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# Economic theory and the New-Keynesian school

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## Abstract

In this paper it is described the school of neo-Keynesians (Akerlof and Stiglitz are in the group of "Hard" New-Keynesians, that don't accept New neo-classical synthesis, i.e. Dynamic Stochastic General equilibrium models-DSGE), that as a basic source of instability in the economies view the demand and supply side shocks, short run is important for them, wages and prices are rigid, expectations of the economic agents are rational, but also historical data are of great importance, and they introduced microeconomic foundations for their macroeconomic models.

**Key words:** New-Keynesians, nominal rigidities, microeconomic foundations.

## 1. Efficiency wages as a source of rigidity in wages

In the 1990s it was formed a consensus around micro-basis of the models with inflexible prices, and this consensus is an important part of the new Keynesian economics (Ball, Mankiw, Romer 1988). By definition, as much less is the amount for which the company wants to increase the price in response to an increase in the output price, the higher is the rigidity (Romer, 2007). These rigidities are very important in the explanation of the short-term business cycle. They, are also the force that reduce the force of negotiation of the companies and profit - maximization prices on variations of the aggregate output which, is the result of the variation of aggregate demand. From what previously was spoken we conclude that for the New - Keynesian economics is not so important where the resulting shocks come from (now into account we take neglected aggregate supply, not only aggregate demand), But the important thing is how to respond to shocks on the side of the offer and the demand, and the slow balance which is the result from the inflexibility of prices and salaries. The price is the mechanism of efficient allocation of resources in the economy. Inefficient allocation of resources happens if prices are not freely adapting. These rigidities are most important for the business cycle. "Administered" prices does not succeed to respond to the supply and demand. The prices in some industries are rigid, it is not unusually they to remain the same in a couple of years. Also the prices are the rigid in some industries that are more concentrated, so between the rigidity of prices and the concentration of industries there is a positive association (Carlton, 1986). The simple real business - cycle shows, that elastic supply of the labor is one type of real rigidity. However, this neo-classical source of rigidity is not sufficient in causing fluctuations in output of size and nature of the kind which we are interested in. In Valrasian models, in turn, wages increases also sharply as the

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amount of labor does. For this assumption to be practical, it is necessary in the long-term elasticity of the offer of labor to be high, or intertemporal elasticity substitution in the supply of labor to be high and aggregate fluctuations in the short-term needs to have large transient component. Place it are taken some non-valrasian sources of real rigidity. For example, for the *efficiency wages*<sup>3</sup> if exist equilibrium of unemployment because effective wages, the cycling behavior of real wages depends from that to effective salaries varies with the aggregate output<sup>4</sup>. In this case, each firm sets out salaries to the level at which minimizes the cost of labor per unit of efficiency than to reduce them the cost of the effort per worker. This rents that minimizes cost per labor unit and per unit of effectiveness is known as *efficiency wages*. The firm employs labor up to the point where the marginal product of labor is equal to the actual wages which is placed. And easy happens aggregate demand for labor, that the firms offered their efficiency wages to be less than aggregate supply, and that is to appear involuntary employment (Akerlof, Jelen, 1985). These wages that are higher than wages you go clean the market plaque from other reasons (for workers not slacking - company pays more than the reserve salaries, or not to give the job, or to increase loyalty to the company ). Many of keynesian papers write for the *problems of coordination*<sup>5</sup> (when the market for a long period of time remains in the inefficient equilibrium), resulting from the fact that unemployment (an example for inefficient equilibrium), arises from the irrational expectation or rigidity in wages and prices (Cooper, John, 1988). Each company afterwards should hires labor up to the point where its marginal product is equal to the actual wages,  $w^*$  (Jelen, 1984). As long as the aggregate demand is located under the aggregate supply of labor and  $w^*$  is greater than reservation salaries of labor, firm will be unrestricted by the market in the conduct of its optimal policy so that equilibrium will be characterized by involuntary unemployment. Each company afterwards need to hire labor up to the point where its marginal product  $e(w^*)F'e(w^*)N^*$  is equal to the real wages,  $w^*$  (Jelen, 1984). As long as the aggregate demand is located under the aggregate supply of labor and  $w^*$  is greater than reserve wages of labor, the firms will be unrestricted by the market in the conduct of their optimal policy so that equilibrium will be characterized by involuntary unemployment. Unemployed workers will prefer to work in real salaries  $w^*$ , but the firms company would not worker of that salaries or lower than it. It is so because every reduction in wages will reduce the productivity of workers who already work. In this way, the hypothesis of the *efficiency wages*

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<sup>3</sup> This hypothesis attempts to explain them compensating scheme on the labor market, and is especially useful because tells them the cost for measuring the efficiency (cost monitoring), anticipated that a manager es will go the award proper working are workers with economic rent

<sup>4</sup> According to the hypothesis on the effective salaries, the reduction in real salaries can reduce the productivity.

<sup>5</sup> Market failure, slow equilibrium of markets .Imperfections are long-term

explains *unvoluntary unemployment*.<sup>6</sup> And this model in efficiency wages has microeconomic foundations that need to be shortly explained.

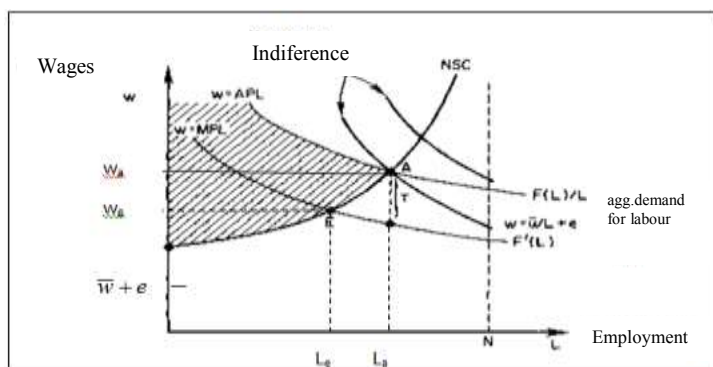
## 2. Shirking model

Very rarely there is such employment contract that specifies the all aspects of what is needed worker to do. he payment per unit (piece rate) is often impractical, monitoring costs are high and is difficult to measure the output. Stiglitz and Shapiro in their model assume that the workers can work ( $e = 1$ ) or to shirk so that their efforts will be equal to zero ( $e = 0$ ). If all firms pay identical wages and if there exist full employment, there don't exist shirking costs and all workers will get paid. In these conditions, all firms can increase the wages and to reduce the shirk. In contrast, the simple model to the model of efficiency wages, shirking model, adds a new argument across function of the effort of firms, the average salaries, aggregate unemployment and unemployment benefits. The problem of the firm is: representative firm wants to maximize:  $\pi = Y - wL$  when  $Y$  is output on the firms and  $wL$  are the cost of wage:  $Y = F(EL)$ ,  $F' > 0$ ,  $F'' < 0$ . Where  $e$  is represents the effort of workers:  $e = e(w)$ ,  $e' > 0$  has  $L_0$  identical workers who can be supplied with 1 unit of labor inelastically. The problem of the firm continues to be:  $F(e(w)L) - e(w) - w = 0$  and  $F'(e(w)L) - L = 0$  or  $F'(e(w)L)w = e(w)$  by replacing is obtained  $w = e(w) / e'(w) = 1$ . Usefulness for the employee is equal to  $U = WE$ , the salaries minus the effort. If the employee are unemployed he gets some compensation under the assumption of unemployment and his effort  $e = 0$  (Stiglitz, Shapiro, 1984). From the aspect of firms, for each firm's optimum is them to fire the shirkers because every other penalty will cause the employee to turn shirk. Wages are subsidized by using pure profits which are subject to taxes (is deducted in the form of tax). This tax policy certainly will increase the employment as it is shown in the image below with the proposal of subsidies on profits ( $\tau$ ) employment is approaching from point E in point A. Optimum situation can be achieved with the tax the all profits and financing the salaries with subsidies as shown of next image, then the employee is paid at the level of the own average product, means  $APL > MPL$ .<sup>7</sup> It means that the average product declines when it is greater than marginal, of course that is being done by the limitations placed by non-shirker constraint- NSC. Shaded region of the NSC curve up to point A is a region where there is no shirker. This model assumes lower employment (underemployment) than the natural rate, and has seen by the image because  $N > L_a > L_e$ .<sup>8</sup>

<sup>6</sup> For the Neo-keynesians there doesn't exist voluntary unemployment.

<sup>7</sup> With subsidized the salaries of the Government, salaries of the labor of  $W = MPL$ , which is equal to the marginal product of labor is approaching to average product of labor  $W = APL$ .

<sup>8</sup> In such conditions, salaries can grow and achieve a higher level of balance, which is shown by the indifference curves.

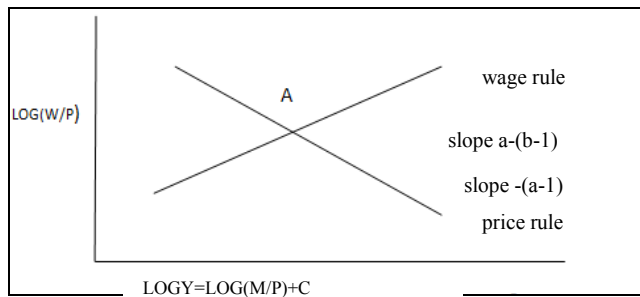


**Stiglitz-Sapiro social optimum at point A**

Of course, in this model, contrary to the classical tradition, again there are reasons found for government intervention in terms of wage subsidies or benefits for the unemployed, which, if properly designed will lead to greater Pareto efficiency. Workers who receive social transfers because they are unemployed and making little effort to think *involuntary staff*, and they accepted to work at the level of equilibrium rate, but of course could not give a firm belief that if you work for wages below the equilibrium level workers would't go shirking. In fact, they receive a social transfer  $\bar{w}$  which is very lower of the equilibrium wage for low effort. Practical, efficiency wages are a source of rigidity the wage in the neoknesian macroeconomic idea.

### 3. Monopolistic competition and the effects of aggregate demand

The assumptions of the model proposed by Blanchard and Kyotaki and also explained by Stiglitz, prove that both, the market of the labor and goods are monopolistically competitive. This assumption is made more for the symmetry than realization. This model is not exactly the simplest, and therefore the focus of a special case when the economy consists of households, firms, each of which produces a differentiated good, in which case there is only one bearer decisions about prices and analysis is simplified. The second assumption is made more as opposed to Say's law under which any offer produced by monopolistic competitive firms creates its own demand. The next image represents monopolistically competitive equilibrium of Blanchard, Kyotaki.



Monopolistically competitive equilibrium

Equilibrium can be characterized by the relationship between the equilibrium of real money and aggregate demand. It is a pair of functions of demand for goods and labor, and a pair of rules for prices and wages. On our figure  $\text{Log}(Y)$  is demand while  $\text{Log}(M/P)$  are real wages, here we use logarithms most likely to result expresses the elasticity and is a clear number how the models would suffer from errors when measuring. If  $\alpha$  and  $\beta$  are greater than 1, then the aggregate's rule of wages has an upper slope, while aggregate rule of price is directed downward. The equilibrium determines real wages and output. Output, gives the equilibrium level of real money and given nominal money, finally we got the price level. Equilibrium real money have a lower level than in monopolistic competition perfect, the level of price is higher and unemployment is lower and output. Make the previous picture of perfect competition and need to move symmetrically, the supply of labor to move the pin down, and the demand for labor to move up and get a new equilibrium. In monopolistic competition output is lower because of the existence of monopoly power in setting prices and wages. But it is also to the existence of externalities on the side of aggregate demand. The increase in nominal money can increase output and social wealth. At present, the fixed costs of output, productivity and profitability are moving in the same direction. This model has some limitations: the assumption of equal and optimal set prices in a dynamic economy is unrealistic. Therefore it is possible to assume that the money and aggregate demand will have a major impact on output. Second, although the nominal money affect output, the same applies to those changes should be unexpectedly high or low.

#### 4. Nominal and real imperfections

Early keynesians saw on the nominal salaries and nominal prices while neglecting inflation and not taken into account inflationary expectations. The only example, to say that *neo-classical revisionists* assumed that firms who opted the salaries

Only care about *relative wages and prices* and therefore fully incorporate inflationary expectations. This is considered one of neutralities (has 5 neutralities)<sup>9</sup> of the new macroeconomics, which results in more constraints on monetary and fiscal policy to affect output and unemployment (Akerlof, 2005)<sup>10</sup>. The natural rate of unemployment NAIRU (Non-Accelerating-Inflation-Rate of-Unemployment) is the only sustainable level of unemployment that is accelerating or decelerating inflation. However, according to Nobel laureate George Akerlof, people are happier with their nominal wages, not real. In Keynesian literature models difficult changing rigid prices are generally divided in two categories: "time-dependent" and "dependent state" models. In time-dependent models of Taylor and Calvo as their staggered<sup>11</sup> contracts that are concluded in the same time period, and so rents are fixed for a certain time. These contracts are fixed but only in the short term, the long term has more changes adjustment. In other dependent state models, firms change prices when there are major changes in demand and cost, when they change have reached certain limits (Roberts, 1995). In the Calvo model each firm holds a fixed price until it receives a signal from the market that can change the  $\pi$ . Change of prices in this way are "hesitant" and the firm takes into account the prices charged by other firms until there is another chance to change the price. Without going into the derivation of the model of equation  $\Delta p_t = E_t \Delta P_{t+1} + (\pi^2 \beta) / (1 - \pi) y_t + \pi^2 / (1 - \pi) \varepsilon_t$ . In fact, the previous formulation is extended. Phillips curve<sup>12</sup> for that difference in price is a

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<sup>9</sup> Others neutrality are: the theory of consumption in the life cycle, Modigliani-Miller theorem, mentioned theory of the natural rate hypothesis of rational expectations, Ricardian equivalence (these neutrality are mentioned in the Nobel speech marking Akerlof the Nobel Prize in 2001, is a lesson that the embryo what is called behaviorist economics).

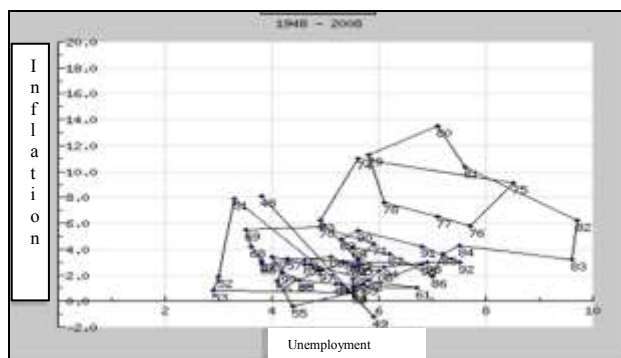
<sup>10</sup> When decision-makers on prices and rents only care about relative salaries or prices, acceleration inflation happens if unemployment is below the critical level is called the natural rate, accelerator deflation happens if unemployment is above that level

<sup>11</sup> Staggered in translation would mean hesitant, while some month are popular for adjustment of labor contracts, and reluctant throughout the year.

<sup>12</sup> Phillips curve shows the exchange between inflation and unemployment and a downward slope in the short term, while the long-term research further showed that this curve is bent. Natural rate of unemployment is different for different economies as the U.S. is 5%, for Europe is 10%. This Phillips curve by Edmund Phelps and Friedman is extended by taking into account expectations for future inflation.

function of the expected value of the difference in prices for the next period (actual expected inflation),  $\beta$  (the elasticity of supply) contract is positive because the offer of the firms has a positive slope, coefficient before the output is positive. Probability  $\pi$ , also is between zero and unit.

In the model of Taylor (1979), salaries are set at two periods of the year, the first agreement is set in January and the second in June. In this model the average salary is  $w_t = (x_t + x_{t-1})/2$ . Here  $w_t$  represents the average salary, which can be observed and  $x_t$  is the salary of the contract. In this model workers are concerned only real salary and unemployment. Taylor's model is:  $\Delta p_t = E_t \Delta p_{t+1} + c_0 - \beta (RU_{t-1} + RU_t + E_{t-1} RU_t + E_t RU_{t+1}) + 2(\varepsilon_t + \varepsilon_{t-1}) + \eta_t$ . Here  $\eta$  is the expected error that depends on  $(E_{t-1} p_t - p_t)$ , and  $RU$  is the expected rate of unemployment. The sign of  $\beta$  is negative as expected when inflation falls unemployment rises. Residuals here are correlated with the residuals from the previous period and have the component moving average (MA-Moving average). Phillips curve in the long term is inclined. The next picture is presented to the U.S. Phillips curve for all years from 1948 till 2008.<sup>13</sup>



### „Bending” Phillips curve “on U.S.-1948-2008

Some of the problems with Keynesian Phillips curve is that it predicts that disinflations cause boom. The explanation is that firms reduce the price increase before the supply of money to slow down  $\uparrow \uparrow M/P \Rightarrow \uparrow \uparrow Y$ , but practice has shown that disinflations cause contractions- case of The United States and Britain in the

<sup>13</sup> During that time in U.S there have been 11 presidents: six Republicans (Eisenhower, Nixon, Ford, Reagan, Bush, and c. Younger Bush) and five Democrats (Truman, Kennedy, Johnson, Carter, Clinton). Republicans and Democrats have different preferences towards inflation and unemployment when Republicans are in power implemented contraction policies after coming to power and cause a slight slump to curb inflation. Democrats, however, contrary to implement expansive policies to reduce unemployment and thus keep inflation in time.



1980s. Another disadvantage of Keynesian Philips curve is that it predicts that the unemployment rate to decline during the adjustment contractionary monetary shock. The cost of the tags, large business cycles, the non-neutrality of money, the small cost of labeling<sup>14</sup> and changing nominal prices could cause large losses of social wealth (Mankiw, 1985). In the Keynesian models, firm must make a small cost to labels if it change the set price after a shock on aggregate demand. Private motive for adjustment of prices are great in terms of expansion of aggregate demand and too small when there is a contraction of aggregate demand. The view from the social planner, the nominal price level can be set or "stuck" too high but not too low. In this sense, prices are rigid downwards, but no means rigid up. In almost all economic models, agents who have the power to affect prices indicate that power by reducing output. Economic equilibrium or natural rate is below the social optimum. Because this deviation is below the natural rate is higher than the cost to society of agents who set prices. Therefore these agents haven't adequate or sufficient incentives to return the economy to the its equilibrium. Many macroeconomic models of price rigidity are common microeconomic basis: infrequent but frequent changes in nominal variables are assumed to be more economical than frequent small changes (Calpin, Spulber, 1987). The model Calpin and Spulber has two technical presumptions. The first, to prevent prices from overshooting (prices do not derail too far from their optimal equilibrium), and to prevent accumulation of the distribution of prices across people who determinate the prices, firms follow (s, S) practices<sup>15</sup> in setting prices and previous audits imperfektical synchronized.

In the aggregate economy rigidity of prices disappears and the money are neutral. This model includes the previously mentioned "state dependent" models for changes in prices. However, in the Keynesian tradition, prices are rigid, which leads to non-neutrality of money. This assumption applies to monetary shocks ( economies undergoing large and frequent nominal / real shocks ) which have real effects ( Romer , 1996 ).<sup>16</sup> If know the labeling cost, if not change prices and wages, it means constant nominal salaries and prices (Blanchard, Kyotaki, 1987). This assumption is in line with the view of money as not product good (numeraire), which means that the government can vary the amount of nominal money , and it can , but only if nominal salaries and prices do not change , thus changing the amount of actual equilibrium money , and the actual amount of not product goods . The only way in which monetary policy can lose its effectiveness when there are long-term *implicit contracts* (Stiglitz, Azariadis, 1983), is for salaries to be indexed in such a way as to duplicate the effects of a contract of one period, generally not taken into account (Fisher, 1977). The reason why this implicit contracts are not taken as a major flagship in theories of wagemess rigidity

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<sup>14</sup> Standard example is costs as occurring in restaurants, printing new menus.

<sup>15</sup>(s, S) pricing policy means that prices change more rapidly when inflation is rapid than when it is low.

<sup>16</sup> This is contrary to the classical tradition in economics which has continuity cleaning of market, and the assumption for neutrality of money-that anticipated changes in the supply of money haven't real effects and government interventions that distorted economy.

was because, unlike effective salaries couldn't well explain involuntary unemployment. However, implicit contracts confirm Keynesian view of changes in output (business cycles) in which there is great variation in employment and a slight variation in the variability of salaries (this view was confirmed during the Great Depression from 1929 to 1933).

## 5. Summary

New-Keynesian models are proposing active monetary policy, this way they are in contradiction with Policy ineffectiveness proposition PIP (monetary policy is ineffective in changing the output, no matter of accepted policy rules). Fischer (1977), proved that PIP doesn't hold even with REH-Rational expectations hypothesis, when prices and wages are rigid. In the new-Keynesian models REH combined with wage rigidity and price rigidity is producing Keynesian policies. In this article financial markets and aggregate demand were not mentioned, they will be subject of research of another paper.

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