectly since in their correspondence no relevant points emerge.

rigidity, with real variables depending on the quantity of money, in Marschak that prices enter the system of behavioral equations (see Boianovsky) and does not imply wage rigidity. In the 1943 article Marschak tested the validity of the assumption of free of money illusion with regards to the analysis of individual demand function, concluding that it was plausible that changes in income affect demand more than change in price. In his 1947-48 Chicago classes Marschak returned on its validity reaffirming that the assumption of free of money illusion was not realistic (1951, 59). Then Marschak distinguished between the «extreme Keynes' case"» and the classical case on the basis of money illusion in the supply sub-set (formed by the labor market functions and the production function), or in the demand sub-set only (formed by private and public expenditures and liquidity preference in which the demand for money is also function of taxation). In the former case, under the hypothesis of wage flexibility, any "«revisions of workers' supply schedule» only affect prices and not the employment level (the demand sub-set being horizontal with respect the real income-price axis (1951, 69)[29]. According to Marschak this result was consistent with a definition of unemployment in terms of the inability of wage cut to increase employment, introduced by Keynes' in Ch. 19. Under the additional assumption of money wage rigidity, which leads to the excess labor supply over demand, we have unemployment also in the sense that not all people willing to work at the existing wage and price get job, discussed by Keynes' in ch. 2. In other words, when the two classical assumptions of no money illusion and free labor market where combined the physical output is completely determined by psychological and technological conditions, independently from price fixation or monetary policy. On the contrary, when one or both hypotheses are removed Keynes' unemployment emerges, which is not far from Modigliani's conclusion.

Modigliani returned to his 1944 paper in the beginning of the 1960s with «The Monetary Mechanism and Its Interaction with Real Phenomena» to reply to the so-called Patinkin controversy on the cash balance effect. The paper represents a summary of Modigliani's extensive notes on «The Theory of Money and Interest in the Framework of General Equilibrium Analysis», wrote in the beginning of the 1950s, where he discussed the role of money in a Walrasian framework under static and dynamic conditions, flexible and rigid wages and prices[30]. As stated in the 1963 article

[29] According to Boianovsky (2002, 232-235) his result is very closed to Patinkin's demand-constrain unemployment theory (1949 and 1956).

[30] As explained in his correspondence to Jacques Drèze, these notes were motivated by critics of his 1944

his mid-1950s model responded to the same philosophy of the early one although constructed in a general equilibrium language, the introduction of bond market and the abandonment of the perfect elastic labor supply. In his notes, in fact, Modigliani defined wage (or price) rigidity as a case in which wage (or price) is not permitted to fall even if there is an excess supply in the market for the $i^{th}$ commodity. Nonetheless, Modigliani's early emphasis on the crucial role of money and his interpretation of unemployment as the equilibrating mechanism of the money market, were reaffirmed.

In successive interviews on Keynesian economics, Modigliani explains that unemployment was (and is) not a «transitory disease» but a «variable that clears the money market… It seems like a dysfunction since we think that full employment is what an economy should produce. But unemployment is a systematic feature of an economy relying on money to carry out transactions» (Barnett, Solow, 2000, 229). In his autobiography Modigliani argued that, in retrospect, he would revise completely the presentation (but not content) of his 1944 article, to make his position more clear. He still emphasized the importance of wage rigidity in the Keynesian system since it leads to «a redefinition of the notion of market equilibrium» (2001, 3). On the other hand, he pointed out the relevance of liquidity preference «in the transmission mechanism from money to employment» (ibid). He defined the classical model a special case in which wages are assumed to be flexible with respect to the Keynesian general model and added: «the difference between rigidity and perfect flexibility turns out to make an enormous difference in the 'monetary mechanism' – the mechanism that ensures the clearing of the money market – and the role of unemployment» (ibid, 20)[31].

Patinkin returned on Modigliani's wage rigidity assumption in his influential 1956 book in regards to Keynes' theory of interest. According to Patinkin, this assumption «carry us into a Keynesian world of unemployment in which monetary changes express themselves primarily in changes in the level of real national income and the rate of interest and only secondarily - if at all – in changes in the level of prices» (1956, 229-

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paper from Hahn (1955) and Patinkin (1949 (48), 1950-51): «My latest absorbing occupation has been monetary theory and the famous Patinkin's controversy. The whole issue was kindled by three factors: 1) a very sharp attack on my liquidity preference paper written by Hahn …; visit and lecture here by Patinkin who is visiting professor at John Hopkins …; the preparation of my course in monetary theory… I have made some very remarkable progress and have finally established the result that the whole Patinkin's controversy in which all people have made a large number of mistakes, and I, myself, am by no means above blame…. (Modigliani to Drèze, January 30, 1956, MP). These notes should became a monograph on the subject.

[31] I only mention Modigliani's later remarks on Keynesian unemployment with respect to his 1944 article since discussion of his successive reading of the paper is beyond the scope of the present paper.

230). Nonetheless, he pointed out the «merely heuristic nature» of the argument. His focal point (in Chs. XIII and XIV) remained the relation between commodity and the labor markets to explain unemployment[32], rejecting once again Modigliani's explanation on the basis of the inability of wage cut to restore full employment: «… we have shown that reductions in this [wage] rate are neither necessary nor a sufficient condition for the rapid reestablishment of full employment equilibrium» (1956, 237-238). Since « he essence of involuntary unemployment is … being off this curve, the necessity for positing any special shape of the labor supply curve in order to speak of involuntary unemployment disappears» (1956, 239).

## 4. Conclusion: Modigliani and the Neoclassical Synthesis

In spite of Modigliani's focus on the working of a monetary economy and its relation to unemployment equilibrium Leijonhufvud, in his influential book on Keynesian economics, denounced that the main interpretations of Keynes's theory (he referred to Modigliani among others) - based on the interest insensitive investment hypothesis or the assumption of wage rigidity - lost the monetary origin of and solution to unemployment, concluding that: «Ironically, the income-expenditure theorists are often, though not always, in accord with the 'Classical' diagnosis: unemployment shows that wages are too high and it would be well if they were lower …» (1968, 335)[33]. Blanchard, in the New Palgrave (1987), ascribes to Modigliani's 1944 article a central role in the construction of the neoclassical synthesis due to his wage rigidity hypothesis However, his claim on the neoclassical synthesis neglecting of the monetary side of the system and its inclination towards fiscal policy appears in stark contrast with Modigliani's 1944 analysis.

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[32] Discussing the case of wage rigidity Patinkin referred to Hicks' (1937) and Modigliani's (1944) system of equations without further comments. Patinkin had already discussed several aspects of Modigliani's monetary theory in his 1949 paper, especially with reference to Modigliani's defense of the classical dichotomy. Differently from Modigliani, who analyzed the effects of monetary variables on real sector, and connected his 'general theory of interest' with his unemployment equilibrium theory, Patinkin distinguished between Keynes' monetary theory of interest and Keynes' theory of involuntary unemployment.

[33] In an interview conducted by Snowdon and Vane, Leijonhufvud 'admitted' that his criticisms to the neoclassical synthesis were addressed to Modigliani's 1944 article but since he had «so much respect and affection for Modigliani» his book avoided challenging Modigliani directly (2004, 124). Leijonhufvud had been Modigliani's student at the Northwestern University in 1960-62 and he ascribes his decision to concentrate his graduate studies in the field of monetary theory to the influence of Modigliani's and J. G. Witte's teachings.

Blaug (1986), discussing the different reading of Keynes' *GT*, puts together Modigliani and Patinkin theories on the basis of their focus on ch. 19 to which, however, Modigliani did not referred. Blaug also considered Hansen one of the main interpreters of Keynes' system in terms of a redefinition of the labor supply function, spurred by Modigliani's 1944 paper, and ascribed to Hansen-Modigliani the popularization of the wage rigidity interpretation of Keynesian unemployment even though they adopted different explanations (lack of investment opportunities *vs.* scarcity of money supply) and solutions (fiscal *vs.* monetary policy)[34].

As it is known the neoclassical synthesis has a quite vague meaning ranging from the IS-LM interpretation of Keynes to the market failures approach. De Vroey and Duarte (2012) indicate two distinct ways in which the terms neoclassical synthesis has been used: the program of integrating classical and Keynesian analysis through some gravitational process … searching for a connection between short and long run theory, and a pluralistic approach to macroeconomics, with classical and Keynesian theories coexisting side by side (5). Under this point of view Patinkin certainly contributed to the foundation of the former research program while Modigliani should be connected to the latter. Modigliani insisted on the different working of classical and Keynesian economics on the basis of wage rigidity without searching for a synthesis between the two: Keynesian and classical results were discussed separately. His original model was not set in Walrasian framework and his equations were not microfounded, as showed by the coexistence of different meanings of unemployment and equilibrium. Nonetheless, Modigliani' 1944 article became famous as a seminal contribution in setting Keynesian economics «on its modern evolutionary path … probing its microfoundations…» as Samuelson's quotation at the beginning of this paper shows. How Modigliani's article has been embodied in the search for a synthesis between classical and Keynesian economics? As already argued, Modigliani's defense of classical dichotomy and his focus on wage rigidity had been read since the beginning as a defense of classical theory and a first step towards the reconciliation between classical microeconomics and Keynesian macroeconomics. With the increasing traction of the micro-foundations research program Modigliani's interpretation of Keynes' unemployment theory in terms

[34] See also Colander (1996, 29). According to him Keynes's reference to the existence of two opposing schools is less in evidence in the modern literature where «the contrasts take the form - initially prompted by Hansen, Klein, Modigliani and others early proponents of the 'rigid wage version' of Keynesian economics, that the economic system would be self-adjusting if (contrary to experience) wages and prices would adjust rapidly» (Colander 1996, 29).

of wage rigidity has been related to the analysis of labor market (trying to explain such rigidity from a microeconomic point of view) rather than to Modigliani's monetary theory. This also led to a definition of unemployment as the result of market failure and to consider his early work within the research program carried out by Patinkin. However, while in Patinkin wage rigidity represented a failure preventing equilibrium for Modigliani it was an historical or institutional fact and involuntary unemployment the equilibrating mechanism: it is through a fall in output and employment, to offset the excess demand for money, that monetary equilibrium can be restored. According to Modigliani «unemployment is a systematic feature of an economy relying on money to carry out transactions» (Barnett, Solow, 2000, 229).

This shits of attention in the reading of Modigliani's 1944 article, from the monetary to the labor market conditions can be also explained by increasing controversies between classical and Keynesian economists on the correct interpretation of the *GT* over the 1950s and 1960s, which led to fit each interpretation within one or another school of thought[35].

The 'reductive' interpretation of Modigliani's paper is also representative of a way of doing macroeconomics that prevailed since the schematizations of Keynes' *GT* onwards, devoted to level out every position. This can be read as the result of two opposite trends in economics: on one side the increasing formalization of the discipline with its need of reducing complex phenomena to simple ones in order to make models manageable and, on the other, the popularization of economics teaching and the diffusion of elementary textbooks[36]. Different causes, which have different weights in the explanation of a specific phenomena, are considered identical without taking into account their feedbacks on the whole system, as in Modigliani's case. In his analysis the causal relations did not move merely from wage rigidity to involuntary unemployment but from the money market to the real one. Furthermore, even if fixed money supply and wage rigidity both explained unemployment, they are not considered equivalent in

[35] The Neoclassical Synthesis represented an important example in this direction. According to Pasinetti, (a long-lasting friend data of Modigliani), it was «a kind of umbrella, general enough as to be able to cover *all* economic theories, including also Keynes's theories», where, however, Modigliani hardly finds a place: «Franco may not have not explicitly objected to such formulations. But my feeling most definitely is that that was not his approach. Keynes's theories are not an essential component of Samuelson's 'neoclassical synthesis' ... Modigliani's theoretical framework would be inconceivable without Keynes's *General Theory"* (Pasinetti, 2005, 28).

[36] See Weintraub 1991, who argued that the mathematization of economics, which occurred between the late 1930s and the early 1950s «were not merely cosmetic: The mathematical *forms* of the arguments significantly altered the *substance* of the arguments» (1991, 1).

once expectations and income distribution are taken into consideration.

Thus, the rediscovery of the original aims of the author (to discuss the relation between monetary and real variables on the basis of different wage behavior) helps not just to set the record straight, regarding Modigliani's contribution to the neoclassical synthesis, but also to appreciate the complexity of his vision – accordingly to the historical context in which it developed - in respect to a 'mechanical' reading of his model[37].

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[37] I thank the anonymous referee for suggesting me to reflect on the kind of contribution my paper wish to adduce to the history of economic thought. The standard interpretation of Modigliani's paper also shows how easily a same assumption (wage rigidity) and model (the IS-LL) can be manipulated according to different purposes (the description of the working of monetary and real economy *vs* the synthesis between micro and macroeconomics relations, classical and Keynesian theories. On the 'flexible' use of models in economics see Morgan (2012).

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