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TITLE	"Adaptive Expections" and Phillips Curve: A Comparison of Them with Other Macroeconomic Schools and Their Relevance for DCs, LDCs and Nics
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ABSTRACT	The focus of this article is the "adaptive expectations hypothesis" of Milton Friedman and his analysis of short-run and long-run Phillips Curve. In order to analyze these contributions of M. Friedman more clearly, discussions about the Phillips Curve and different views about this issue according to various macroeconomic schools and information about the evolution of the Phillips Curve Analysis are given. In this sense, apart from Milton Friedman and Monetarists, Phillips Curve was analyzed in a successive order compatible with the history of discussion within Keynes and Keynesian economics, New Keynesian Economics and New Classical School operating with "rational expectations hypothesis".
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"Adaptive Expectations" of Milton Friedman and Monetarists and Phillips Curve; And the Comparison of them with Other Macroeconomic Schools

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Abstract— The focus of this article is the "adaptive expectations hypothesis" of Milton Friedman and his analysis of short-run and long-run Phillips Curve. In order to analyze these contributions of M. Friedman more clearly, discussions about the Phillips Curve and different views about this issue according to various macroeconomic schools and information about the evolution of the Phillips Curve Analysis are given. In this sense, apart from Milton Friedman and Monetarists, Phillips Curve was analyzed in a successive order compatible with the history of discussion within Keynes and Keynesian economics, New Keynesian Economics and New Classical School operating with "rational expectations hypothesis".

Keywords: adaptive expectations; phillips curve

I. PHILLIPS CURVE ANALYSIS IN MAJOR MACROECONOMIC SCHOOLS

A. Phillips Curve Analysis and The Early Keynesian Interpretation of The Phillips Curve

Keynes's and early Keynesian economists' assumption that any price increase which could be considered as inflationary will not be observed before the equilibrium settles at the full-employment equilibrium level was firstly refuted by the English economist A.W. Phillips (1958). Although A.W. Phillips is affiliated to the Neo-Keynesian school, with his Phillips Curve Analysis called after his name which is about the choice between the nominal wage (or the general price level) increase and unemployment rate and with the help of some econometric researches reaching a conclusion different from Keynes and the early Keynesian economists, he criticized the Keynesian economic and policy recommendations. According to A.W. Phillips, the increase in the nominal wages and hence the increase in the general price level would be reaching inflationary dimensions before the economy reaches the full-employment equilibrium.

The first headstone about the relationship between increase in the nominal wage (or in the general price level) and unemployment was formed with the study of A. W. Phillips dating 1958. As a result of Phillips' assertions, Keynesian economists abandoned their assertion that the full-employment

equilibrium will be reached without experiencing any inflationary price increases and they included the Phillips Curve Analysis within their own system adopted their monetary and fiscal policy recommendations accordingly. In the Phillips Curve Analysis, the aim is to choose the unemployment and inflation rate combination on the Phillips Curve which would give the least total social harm according to social utility curve of the society. Monetary and fiscal policies should then be applied accordingly; for example, rather than exceeding a price increase which can be regarded as inflationary, a certain amount of Keynesian unemployment resulting from the lack of effective demand can be endured (Baumol and Blinder, 1988). In the developed countries, any price increases higher than 3% are considered as inflationary.

However, the interpretation of the Phillips Curve Analysis incorporated into the Keynesian policy recommendations had one deficiency: The policy recommendations for the long-run were actually based on the short-run Phillips Curve Analysis and the analysis did not take into account the changes in the price increase expectations for the long-run which necessitated a deeper analysis based on short-run and long-run Phillips Curves since long-run and short-run Phillips Curve separation would be formed according to different price expectations against different price increases. This deficiency was firstly revealed by Milton Friedman (1968). These findings of Milton Friedman form the second and maybe more important headstone in the Phillips Curve Analysis (Blaug. 1985).

B. Milton Friedman, Monetarism, Adaptive Expectations, Short-Run and Long-Run Phillips Curves

Milton Friedman introduced the term "natural rate of unemployment – nru" which replaced the term "full employment" equilibrium level in the early Classical System and in the Generalized Classical System. At nru, the long-run aggregate supply curve in the economy steepens and the realization of unemployment rate which is lower than this point becomes impossible due to quite high price increases beyond this point. Nevertheless, according to Friedman, the economy would reach the equilibrium at this unemployment rate automatically in long-run. Still, according to Friedman, if the

aggregate demand is increased through monetary and fiscal policies, the economy would end up at a higher short-run Phillips Curve which is convex to origin. This point gives a combination of an annual price increase level which is would not be considered as inflationary and an unemployment level which is lower compared to the previous point. This process is as the way how the Keynesian economists first interpreted Phillips Curve. However, according to Friedman, this is only valid for the short-run and it is temporary. Because at this first stage of, let's say, 0% price increase, workers adopt a 0% price increase expectation, and they don't demand any further nominal wage increase. But this misconception in the expectations is only temporary. Workers will soon realize the err in their price expectations abandon their expectation of 0% price increase and will demand higher nominal wages by the same rate of the actual price increase. This means that, they would rearrange and adapt their price expectations in long-run. Friedman describes this process as "adaptive expectations". According to Friedman, the fall in the unemployment level through monetary and fiscal policies would be temporary, not permanent. In the long-run, the economy would turn back to nru again; hence the increase in the aggregate demand would only raise the prices in long-run. Under these circumstances, despite the existence of many and "short-run" Phillips Curves which are convex to the origin according to different price increases and expectations for these different price increases there is a "long-run" Phillips Curve perpendicular to the x-axis through which all the short-run Phillips Curves pass at nru and any long-run economic policy is actually based on this long-run Phillips Curve. Friedman, from this point of view, opposed to Keynesian policy recommendations of "fine tunings" of the aggregate demand curve and claims that increasing the aggregate demand would only increase the prices in long-run. Still, from this point of view, Friedman suggests not to increase the aggregate demand if there is unemployment in the economy. Because according to Friedman, within a period which is not considered too long (indeed, in a term, accepted as "long-run" in the economic theory), the economy would reach the equilibrium automatically at nru and not increasing the aggregate demand would actually keep the equilibrium within the price stability in long-run.

During the '60s, the budget deficit and inflation continued to rise due to the Vietnam War in USA; together with both this case on one hand and negative effects of the increase in the oil prices by OPEC in the early '70s on the other hand, the Keynesian approaches fell from being the mainstream during the '70s in the academic circles. Meanwhile, the Monetarist approach of Friedman gained strength in the economic literature.

The foundations of Monetarism were laid by Friedman just in the midst of '50s (1956); but Monetarism gained importance in the academic circles with the studies of Friedman about the fact that the velocity of money is a more stable coefficient compared to the Keynesian investment multiplier (Friedman and Meiselman, 1959; Friedman and Schwartz, 1971).

Later on, especially in the '60s, during the Vietnam War, budget deficits, balance of payments deficit and inability of preventing the inflation caused Keynesian policy recommendations to be disgraced. The increase in the oil prices by OPEC in the '70s giving rise to stagflation, the balance of payments deficits, the negative growth rate, the decrease in the national income and the inability to take sufficient and necessary precautions against these problems in the economy, gave rise to criticisms coming from the Monetarist economists and New Classical economists against the Keynesian System and their policy recommendations. Meanwhile, many economists, together with Friedman, asserted views within the Monetarist approach; economists such as Karl Brunner (1969, 1971) and Allan Meltzer (1976) are especially among them.

Monetarism not only spread out in the academic circles, but the Monetarist policy was also applied both in USA during Reagan Era (1980-1989) and in England during Margaret Thatcher Era (1979-1990) for a short time, but it was abandoned later on. The Keynesian economists claimed that the economic policies applied in the USA in the 60s were contrary to the policy recommendation of Keynesian economic consultants of that era; therefore, it would not be possible to deduce that Keynesian approaches for balance of payments deficit, budget deficit and inflation were wrong for that period. Similarly, Monetarists interpreted that their monetarist policy was ineffective simply because the monetarist policies were applied in a wrong way (Klamer, 1984).

C. Neo-Classicals Operating with Rational Expectations Hypothesis

Parallel to the Keynesian System being on the demise in the '70s, New-Classical School which operates in accordance with Monetarism but with "rational expectations hypothesis" different from Monetarism, was founded. In fact, the rational expectations hypothesis was introduced by John Muth in 1960-61, but its evaluation of the use terminology within a general macroeconomic approach belongs to Robert E. Lucas Jr. towards the end of '60s and beginning of '70s (Lucas and Rapping 1969, 1970, 1972). Although Lucas, like Friedman, is a graduate of Chicago University and a younger academician; there is no consensus between them. As it will be mentioned later on, the New Classical economists operating with rational expectations hypothesis oppose to both the Keynesian System and their policy recommendations and to Monetarism and monetarist policy recommendations, asserting that the monetarist policy recommendations would not bring any result. Apart from R.E. Lucas; Thomas Sargent (1978) Neil Wallace and Thomas Sargent (1976) and Robert J. Barro can be named as the representatives of New Classical economists operating with rational expectations.

There are two main assumptions in their approach: First one is the "rational expectations", the second and the basic one is the assumption that the wages and prices to be perfectly elastic (Klamer, 1984).

According to Keynes and Keynesian economists, workers err in their price expectations subjectively and they systematically underestimate price increases for the future and according to their prediction, they demand a low nominal wage increase; resulting in a decrease of the real wage and a short-run aggregate supply curve being positively related to the price level. Therefore, in the case of an increase in the aggregate demand through monetary and/or fiscal policy, the real income and employment would increase together with an increase in

prices to some degree, and the rate of unemployment would decrease. Parallel to this, it was possible to attain a low rate of unemployment with a higher (but not considered as inflationary) price increase on the Phillips Curve. Contrary to this, Friedman developed "adaptive expectations" hypothesis and for the first time introduced the term short-run and long-run Phillips Curve.

With the hypothesis of "rational expectations", New-Classicals adopted a more radical approach compared to Friedman. According to the New-Classicals, all the decision-making units in the economy (such as entrepreneurs, workers etc.) can access the most accurate and basic information instantly and can make the most accurate decision instantly according to these data. The decisions do not have to be "right on"; what matters is that their decisions do not include any "systematic error". In this sense, workers can predict future price increases correctly even in the in the short-run and will demand a nominal wage increase accordingly. Especially, as the case of Keynesian System, systematic errors in the price expectations and the price expectations being lower than the actual price increase is not the question. Hence, both the short-run aggregate supply curve and the Phillips Curve for the New Classicals operating with rational expectations form a perpendicular line independent from the prices. New Classicals have also adopted Friedman's concept of nru; the positions of both the aggregate supply and the Phillips Curve are determined by nru. In other words, New-Classicals operating with rational expectations adopt more radical hypothesis and therefore differ from both the Keynesians and Monetarists and oppose to both of them.

Another point which is different from Monetarism in the New Classical School is the foreknown and predicted economic policies. According to the New-Classicals, decision-making units would make their future predictions according to these foreknown economic policies and their effects in the economy. In this case, foreknown, predicted policies will be having no effect at all. This criticism is directed towards Monetarists as much as towards monetary and fiscal policies in the Keynesian approaches. Because Friedman and Monetarists asserted that in order to decrease the unemployment; increasing the aggregate demand through monetary and fiscal policies would have no effect; it will only give rise to prices increase in the long-run. However, according to Monetarists, the supply of money should be raised at a constant rate because in the long-run the accumulation of capital and technological progress would give rise to an increase in the growth rate. According to Neo-Classicals operating with rational expectations, on the other hand, this monetary policy can again be predicted by all the economic decision makers including the workers taking account the effects of this monetary policy on the prices in their price expectations; monetary policy is ineffective. It means, New Classicals oppose to the policy recommendations of Monetarists as much as the Keynesian economists (Klamer, 1984). According to the New Classicals, there is no other way but to apply unpredictable "shock" economic policies in order to make a change in the economic parameters.

The second and more important assumption of New Classicals is the perfectly flexible wages and prices. In this case, all equilibria will be reached within the Walrasian general equilibrium analysis as a result of changes in price; – and more importantly, rather than via price increases, via possible price decreases- at nru. We can show the price flexibility assumption being a more crucial assumption than the rational expectations by this way: Some of the New Keynesian economists conducted testing models operating with the rational expectations hypothesis but inflexible prices and wages. These models gave the result of Keynesian unemployment; hence Keynesian monetary and fiscal policies were more effective in decreasing the unemployment level (For example: Fischer 1977, 1980; Taylor 1975, 1979).

D. New Keynesian Approach and Phillips Curve

The New Keynesian economists who oppose both to Monetarism and New Classical School operating with rational expectations hypothesis made important corrections in the Phillips Curve Analysis compared to the early Keynesian interpretations of the Phillips Curve in the '60s; yet continued to oppose to both approaches.

It must be stated here that the Keynesian economists, together with Keynes, had great contributions to economic literature and generations belonging to Keynesian schools can be stated; Alvin Hansen, Paul Samuelson, J. R. Hicks, R.Harrod, R.G.Allen, J.Duesenberry, L.Klein, N.Kaldor, Ragnar Frisch, James Tobin, S. S. Alexander can be stated within the early Keynesian generation. William Heller, Gardner Ackley, F. Modigliani, R. Solow, R. Musgrave, William H. Branson are the representatives of Keynesian school from farther generation. We can mention especially Alan S.Blinder, Stanley Fischer, R.Dornbusch, John B.Taylor within the latest Keynesian generation, namely, the New Keynesian generation.

We observe that the New Keynesian economists also analyze the short-run and long-run Phillips Curve separately. According to them, workers would change and raise their price expectations due to the actual price increases, and demand an increase in their nominal wages. However, in the long-run, there would still be systematic errors in the increase and correction of their price expectation; such as keeping their price expectations below the real price increase; hence, nominal wages will increase less than the real price increase. Under these circumstances, although "long-run" Phillips Curve is will steeper compared to the short-run Phillips Curves, it would still be convex to origin. In this sense, an increase in the aggregate demand through monetary and fiscal policies will give rise to a slight increase in prices and a considerable decrease in unemployment in the short-run. However, in the long-run, when the price expectations are further adapted to the real price increase, this time, there will be a higher increase in the prices and a less decrease in unemployment compared to the short-run. But, in long-run, despite a certain amount of increase in the prices compared to first period, still, a decrease in unemployment would be achieved (Branson, 1979).

In other words, it may take too long (longer than the long-run itself) to reach the long-run perpendicular Phillips Curve automatically; so that increasing the aggregate demand through monetary and/or fiscal policies and decreasing the unemployment would be a much practical and would take shorter time even in the long-run; although some degree of

price increase is inevitable. Here, we can choose a combination of long-run price increase and unemployment; in this sense, Friedman's policy suggestions are suitable, endure high rates of unemployment for such a long time for the sake of the price stability it is not acceptable (Baumol and Blinder, 1988).

New Keynesian economists also oppose to the views of New Classicals operating with the rational expectations. According to the New Keynesian economists, rational expectations hypothesis is not realistic. Apart from the inadequacy of information and cost of collecting the economic data, there would always be a possibility of systematic error in the predictions. But more importantly, the New Classicals assume perfect flexibility in the prices and wages. Yet, according to the New Keynesian economists, neither prices nor wages are flexible downwards so that the equilibria in the economy will not be reached through changes in both the prices and wages with respect to the Walrasian general equilibrium analysis. Prices and wages do not move downwards, so that the necessary adjustments will be achieved rather through changes in the quantities. And this will results in the Keynesian unemployment in the economy (Klamer, 1984).

As it was mentioned before, Keynesian approaches were regarded with suspicion, Monetarism has begun to propagate and found practice area and New Classical School operating with rational expectations has been founded in '70s. But the New Keynesian Economics drew great interest especially from young economists with higher mathematical skills and due to the fact that it is based on a very few corporate and non-economic assumptions. However during the 70's, Keynesian approaches become influential in the economic literature. Later on, in the 80's and in the 90's, Keynesian approaches have become more and more influential. Due to unsuccessful of implementation of monetarist policies in the '80s; Keynesian school became the mainstream economics once again in the theory policy implementations in the '90s. Although the New Keynesian Economics still prevails as the mainstream, both Monetarism and the New Classical School working with rational expectations have very important contributions to the macroeconomic theory.

Post-Keynesian macroeconomic school is particularly not mentioned in the article; because their view about the Phillips Curve Analysis is the same with the Keynesian school.

II. ANALYSIS OF THE PHILLIPS CURVE FOR FRIEDMAN AND MAJOR MACROECONOMIC SCHOOLS THROUGH DIAGRAMS

A. Phillips CurveAnalysis in the Keynesian System and the New Keynesian School

In this section, principles of Phillips Curve will be analyzed by the aid of diagrams and chronologically.

As it was mentioned above, in the years when Keynes came up with his new macroeconomic system, he believed that, despite some slight increases in costs and prices, full-employment equilibrium will be reached by an adequate increase in the aggregate demand through monetary and fiscal policies without experiencing any inflation. At this first stage of the evolution of the economic thought, Keynesian

economists shared the same view; according to them, full-employment actually meant the prevention of unemployment caused by the lack of effective demand. Otherwise, there would always be a certain amount of "frictional" unemployment (temporary unemployment caused by a change of occupation and/or place) and a certain amount of "structural" unemployment (decrease in employment in one sector due to a decrease in the supply and production in this sector, and these unemployed workers not finding a job in another sector due to their ages or inadequacy of their skills). Considered 3% of annual increase in real prices as inflationary in the developed countries, at the beginning of disputes Keynes and Keynesian economists assumed Phillips Curve given in Figure 1.
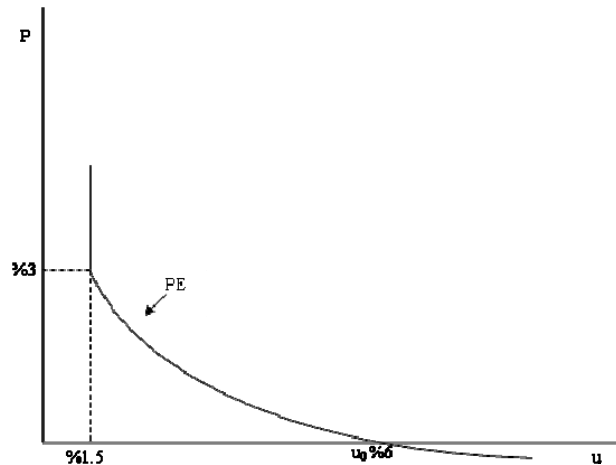
Figure 1. Phillips Curve used in Keynesian System

u_0 in the diagram represents the rate of unemployment in the beginning period and this rate is; for example, 6%. Say, that the frictional and structural unemployment in economy is 1.5%. According to Keynes and the Keynesian economists, when the Phillips Curve reaches the unemployment rate of 1.5%, i.e. when the unemployment caused by the lack of effective demand is eliminated totally (at "full-employment" equilibrium point), the increase in costs and prices will be a slightly below 3%. In other words, full employment point would be reached without inflation. Beyond this point, inflationary gap would occur and prices would rise rapidly. Hence, the Phillips Curve begins to steepen. At this stage, there is not yet any inflation possibility before the full-employment equilibrium and no discrimination between long-run and short-run Phillips Curve.

1) Findings of A.W. Phillips

When A.W. Phillips introduced the relationship between the rate of increase in the nominal wage ($\dot{W}$) and the unemployment rate (u) with his work and research dating 1958, he stated that before totally eliminating the insufficiency in the Keynesian aggregate demand by an annual nominal wage increase or accordingly by an annual price increase ($\dot{P}$), hence reaching the full-employment equilibrium, the economy might settle at a point which could well be considered as inflationary. We can show the relation between the increase in the nominal

wage ($\dot{W}$) and rate of unemployment (u) in A.W. Phillips with the function below:

$$\dot{W} = f(u) ; f < 0 \quad (\text{or } \dot{P} = f(u); f < 0) \qquad (1)$$

In case of a decrease in the unemployment rate, the rate of nominal wage (or price) increase will rise. In this case, the price increase exceeds for example 3% of inflation rate before the full-employment is reached (Figure 2). Say, as a result of technological progress and capital stock increase; the Marginal Physical Productivity of Labor would increase by 2%. Hence, the limit of inflation as the annual increase of nominal wages is equal to 5%. If the sum of frictional and constitutional unemployment was 1,5%, so that the Phillips Curve steepens beyond that point.

Under these circumstances, the 3% of inflation (or accordingly, 5% of annual nominal wage increase) would appear as 2,5% of unemployment just before unemployment due to the lack of effective demand is totally eliminated (Figure 2).

Figure 2.   The Relation between Nominal Wage (and Price) Increase and Unemployment Rate in A.W. Phillips

2) Early Keynesian Interpretation of The Phillips Curve

Following these contributions of A.W. Phillips, the Keynesian economists interpreted A. W. Phillips Curve as a political tool which maximizes the total social welfare or minimizes total social burden caused by the unemployment or inflation; the public opinion and the government would choose this point and through monetary and/or fiscal policies aim at the aggregate demand.

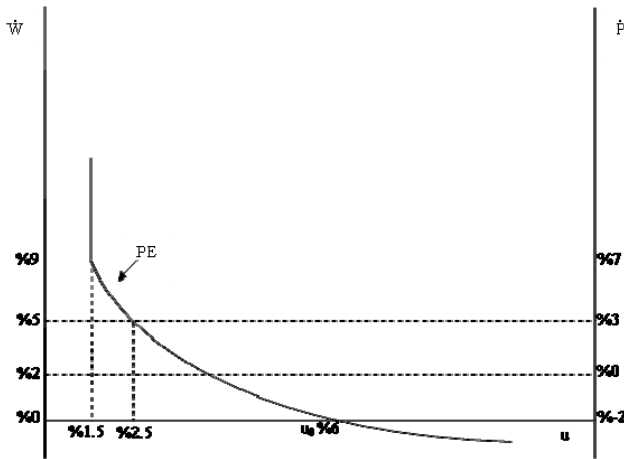This is explained in Diagram 3 with Aggregate Supply (AS) and Aggregate Demand (AD) Analysis. Say, that at the beginning; AD_0 and AS_0 and P_0 with y_0 (and accordingly, unemployment is 6%). If the aggregate demand is increased; the real income (y) will increase while unemployment will decreases parallel to this increase, and the general level of prices (P), i.e. the annual price increase rate ($\dot{P}$) will also be increasing. In Figure 3, different and increasing levels of AD and the increasing y and P can be followed:
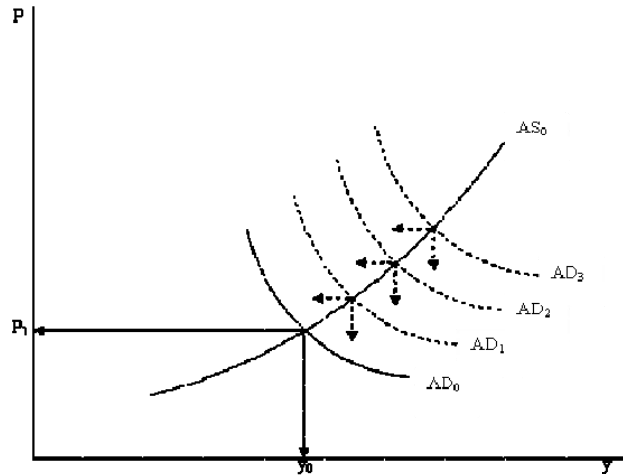
Figure 3.   Increasing Real Income and Prices against Increased Aggregate Demand

From these different combinations of different levels of P and y which occur according to these different AD levels, it is possible to attain the Phillips Curve presented in Figure 2. According to the early Keynesian interpretations, then let's say; instead of choosing a point of 1,5% unemployment rate (A point) which results from 7% P (or 9% W) or only from frictional and constitutional unemployment or current point (C point) which shows 0% price increase but 6% unemployment (unemployment resulting from 1,5% frictional and constitutional unemployment and 1% Keynesian demand inadequacy); B point which show 2,5% unemployment and 3% price increase in total can be chosen. In other words, before demand inflation and demand inadequacy are experienced before they are totally resolved and full-employment is achieved and accordingly a point which keeps price increase under "normal" level should be chosen as the target. Demand inflation is not a case that would be experienced after full-employment point.

B. Friedman, Changes in Prices Expectations, Short-Run and Long-Run Phillips Curve

The biggest mistake of Keynesian economists in this first interpretation is their implicit assumption that whatever the actual price increase would be, price expectations would not change. In fact, by accepting the fact that price expectations will not change according to price increases; analyses that would be valid only for short-run were accepted to be valid for long-run as well. In other words, any policy should not be chosen depending on short-run Phillips Curve. This mistake was revealed for the first time by Friedman in his works dating 1967, 1968.

Milton Friedman asserted that workers will absolutely change their expectations about price increase in case of actual price increases and will sooner or later estimate price increases in long-run correctly and demand nominal wage increase accordingly (*adaptive expectations*). Then, following the work

of Friedman, economists whom we gathered under the name of New-Keynesian here accepted that different price expectations would occur according to different actual price increases. Accordingly, we would see "short-run" Phillips curves (SRPC), more precisely Phillips family curves formed by different price expectations. However unlike Friedman; according to New-Keynesian economists workers would again make systematic error in long-run and demand nominal wage increase below actual price increase.

Then we need to include price expectations to the function of A. W. Phillips which determines the relation between nominal wage increase $(\dot{W})$ and unemployment rate $(\dot{u})$:

$$\dot{W} = f(u) + a\dot{P}; \ f'<0 \quad ve \quad 0 < a < 1. \tag{2}$$

As it is observed in the function, there is a negative relation between unemployment and nominal wage increase, but annual wage increase depends on annual actual price increase $(\dot{P})$ apart from this and according to New-Keynesian interpretation, the value of coefficient a related with price expectation and actual price increase is $0 < a < 1$. In other words, even if nominal wage increase is not arranged, this demand for nominal wage increase would be below actual price increase.

At this stage, say that

$$W = f(u) + aP; \quad f' < 0 \quad and \quad a = 0 \tag{3}$$

was accepted in the first Keynesian interpretation. As we will mention later on, Milton Friedman stated short and long-run separation as such:

In short-run: $\dot{W} = f(u) + a\dot{P}; \ f' < 0 \quad and \quad 0 < a < 1$ (4)

In long-run: $\dot{W} = f(u) + a\dot{P}; \ f' < 0 \quad and \quad a = 1$ (5)

And for Neo-Classicals operating with rational expectations this function is as such in much shorter-run:

$$\dot{W} = f(u) + a\dot{P}; \quad f' < 0 \quad and \quad a = 1. \tag{6}$$

The interpretation of New-Keynesian school mentioned above gives us a long-run Phillips Curve (LRPC) which is convex to origin though rather perpendicular (Figure 4) apart from short-run Phillips Curves (SRPC) (ie. giving different price expectations for different price increases) which are also convex to origin.
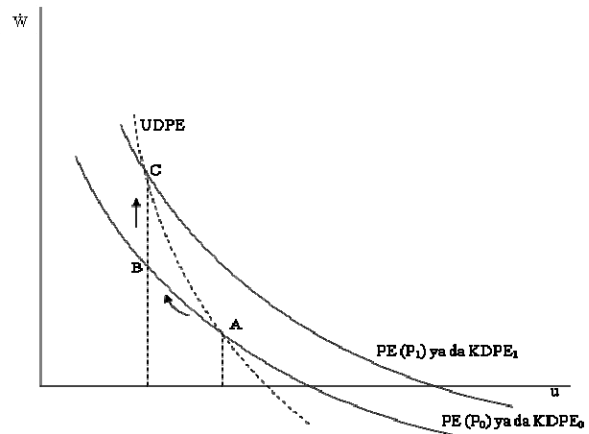
Figure 4.   New-Keynesian Short and Long-run Phillips Curves

According to New-Keynesian interpretation, say that, aggregate demand monetary and fiscal policies were increased moving from A point and u_0 unemployment rate in economy. First of all and when price expectations have not changed yet; there would be a shift from A point to B point on PE (P_0) or SRPC$_0$. Then unemployment would be pulled down to the rate of u_1, in addition there would also be a price increase. However this actual price increase would also increase price expectations of workers in "long-run". Then new short-run Phillips Curve would "shift" to PE (P-$_1$). According to this, economy would shift from B point to C point. This point means higher price increase and lower unemployment decrease compared to short-run. However; since it is assumed that systematic errors in price expectations still exist in long-run, though less, unemployment was decreased comparing to initial period. Then there would still be choice of unemployment or price increase principly and in Keynesian policies, decreasing unemployment by enduring a certain amount price increase is valid for long-run as well.

Depending on actual price shifts of the same New-Keynesian assumption, ie price expectations, there would be a long-run shift in Aggregate Supply Curve of lower level shift assumption. We can explain this in Figure 5.
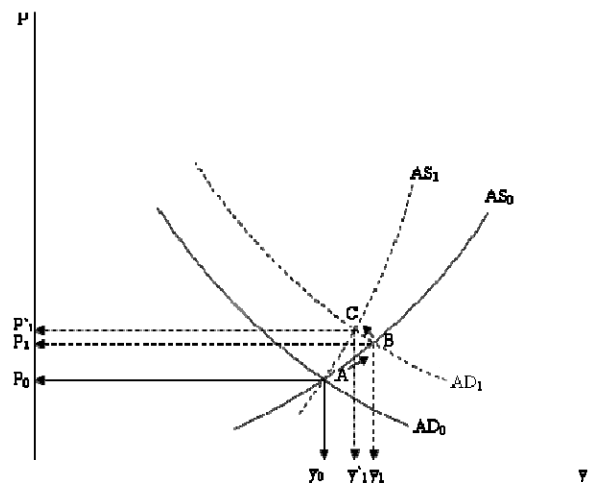
Figure 5. Shifts according to Price Expectations in Aggregate Supply Curve for New-Keynesians

Say that; AD_0 and AS_0, and P_0 and y_0 equilibrium is valid at the beginning. Again say that, this time aggregate demand was increase through monetary and/or fiscal policies and AD_1 becomes valid. Then, in short-run and before price expectations change, P_1 and y_1 equilibrium will be valid in short-run. But in the second stage and long-run, workers will increase their demand for nominal wage increase due to change in expectations caused by actual price increase, in other words they will decrease labor supply according to wage, then aggregate supply curve would steepen and become AS_1. And in this case, compared to short-run, economy in long-run would reach the equilibrium at higher price level (P'_1) and lower real income (y'_1) point. The equilibrium of economy would shift from A point, first to B and then to C. However, compared to starting period (to y_0 and P_0) real income has increased, employment has increase as well and unemployment has decreased (Branson 1979 and Klamer 1984).

Or according to New-Keynesian interpretation, although we assume a perpendicular long-run Phillips Curve in natural unemployment rate (*nru)* in "very" long-run, it would take such a long time to reach *nru* from existing unemployment point that instead of enduring high rate of unemployment during this very long time, we could choose to decrease unemployment at the expense of price increase by increasing aggregate demand through monetary and fiscal policies. This analysis and interpretation are shown with Figure 6 (Baumol and Blinder, 1988).
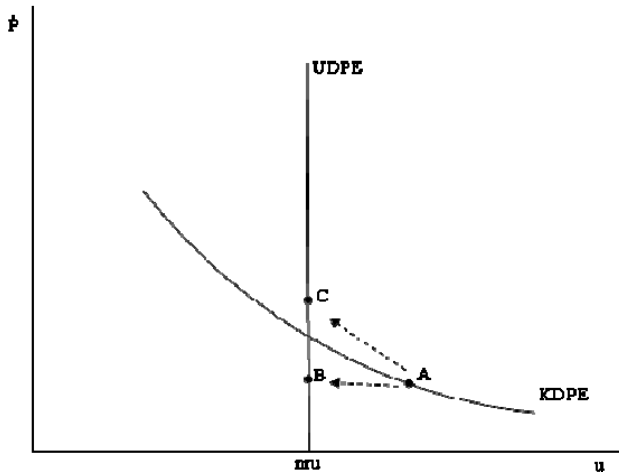
Figure 6. Long-Run Policy Choice according to New-Keynesians

Say that, economy is at A point and rate of unemployment is higher than *nru*. Then, if we leave economy by itself, *nru* point (say that B point on LRPC) would be reached after a long time. Therefore, according to New-Keynesian school, it would be more suitable to increase aggregate demand through monetary and fiscal policies, decrease unemployment instantly for certain amount of price increase, say that to choose moving toward C point. That is, according to Ne-Keynesian school,

monetary and fiscal policies should be implemented according to the analyses in Diagram 4 and Diagram 5.

1) Shifts in Aggregate Supply and Phillips Curve in Process of Time and Positive Sloping Phillips Curve

In the environment of stagnation especially in 70's and as a result of increase of oil prices by OPEC, it was realized that Phillips Curve shifted upwards. Studies carried out on this show that these shifts are as the way presented in Diagram 7 for USA.
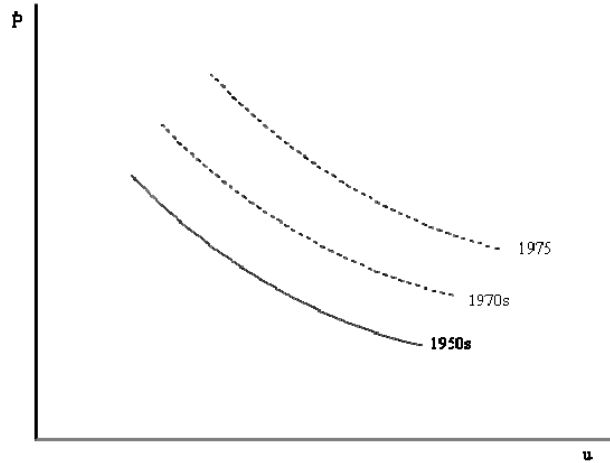
Figure 7. Shift in Time in the Phillips Curves

In this way, there may be a positive sloping LRPC in long term. But we should express that these shifts do not result only from changes in price expectations analytically, but also from reasons such as cost and energy restrictions in aggregate supply (AS) and Phillips Curves (PC). Shifts in AD and AS in the process of time, including shifts resulting from price expectations and therefore P and y compositions are presented in Figure 8. These shifts, as mentioned above, give *positive sloping* long-run Phillips Curve (LRPC) (Baumol and Blinder, 1988).
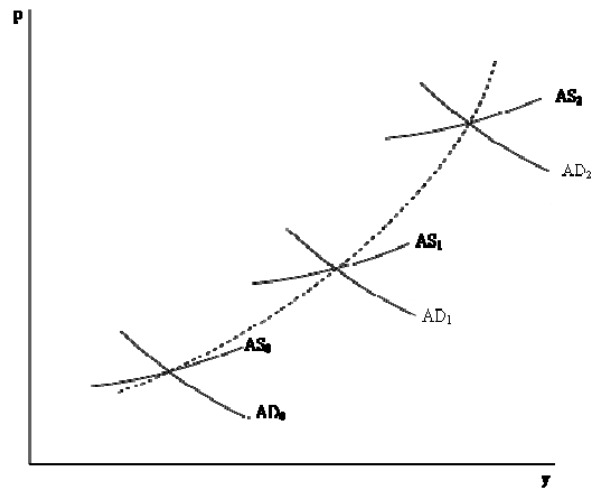
Figure 8.   Shifts in AD and AS in Time and the Possibility of a Positively Sloping LRPC

Figure 9.   Natural Rate of Employment for Friedman, Short and Long-run Phillips Curves

2) Principles about Phillips Curve for Friedman and Monetarists

As it was mentioned before, Friedman made great contributions to Phillips Curve analyses with his works dating 1967, 1968; he did not only mentioned about the views of Monetarists on this issue but also created effects that would change the views of all the other approaches and schools. Friedman also brought new terms and approaches such as *natural rate of unemployment and adaptive expectations* in these analyses. The meaning of these terms and a summary of Friedman's long and short-run Phillips Curve analysis based on these terms are presented in the section below (Blaug, 1985).

a)   Natural Rate of Unemployment

The focus point of Friedman's analyses are "natural rate of unemployment" *(nru); nru* can be defined as "natural" rate of unemployment observed at the level of real wages and which brings labor market to equilibrium, and at the same time on which the whole commodity market reaches equilibrium; corporate factor such as labor unions and existence of minimum wages laws can also play role in the formation of *nru*. Including the effects of all these factors, *nru* would stabilize the level of real ages in labor market; also assuming that there is no change in marginal physical productivity of labor, it would stabilize general level of prices as well. After *nru* point, labor productivity, therefore prices and costs increase rapidly. According to Friedman, when economy is left by itself it would reach equilibrium at this *nru* point sooner or later and without a long time-delay. But this may take place not in short-run but only in "long-run". That is, *nru* takes the place of Classical and Neo-Classical full-employment equilibrium with certain changes (Blaug 1985, P. 681).

Again, *nru* may not stay stable in economy in a process of time due to both corporate and other reasons. Therefore, while on one hand economy directs towards this rate in long-run, also the rate itself may change upwards or downwards in long-run.

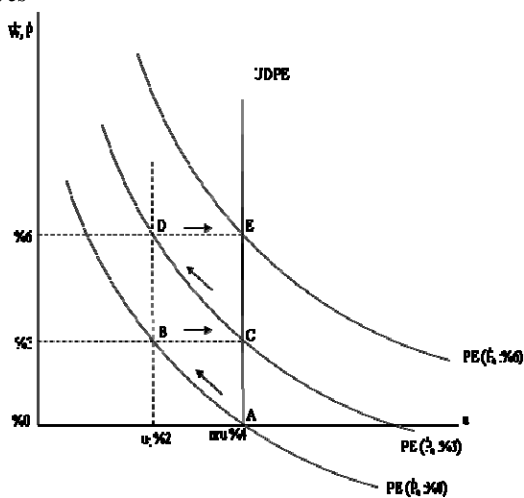*b)   Adaptive Expectations, Short and Long-run Phillips Curves*

Following Blaug (1985), the views of Friedman can be summarized with Figure 9. Simply assume that labor productivity stay stable in economy. That is, nominal wage increase $\dot{W}$ and general level increase of prices $\dot{P}$ would be equal and these parameters would be on y-axis. The rate of unemployment (u) will be on x-axis. Assume that natural rate of unemployment, *nru* is 4%. Then, *nru* would intersect negative sloping and convex to origin (short-run) Phillips Curve x-axis according to zero price expectation $\dot{P}_e$:% 0 at 4% point.

Now assume that government regard that 4% unemployment rate is too high and increase aggregate demand through monetary and fiscal policies in order to decrease it 2%. General level of prices (price of materials) would increase rapidly against aggregate demand increase, but money wages would not increase for some time. That is, the rate of unemployment will actually decrease to 2% against this decrease of real wages in short-run. Then, we will shift from A point to B point on short-run PE ($\dot{P}_e$:% 0) axis in Figure 9. At this point, workers still think that prices will be stable and do not demand nominal wage increase. That is, workers are mistaken in price expectations in short-run, as New-Keynesian economists accepted. There is no such fallacy for employers neither in short-run nor in long-run.

It was assumed in New-Keynesian approach that workers would correct this fallacy in long-run and increase nominal wages yet the fallacy would go on for a while in long-run. According to this and new price expectations, there was not a lot of shift in Phillips curve in long-run (Figure 4). It was accepted that it is possible to decrease the rate of unemployment through monetary and fiscal policies enduring a little increase of prices in long-run. In short, in Keynesian interpretation fallacy of workers' expectation about price increases sustained though diminished in long-run. In Friedman and Monetarism, workers can measure decrease in real wages exactly and demand nominal wage increase accordingly. So in Figure 9, there would be a shift to new Phillips Curve according to price expectation $\dot{P}_e$:%3. In this way, economy would shift to 4% unemployment rate again, that is to *nru* point.

Although price expectation of workers are less both ib short-run and in long-run compared to short-run in Keynes, although they are mistaken there is an assumption in Friedman and Monetarism that workers would correct their price expectations in long-run and adjust nominal wage increases accordingly and this is called "adaptive expectations".

Now if the government insists on policies that would increase aggregate demand in order to decrease unemployment rate to 2% and increases aggregate demand according to this, then economy again would shift towards D point in second short-run and E point in long-run in Figure 9, that is it would shift towards 4% natural rate of unemployment.

In this way as a result of "adaptive expectations" hypothesis in Friedman, long-run Phillips Curve becomes a perpendicular line at *nru* point. Then, decrease of

unemployment through monetary and fiscal policies would be valid only for short-run, that is for a short period of time. In long-run it would not decrease unemployment but only increase general level of prices. Friedman and Monetarists totally differ from Keynesian approach with this result and are drawn to Classical interpretation. However, in Classicals; full-employment equilibrium (natural rate of unemployment) can be reached automatically in short-run. In Friedman, natural rate of unemployment can be reached in long-run. As a result, increase of aggregate demand through monetary and fiscal policies cannot change real equilibrium of economy both in Classicals and in Monetarists, only increase general level of prices and nominal parameters.

This result would separate Monetarists from New-Keynesian economists totally in the sense of policy suggestions that should be implemented. According to Friedman and Monetarists, it was in vain to increase aggregate demand through monetary and fiscal policies in order to decrease unemployment in economy and it only would increase prices. This case, that is the choice of leaving economy by itself, is valid for the situation in which unemployment rate is actually below *nru.* Because in this case, unemployment rate would decrease and reach *nru* point by itself through adjustment of wages and prices in economy and decrease of price increases. Therefore, according to Friedman, fine adjustments about unemployment in economy by implementing Keynesian monetary and fiscal policies should be abandoned. On the contrary, the main policy goal should be price stability, expansionary monetary and fiscal policies should be abandoned, money supply in long-run should be increased only as much as compensating productivity increase in economy. Economy would reach *nru* point within price stability by itself and in long-run (or after relatively "short" time).

New-Keynesian economists oppose to these claims. According to them, economy would not reach *nru* point by itself and in a short-run. This would take quite a long time due to wage and price inflexibility and especially wage and price rigidity. Then according to New-Keynesian school suggestions of increasing aggregate demand through monetary and fiscal policies are still valid.

We can observe the difference between these two views with the help of Diagram 10 below which shows rather general case. In Diagram 10, long-run Phillips Curve was accepted perpendicular to *nru* point. Say that, in short-run Phillips Curve pases through (e) point and the equilibrium will be reached on (e) point. But say that for a moment, economy is at an unemployment rate below *nru* such as (d) and it was because of increase of aggregate demand through monetary and fiscal policies. Then adaptive expectation and nominal wage increase in long-run would sooner or later bring ud to, let's say (f) point on long-run Phillips Curve. Or say that, we are at (a) point on short-run Phillips Curve (SRPC) which is below actual unemployment rate *nru.* Then, when economy is left by itself, demands for nominal wage increases and therefore real wages would decrease against this high rate of unemployment and economy would reach equilibrium at (c) point let's say, on a long-run Phillips Curve (LRPC) and *nru* (Baumol and Blinder, 1988, s.355).
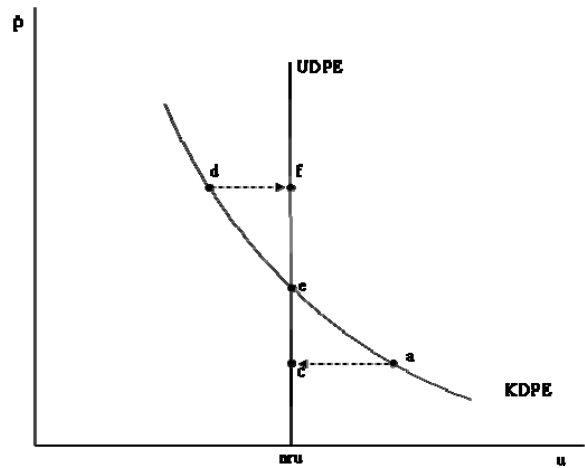

Figure 10. Long-run Perpendicular Phililps Curve and Shifts on this Curve

Actually, short-run Phililps Curve does not give us policy combinations (points) to be chosen. When the economy is left by itself, it would sooner or late reach *nru* equilibrium. According to Friedman, this adjustment takes relatively *short time* and economy reaches natural rate of unemployment in "long-run". In this case, according to Friedman, economy should be left by itself even if it is below the *nru* point because it would automatically reach the *nru* equilibrium by itself in long-run (or after relatively "short" time). Keynesian expansionary fiscal policy can enable further and rapid decrease in unemployment in the short-run, but in long-run, prices would have been increased in vain in this case.

We can evaluate the anti-inflationary policy recommendations of Friedman which aim to diminish the increase of money supply in order to bring down the inflation rate with the aid of a similar analysis. When anti-inflationary policies are implemented, the unemployment rate would be increasing in the short-time but in long-run, that is short-run for Friedman, it would turn back to *nru* point. This equilibrium of *nru* would be achieved with lower rate of price increase according to implementing expansionary old policy exactly and not implementing anti-inflationary policy (Baumol and Blinder, 1988, P. 358).

In this case, according to M. Freidman, Aggregate Supply curve is a perpendicular curve at real income level which is equal to *nru* and economy always turns back to this point in long-run. This can be observed in Diagram 11**.** Say that; AD_0 is aggregate demand and AS_0 is aggregate supply curves and y_0 is equilibrium; and y_0 is the real income level which gives *nru.* Now let's say, AD was increased and made AD_1 through monetary and/or fiscal policies.
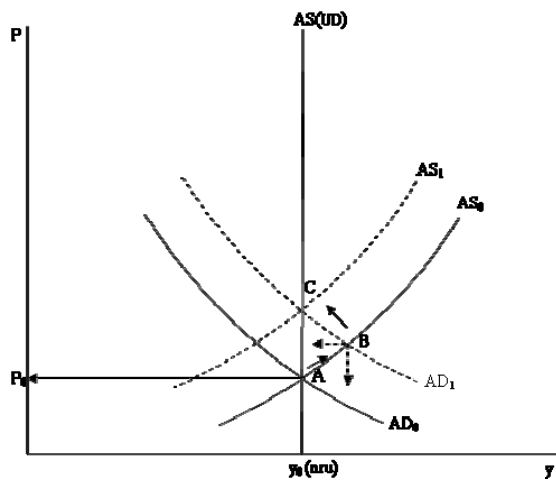
Figure 11. Equilibrium in Monetarists with the Aid of AD and AS Curves

In this case economy will reach equilibrium in short-run from A point at B point, y would increase, which means there would be unemployment below *nru* and a specific amount of increase in prices. This increase in prices would change price expectations of workers, in long-run workers would not be mistaken and make correct estimations and demand for nominal wage increase accordingly. Then AS would shift towards left and as a result of adaptive expectatios hypothesis, new AS curve would intersect with AD₁ at real income point which gives *nru*. In this case, long-run AS curve is perpendicular just like long-run Phillips Curve. Then according to Friedman, effects of increase of aggregate demand through monetary and/or fiscal policies on employment and unemployment would be temporary, as it was mentioned with the help of Phillips Curve before; aggregate demand increase in long-run would only increase prices.

New-Keynesian economists oppose to these analyses of Monetarists and suggestions of implementing anti-inflationary money policies instead of expansionary monetary and fiscal policies with this reason: First of all, wages and prices in economy are not as flexible as Monetarists assume in these analyses; especially wages and prices are less flexible downwards. In this case, if the economy is left by itself, unemployment would sustain for a long-time. Especially in the adjustment of price expectation according to inflation there is always delays depending on long time for workers and labor unions. That is, unless a very long time is considered, we should regard "long-run" Phillips Curve not as perpendicular but as negative sloping (Diagram 4). In short, according to New-Keynesian economists, it would not be possible to see long-run perpendicular Phillips Curve within a short time through adaptive expectations. Especially when a great unemployment is experienced, according to New-Keynesian economists, contrary to Monetarists view, it would be possible to decrease unemployment considerably in a short time and in "long-run" without experiencing great price increase. Changes in wage expectations of "long-run" prices, shift in Phillips Curve according to new price expectations and therefore increase of wage and prices should be taken into account and goal should be determined according to this.

For these reasons, according to New-Keynesian economists, as it was mentioned in the section about New-Keynesian Phillips Curve before, Keynesian policy suggestions are still valid. If we are at low income level, that is in depression period, through more effective fiscal policies; if we are at high income level and experienced one recession, then through more effective monetary policies; we can decrease unemployment by increasing aggraget demand and enduring specific amount of price increase (on condition that this price increase is more in long-run compared to short-run) (Branson, 1979).

C. Principles about the Phililps Curve Analysis in the New-Classical Systems Operating with Rational Expectations

New-Keynesian economists assume that workers are systematically mistaken in their expectations about the price increases both in the short-run and in the long-run. They increase their expectations in prices in the long-run compared to the short-run but their fallacy still sustains.

According to Friedman, workers are also systematically mistaken expectations about the price increases in the short-run but corrected their fallacy in long-run (after a relatively "short" time), that is, in long-run "adaptive expectations" hypothesis was holds true.

The New-Classicals diverge from both the New-Keynesian economists and the Monetarists with their "rational expectations" hypothesis. According to the rational expectations hypothesis, both workers and all other economic decision-making units obtain the necessary and the correct information about their decisions, evaluate them correctly and instantaneously without any mistake. In this sense, a worker adjusts his expectations in prices and real wages instantly and correctly just like any employer as it is generally accepted. This assumption is called "rational expectations".

Rational expectations hypothesis should not be interpreted as if everybody would always estimate the future price changes exactly, and as if they have access to all kind of detailed information about these. There might be a fallacy in the expectations. But these fallacies are not "systematic" according this hypothesis. New-Keynesian economists assume that workers and labor unions estimate the price increases always lower than the actual price increase; that is "systematically" lower. Friedman and Monetarists accepted the assumption that workers would be systematically mistaken in the short-run, but they would correct their fallacy in the long-run (adaptive expectations). According to New-Classicals, there would not be any fallacy and any systematic error in the short-run. The New-Classical "rational expectations" hypothesis leads us to this result.

New-Classicals operating with rational expectations do accept the "natural rate of unemployment" concept developed by Friedman and include it as is in their analysis. In this case, according to the New-Classicals, the Phillips Curve would be a perpendicular line at *nru* point in the short-run (Figure 12)**.** Hence, the Phillips Curve analysis actually becomes meaningless (Baumol and Blinder 1988, P. 362).
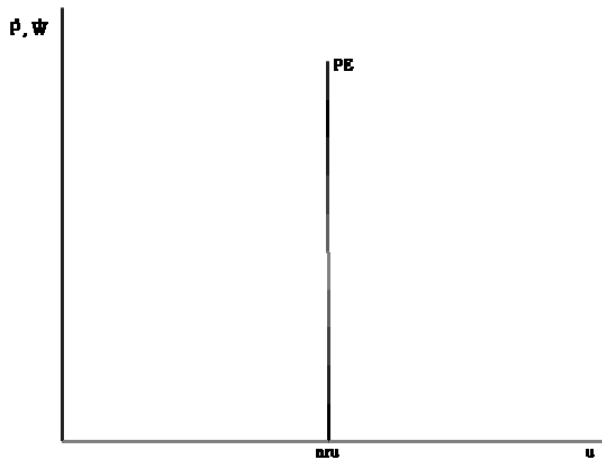
Figure 12. Phillips Curve in Neo-Classicals

Figure 13. Aggregate Supply Curve in New-Classical School

Again, in the New-Classical School, prices and wages are perfectly flexible. Hence, the economy will always come to equilibrium at the *nru* level in the short-run. In this case, it is useless for the government to intervene in economy through monetary and fiscal policies or by other means. The government should not intervene in the economy at all: expansionary monetary and fiscal policies cannot decrease the unemployment level in the short-run; they will only cause an increase the general level of prices. This criticism aims not only at the Monetarist policy recommendations but at the Keynesian policy recommendations as well. That is, according to the New-Classicals operating with rational expectations, any policy aiming to increase the money supply parallel to the economic productivity suggested by Friedman and Monetarists is futile. Because since all the economic decision-making units already expecting and knowing this policy, would take it into consideration in their expectations and decisions and make their decisions accordingly. In this case, there will be no positive effects of these economic policies. According to the New-Classicals operating with rational expectations, it would be effective only if government implements a policy that is not foreknown and not foreseen before. Or the course of economy may only change when an unusual event takes place hence the expectations are different than estimaed.
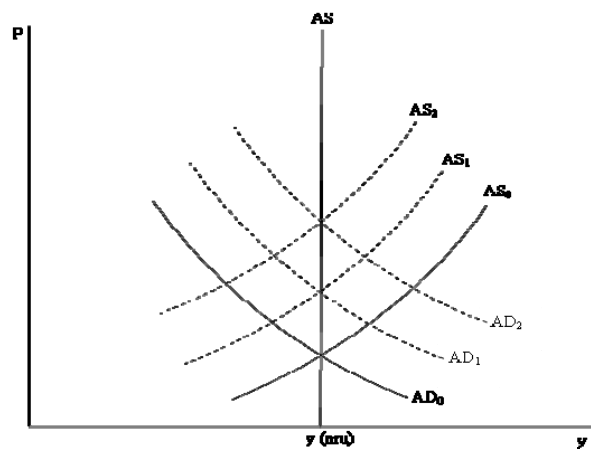
For the New-Classicals operating with rational expectations, AS curve is a perpendicular line at that y-level which gives *nru* in the short-run. In Figure 13, say that AD_0 and AS_0 are the aggregate demand and the aggregate supply curves which are at the equilibrium at y_0-level at *nru*. Now, suppose that the aggregate demand is increased to AD_1 through monetary and/or fiscal policies. The price increase will instantly raise the aggregate supply curve to AS_1 as a result of the rational expectations. Hence, at the new equilibrium of AD_1 and AS_1, y_0 would remain same; and the increase of the aggregate demand would only raise general level of price level P (or $\dot{P}$ in the Phillips Curve analysis). As all these AD-increases would create this effect instantaneously (AD_2 and this time AS_2), hence the AS is a perpendicular line at y-level which gives *nru* even in the short-run (Baumol and Blinder 1988: Klamer, 1984).

The New Keynesian economists oppose to the New Classicals operating with the rational expectations for two reasons (Baumol and Blinder 1988); First of all, according to the New-Keynesian economists; rational expectation hypothesis is not realistic. Economic decision-making units may not always be able to obtain every kind of information correctly and instantly: they can make errors; what is more, they can make systematic errors. The most important example of this is the systematic error is the workers' and labor unions' price expectations. Anyway, these systematic errors are actually in favor of the workers: they result in a decrease in the unemployment rate at the expense of some slight decrease in the real wages.

Second and the more important reason is, according to the New Keynesian economists, prices and wages are not flexible, as it was mentioned earlier, they are especially rigid downwards. Therefore, according to the New Keynesian economists, the analysis used in the New Classical School operating with the rational expectations does not reflect the truth.

III. CONCLUSIONS AND SOME OBSERVATIONS ABOUT RECENT YEARS

In this article, the aim is to compare the Phillips Curve analysis of Milton Friedman and Monetarists with the Phillips Curve analysis of Keynes, New Keynesians and New Classicals operating with rational expectations, and hence explain the differences between their general equilibrium analysis and policy recommendations. We will not make any evaluation about which school or approach among these three is the correct one. However, we observe that, although the views of both Monetarists and New Classicals operating with rational expectations gained strength and importance in the '90s; the Keynesian approach and, in this sense, New Keynesian Economics have been adopted and accepted as the mainstream thinking by most of the economists since the 90's. Looking at the policy implementations in the recent years, it can be thought that Monetarism is influenced by the New Classical School operating with rational expectation in the sense of decreasing the government interventions, balancing the budget or decreasing the budget deficit and downsizing the state. But these actual policy practices in this sense are, in fact, in tune with the Keynesian anti-inflationary policy recommendations. The monetary policies implemented by the Central Bank are generally present themselves as fine tunings against inflationary or recessionary trends. That is, the actual monetary policy implemented is different than both from the New Classical and Monetarist policies and included within the Keynesian policy recommendations (Klamer, 1984; Kaldor, 1985).

Keynesian-based views in literature and practice are generally valid today. In fact, the global financial crisis and the global recession which started in September 2008 and still sustain confirms this situation. Globalization is an extension of the open economy and was supported by many important economists such as Bhagwati (2004) and Rodrik (1999) but the same process has actually formed the basis of the economic crisis which started in the USA to propagate throughout the whole world. All developed countries, primarily the USA implemented Keynesian policies in order to prevent serious recession. Central banks increased the money supply by decreasing the interest rates (towards zero). Finance ministries tried to accelerate private consumption expenditures by decreasing the income taxes collected especially from medium- and low income-groups. Moreover, special public investment and expenditure programs were implemented in order to compensate the decrease of private investments. Not only the financial sector was supported by as the crisis required but it also was controlled. Since our subject is not the analysis of the global crisis, we will not go into details. But it is observed that all these precautions are Keynesian and any restriction of globalization would not be possible; this holds also true for Phillips Curve and its short-run implementation as well.

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