Volume 2 Number 1 2002

Izabela BLUDNIK, Jacek WALLUSCH
The Poznań University of Economics

Looking for the microfoundations: nominal rigidities and the New Keynesian economics

Abstract. This paper presents a critical description of the most influential New-Keynesian models with nominal rigidities. The study aims to elucidate the concept of long-term contracts, small menu costs, and near-rationality. Since this approach avoids the formulation of market clearing price, the early New-Keynesian models are incomparable to those developed by New Classical Economy. Hence, the New Keynesian economics, contrary to the common interpretation, is unable to challenge its adversaries.

Keywords: nominal rigidities, New Keynesian economics, microfoundations.
JEL Classification: B21, B22, B31.

Introduction

One of the most important objections raised to the Keynes' system was the lack of microfoundations. However, Greenwald and Stiglitz (1993, p. 25) maintain that In fact we could argue that Keynes did the best he could with the micro-foundations which were available at the time. In a similar manner Howitt (1986) affirms that Keynes provided sufficient micro-basis shown in his theory of effective demand. Keynes, pointing out the role of effective demand, presented in detail how the entrepreneurs' decisions based on the expectations influence the aggregate demand and how every producer, comparing the level of interest rate to the marginal efficiency of capital, decided about the level of investments. Nevertheless, a quest for Keynesian microeconomics dominated attempts of his recent inheritors. Evidently, all hints were found in General Theory.

Explaining the importance of effective demand Keynes did not provide a similarly detailed analysis of price and wage behavior. In his opinion nominal price and wage levels were downward rigid which made the equilibrium at full employment impossible to attain[1]. It must be pointed out that Keynes also described the situation when

[1] Keynes did not explain the existence of nominal price and wage rigidities on the microeconomic ground. Above all he neglected the problem of price stickiness. Since Keynes omitted in his

the nominal wages would be lowered, nevertheless this would not do anything to raise the level of employment. Irrespective of wage stickiness or flexibility, Keynes' conclusions from the theory of insufficient effective demand are valid[2].

The present paper describes a new-Keynesian point of view rooted in the old-Keynesian tradition. The New-Keynesian approach, which actually is not new anymore, developed Keynes' original concept of stickiness. The study shows three most influential New-Keynesian models presented by Stanley Fischer, George Akerlof and Janet Yellen, and N. Gregory Mankiw. Our analysis starts with the long-run labor contracts which introduce the nominal wage rigidity. The other sticky element, namely the prices, is led in by the so-called 'small menu costs'. The following section deals with non-maximizing behavior that results in the second-order losses. Temporary non-maximizing behavior displayed by the agents produces the deviation from the market-clearing price. However, we show that those models concentrate only on the producers' activity, while the description and explanation of the consumers' behavior is omitted. We also demonstrate that there is no room for such a construction in the New Classical approach, and that New-Keynesian and New (Neo?) Classical models are hence incomparable.

1. Long-term contracts, short-term adjustment

The most visible sign of the union's political power is a wage and labor contract. This power obviously disequilibrates the labor market. Stanley Fischer shows that the active monetary policy can alter the output in spite of rational expectations and perfectly recognized money supply. The point of Fischer's analysis is the introduction of the long-run nominal wage contracts which produce nominal wage rigidity. Decisions about changes of money supply can be taken by monetary authority more frequently than labor contracts are renegotiated. Therefore, the monetary policy can have an impact on the output in the short-run. The efficiency of monetary policy does not depend on cheating or surprising anyone. In this model

analysis the consequence of industry, technology and competition, he was not interested in the value and distribution theory. He also ignored the theory of imperfect or monopolistic competition. These theories were rooted in the 1930s and could help to interpret Keynes' macroeconomic arguments on the microeconomic ground. Some economists, for example Davidson, argue that Keynes omitted the problem of economic monopolization because he wanted to show that the equilibrium with underemployment can occur even when the market failures are excluded from the analysis.

[2] The neoclassical synthesis left its impression on the later interpreters, and nominal rigidities became the crucial assumption of their models. But there were provided no microeconomic foundations to prove the existence of such rigidities. Instead, there were suggested some ad hoc explanations, i.e. the money illusion, the institutional and social factors and the monopolistic practices of labor supply (Gerrard 1995).

monetary policy is wholly foreseen. But since it is grounded on the information which is available not before all the labor contracts are entered, it can change the level of real output and employment.

The economy is described by three basic equations:

1. labor contracts

$$_{t-i}E\left(w_t\right) = {}_{t-i}E\left(P_t\right) \qquad i = 1,2. \tag{1}$$

2. output

$$Y_t^S = \left[P_t - {}_{t-1}E\left(P_t\right)\right] + u_t. \tag{2}$$

3. demand

$$Y_t^D = M_t - P_t - v_t. \tag{3}$$

where: E – expectations operator, w – nominal wage, P – price level, M – money supply, Y^S – output, u and v – random terms.

Monetary authority offsets the disturbances following the monetary rule:

$$M_t = \sum_{i=1}^{\infty} a_i u_{t-i} + \sum_{i=1}^{\infty} b_i v_{t-i}. \tag{4}$$

Since the error terms are identified in the recent period, the amount of money supplied in t is equal to the expectations:

$$_{t-1}E\left(M_t\right) = M_t. \tag{5}$$

The money supply seems to be fully controlled by the central bank, and there is no place for the nominal shocks. Note that the conclusions from the standard New Classical models (e.g. Sargent and Wallace (1976)), prove the monetary neutrality, if (5) holds. Equaling the quantities supplied and demanded one obtains:

$$2P_t = M_t + {}_{t-1}E\left(P_t\right) - \left(u_t + v_t\right). \tag{6}$$

The difference between the actual and the expected price level is equal to:

$$P_t - {}_{t-1}E\left(P_t\right) = \frac{M_t - {}_{t-1}E\left(P_t\right) - \left(u_t + v_t\right)}{2} = -\frac{\varepsilon_t + \eta_t}{2}. \tag{7}$$

Consider now two cases in which one- and two-period wage contracts are set. Equation (7) implies that the difference between price level and its expected value

is unpredictable: imposing the Muth-like rationality on the agents' expectations, the expected values of both ε and η are equal to zero. Hence, if the wage contract is set every year, monetary policy has no effect on the real variables.

But since the negotiations are costly, the length of contracts exceeds one period. Fisher assumes that *in the period t, half the firms are operating in the first year of a labor contract drawn up at the end of* t*–1, and the other half in the second year of a contract drawn up at the end of* t*–2*. The two-period contracts are set using (1) and replacing *i* by 2 for a half of the firms, while for the other half by 1. The demand is then:

$$Y_t^D = \frac{M_t - {}_{t-2}E(M_t)}{3} + \frac{u_t + v_t}{2} + \frac{{}_{t-1}E(u_t + v_t)}{6} + \frac{{}_{t-2}E(u_t + v_t)}{3}. \tag{8}$$

The difference between the actual money supply and its expected value in period t-2 is equal to:

$$M_t - {}_{t-2}E(M_t) = a_1(u_{t-1} - \rho_1 u_{t-2}) + b_2(v_{t-1} - \rho_2 v_{t-2}) = a_1\varepsilon_{t-1} + b_1\eta_{t-1}. \tag{9}$$

Since there is a significant difference between the observed and predicted money supply, monetary authorities are able to adjust the non-expected (in period t-2) changes. The moment of interest is the variance of output; equation (9) suggests that the central bank is able to minimize this variance. Substituting (9) and (4) into (8) one obtains:

$$Y_t^D = \frac{\varepsilon_t - \eta_t}{2} + \frac{\left[\varepsilon_{t-1}(a_1 + 2\rho_1) + \eta_{t-1}(b_1 - \rho_2)\right]}{3} + \rho_1^2 u_{t-2}. \tag{10}$$

The asymptotic variance of output is as follows:

$$\sigma_{Y^D}^2 = \sigma_\varepsilon^2\left[\frac{1}{4} + \frac{4}{9}\rho_1^2 + \frac{\rho_1^4}{1-\rho_1^2} + \frac{a_1 4\rho_1 + a_1^2}{9}\right] + \sigma_\eta^2\left[\frac{1}{4} + \frac{1}{9}\rho_2^2 + \frac{\rho_1^4}{1-\rho_1^2} - \frac{b_1 2\rho_2 - b_1^2}{9}\right]. \tag{11}$$

Differentiating (11) with respect to a_1 and to b_1 one yields the variance minimizing values of a_1 and b_1 equal to:

$$a_1 = -2\rho_1,\ b_1 = \rho_2, \tag{12}$$

and then the output variance:

$$\sigma_{Y^D}^2 = \sigma_\varepsilon^2\left(\frac{1}{4} + \frac{\rho_1^4}{1-\rho_1^2}\right) + \frac{1}{4}\sigma_\eta^2. \tag{13}$$

The term $\frac{\left[\varepsilon_{t-1}(a_1+2\rho_1)+\eta_{t-1}(b_1-\rho_2)\right]}{3}$ in (10) is unknown during the period $t-2$, but the monetary authority, due to (12), can offset the disturbances which occurred since the contracts in $t-2$ were entered. Thus, even if the monetary policy is fully predictable, the central bankers are able to affect the real variables.

2. Small costs – large cycles

It is commonly assumed in the perfect competition models that the price adjustment is costless. Unfortunately, those models do not take into consideration some necessary costs relevant to the price changes. Such costs, the so-called 'menu costs', are the crucial point of Mankiw's model. N. Gregory Mankiw, on the basis of a model of monopoly firm, shows why sticky prices, ineffective from the aggregated point of view, can be effective from the disaggregated point of view. In the situation of aggregate demand decrease, prices become more rigid. The firms which can influence the price level usually avail themselves of this fact to restrain the level of output. Hence, the economic equilibrium is achieved below the social optimum. Because such a situation causes much higher costs for the society than for firms, the latter have no incentive to change their behavior. In these economic circumstances, the monetary policy can stabilize the predominant real magnitudes.

2.1. The model

The monopoly firm chooses price p and quantity q to maximize profit. The nominal price set by the agent is equal to:

$$p_m N, \tag{14}$$

where: N – nominal scale variable (i.e. aggregated demand, price level, nominal GNP or money stock). The variable p_m is not explicitly defined and derived[3]. The constant cost function faced by the firm is:

$$c = kq, \tag{15}$$

where: c – cost, k – constant, q – quantity. Figure 1 presents the profit earned by monopoly, which is equal to the rectangular area between the constant k and the

[3] The variable p_m seems to be a nominal price set at the maximizing level.

price p_m, and the consumer surplus equal to the triangular area above the p_m. The nominal scale variable is likely to be a budget constraint. Mankiw assumes that the price is set in advance, one period ahead. For notational convenience, let the time be discrete. Hence, the nominal price is:

$$p_{t-1}^{m}\left[{}_{t-1}E\left(N_t\right)\right]. \tag{16}$$

The observed price p_t^0 is:

$$p_t^0 = p_{t-1}^{m}\left[{}_{t-1}E\left(N_t\right)/N\right]. \tag{17}$$

Obviously, if the expectations about N are formed correctly, the expected price is equal to its actual level $p_t^0 = p_{t-1}^{m}$.

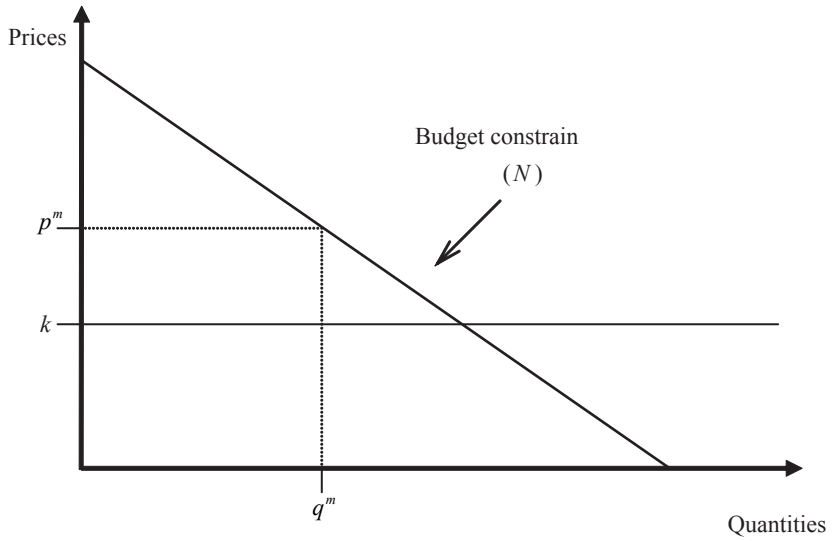

Figure 1. Welfare measurement in Mankiw's model

2.2. Menu costs

Consider now that $N_t < {}_{t-1}E\left(N_t\right)$. The demand changes produce a shift along the line N. According to (17) the observed price p_t^0 exceeds its maximizing level p_{t-1}^{m}, which is diagramed in figure 2.

The monopoly firm is unable to sell the whole produced output q_{t-1}^{m} without lowering the price level to p_{t-1}^{m}. The price change is costly and requires the so-called *small menu costs*. If those costs z exceed the additional profit (obtained by reduced price), the agent does not change the price.

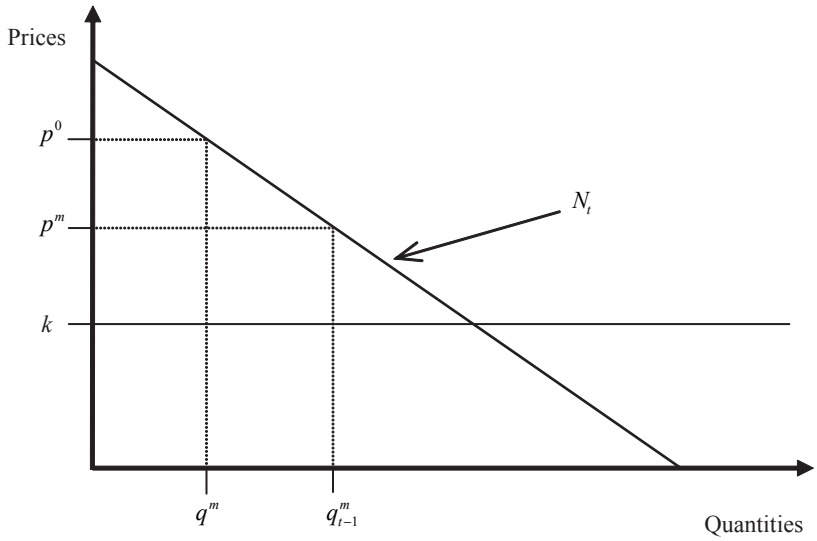

Figure 2. Demand shock and the optimal price level – Mankiw's approach

3. Near rational behavior: second order causes – first order consequences

Unlike Fischer and Mankiw, Akerlof and Yellen (henceforth A&Y) present only the consequences of the sub-optimal behavior (A&Y 1985, 1991). The authors prove that such behavior yields the second-order loses and presents the first-order consequences on the employment level.

George A. Akerlof and Janet L. Yellen proposed an idea of 'near rational' firms' behavior in order to explain the nominal price and wage rigidities. In the authors' opinion, price-wage inertia does not have to be costly for the firm. Those firms adjust their prices and wages to the actual economic situation very slowly. Hence, they can sustain some losses, but from the individual point of view they will be very small. 'Near rational' behavior is a sub-optimal one but at the same time it does not mean any significant losses for the individual firm. This behavior, however, can have considerable macroeconomic consequences. If some firms behave 'near rationally' and they follow the sticky price and wage rule, money becomes non-neutral. Thus, the changes in money supply affect employment and output levels.

For notational convenience, let the situation in a certain initial time period $t-1$ be identical to the long-run equilibrium, while in the very next period t equilibrium is distorted by a demand shock. The whole set of identical[4] entrepreneurs F is divided into two different groups. The first cluster contains the non-maximizing firms

[4] Identical in the sense of supplied commodity.

F^n, while the second one the maximizing F^m:

$$F = \beta F^n + (1-\beta)F^m.$$

The demand for commodities supplied by each firm is:

$$X = \left(\frac{p}{\overline{p}}\right)^{-\eta}\left(\frac{M}{\overline{p}}\right) \qquad \eta > 1, \tag{18}$$

where: X – output, p – price set by the firm, $\overline{p}$ – geometrical averaged price level. Obviously, since η is assumed to be greater than 1, the revenue increases if p tends to $\overline{p}$. Hence, in the last 'equilibrated' period $t-1$ there is a 'common' price level for both maximizing and non-maximizing firms, i.e. $p^m_{t-1} = p^n_{t-1} = \overline{p}_{t-1}$. The volume supplied by each firm depends on the average effort of laborers hired, e, and the number of laborers hired:

$$X = (eN)^{\alpha} \qquad \alpha \in (0,1), \tag{19}$$

where: $e = e(\omega)$, ω – real wage. Combining (18) and (19) A&Y obtain a profit function Π:

$$\Pi = p\left(\frac{p}{\overline{p}}\right)^{-\eta}\left(\frac{M}{\overline{p}}\right) - \left(\frac{p}{\overline{p}}\right)^{-\frac{\eta}{\alpha}}\left(\frac{M}{\overline{p}}\right)^{\frac{1}{\alpha}} \omega\left[e(\omega)\right]^{-1}\overline{p}, \tag{20}$$

where the second term reflects money wages and labor hired. Note that the output sold by a firm is equal to the demand, which appears in the first fraction on the right side of (20).

A&Y describe first a long-run equilibrium. Hence, the price and money supply in (20) is $p_{t-1} = \overline{p}$ and $M_{t-1} = M$ respectively.

Consider now a demand shock which occurs in the period t. The initial money supply increases by a fraction ε, i.e. $M_t = M_{t-1}(1+\varepsilon)$. The short-run maximizers follow the optimizing procedure and set their price according to the quantity theory:

$$p^m_t = p_{t-1}(1+\varepsilon)^{\theta}, \tag{21}$$

where: $\theta = \dfrac{(1-\alpha)/\alpha}{\beta(\eta/\alpha - \eta + 1) + (1-\beta)\left[(1-\alpha)\ \alpha\right]} \leq 1$. An optimizing procedure (differentiating (20) with respect to ω and setting to 0) yield a condition:

$$\omega^m_t = \omega^*. \tag{22}$$

The short-run non-maximizers do not change the price (and money wages), so that $p_t^n = p_{t-1}$. Obviously, an average (geometrical) price $\bar{p}$ differs from both p^m and p^n, and is equal to:

$$\bar{p}_t = \left(p_t^n\right)^{\beta} \left(p_t^m\right)^{1-\beta} = p_{t-1}\left(1+\varepsilon\right)^{(1-\beta)\theta}. \tag{23}$$

Since the money wages w_t paid by the non-maximizing firms remain unchanged, their real wages ω_t^n are equal to:

$$\omega_t^n = \frac{w_t}{\bar{p}_t} \equiv \frac{w_{t-1}}{p_{t-1}} \frac{p_t}{\bar{p}_t} = \omega^* \left(1+\varepsilon\right)^{-(1-\beta)\theta}. \tag{24}$$

The heterogeneous behavior displayed by the firms causes the changes in profit. Combining (20) and (21) – (24) the authors obtain two profit functions:

$$\Pi_t^m = \left[p_t^m(\varepsilon)\right]^{1-\eta} f(\varepsilon) - \left[p_t^m(\varepsilon)\right]^{\frac{-\eta}{\alpha}} g(\varepsilon)\omega^* \left[e(\omega^*)\right]^{-1}, \tag{25}$$

$$\Pi_t^n = \left[p_{t-1}(\varepsilon)\right]^{1-\eta} f(\varepsilon) - \left[p_{t-1}(\varepsilon)\right]^{\frac{-\eta}{\alpha}} g(\varepsilon)h(\varepsilon)\omega^* \left[e(\omega^*)\right]^{-1}. \tag{26}$$

Obviously, the crucial aim is to present the reaction of the difference between Π_t^m and Π_t^n to the demand shock. Differentiating $\left(\Pi_t^m - \Pi_t^n\right)$ with respect to ε and assuming that $\varepsilon = 0$ the difference is equal to zero. The authors underline that this result, i.e. $d\left(\Pi_t^m - \Pi_t^n\right)/d\varepsilon\,|_{\varepsilon=0} = 0$, is a key result of their paper. It implies that the loss to the non-maximizing firms, represented by $\left(\Pi_t^m - \Pi_t^n\right)$, is second order with respect to the demand shock.

Since the loss is of the second-order nature, it is reasonable to assume that some of the entrepreneurs do not change their prices and wages following the maximization procedure. This behavior, however, causes the first-order changes in employment level. Since the real wage paid by the non-maximizers differs from the one paid by the maximizers, the demand shock causes changes of the number of laborers hired. Contrary to the starting period, the optimal real wage, similarly to the (23), must by replaced by a geometrical average. Comparing the demand for labor in both periods one obtains:

$$N_{t-1} = \frac{k^{\frac{-1}{\alpha}}}{e(\omega^*)} \neq \frac{k^{\frac{-1}{\alpha}}}{e\left[\left(\omega_t^n\right)^{\beta} (\omega^*)^{1-\beta}\right]} = N_t. \tag{27}$$

Evidently, it also explains why changes in the money supply have real consequences. The way how the near-rational behavior affects the real activity is presented in figure 4.

4. New-Keynesians without microfoundations

The common component which always brings all New-Keynesians together is the search for micro-foundations. They do not assume any fundamental issues *ad hoc* (just like neoclassical synthesis did, *e.g.* wage rigidity) but they try to explain them on the ground of microeconomics. This proudly underlined feature, however, is very problematic. The following subsections present only few, but so far unexplored, critical remarks. It must be admitted that our attempt is not to examine the final results obtained by the New-Keynesians. We examine the structure, assumptions, and method of explanation chosen by the authors.

4.1. Rationality, contracts, disturbances

If the wage contracts are described in a way similar to (1), both indexed and one-period contracts are more 'rational' than the long-period non-indexed ones. The aim of all contracts is to minimize the real wage uncertainty. The probability of the constant real wage condition in a long-period non-indexed contract, however, is smaller than the probability condition in a one-period agreement or indexed ones.

The objective function of employees is to maximize their utility function. Let the function contain only two arguments, consumption and labor supplied. The optimum condition depends in a certain way on real wage: without obtaining the optimal real wage only suboptimal utility would be reached. Such a situation is obviously unacceptable for workers who act rationally in the market. The simplest solution to avoid this problem is to enter a wage contract. The contract requires some additional costs Ω covered by both sides which are interested in minimizing them. A dynamic game is entered by employees and employers.

The employees face a decision problem in which losses are compared to the costs of renegotiations. If a one-period commitment is entered, a simple quadratic loss function, according to (1), would be of the following form:

$$L_1 = \left[{}_{t-1}E\left(P_t\right) - P_t \right]^2. \tag{28}$$

A loss function for a two-period contract is of the similar form:

$$L_2 = \left[{}_{t-2}E\left(P_t\right) - P_t \right]^2. \tag{29}$$

Hence, if workers display an optimizing behavior their decision depends on:

$$L_2 - L_1 \left\{ \begin{matrix} > \\ = \\ < \end{matrix} \right\} \Omega. \tag{30}$$

If the difference between L_2 and L_2 exceeds the contract cost Ω, a short-run commitment is chosen. Evidently, the long-run contracts are cheaper than the short-run ones. Price uncertainty, however, disturbs the cost calculations. A rational consumer would then compare the potential loss with the cost of short-run commitment. If the difference between the expected and the actual real wage (compared on the basis of both loss functions) exceeds the cost, a short-run contract is chosen. On the other hand, the contract indexation is an alternative way to avoid the uncertainty and losses. Moreover, indexation minimizes the cost of contract. A Muth-rational employee would rather enter an indexed contract.

It is worth mentioning here the empirical results obtained by Susan B. Vroman (1989). Her studies confirm the thesis that inflation uncertainty reduces contract length and that greater contracting costs increase the contract length. The results also indicate that indexed contracts are longer than non-indexed ones. These conclusions challenge (at least partially) Fischer's theoretical considerations. More than that, given the safety of the real wage guaranteed by the indexed contracts, Fischer's remark that the indexed contracts would be less attractive than the non-indexed ones seems to be unaccountable.

4.2. Puzzling geometry

Similarly to Mankiw, consider the same situation, in which aggregate demand is smaller than its expected level $N_t < {}_{t-1}E\left(N_t\right)$. This situation is sketched in figure 3 which is, however, of the different form than the figures presented by Mankiw.

The crucial distinction concerns the budget constraint and hence both the expected and the actual price. It is obvious from Mankiw's figures that the demand changes do not shift the budget constraint (*N* line), and thus are rather of endogenous nature. If this interpretation is correct, there is uncertainty concerning the direction in which causality goes. It is a well-known microeconomic effect that a shift along the unique budget constraint *N* represents the reaction to the price changes.

Coming back to figure 3., we assume that the demand changes shift the budget line *N*. The expected level of nominal demand was used in the optimizing procedure in period $t-1$. Evidently, the optimal quantity calculated in the previous period deviates from its observed level. The price adjustment is costly and the firm, as noted in the second section, faces certain menu costs *z*. Since the agent behaves optimally, the menu costs are compared to the difference between the observed (31) and the maximizing (32) profit π in period *t*:

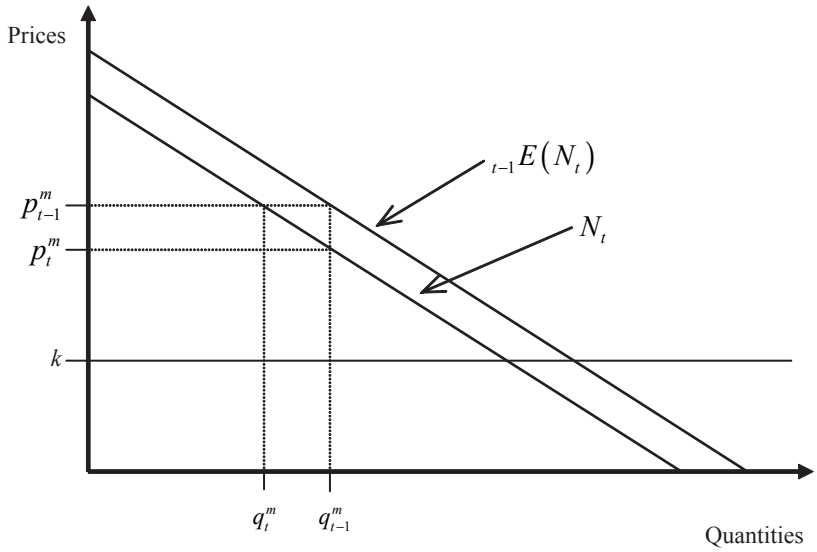

Figure 3. Demand shock and the optimal price level

$$\pi_t^0 = p_t^0 q_{t-1}^m - c\left(q_{t-1}^m\right), \tag{31}$$

$$\pi_t^m = p_{t-1}^m q_t^m - c\left(q_{t-1}^m\right), \tag{32}$$

$$\pi_t^m - \pi_t^0 \left\{ \begin{matrix} < \\ = \\ > \end{matrix} \right\} z_t. \tag{33}$$

Note that the second term on the right side in (31) and (32) remains unchanged: the output decision in $t-1$ holds in both periods. Finally, if the menu cost exceeds the difference between N_t and $_{t-1}E(N_t)$ no price shift is undertaken. An opposite effect is produced by the expansion in demand.

Mankiw stresses that since the second term in (17) is greater than 1, the observed price is smaller than the expected one. This statement, due to the assumed market structure, is puzzling. The author does not provide the exact explanation of the divergence between price levels. If the monopoly firm sets the price in advance, there is no room for market pricing mechanism. The price level is dependent, above all, on the monopoly firm's settlement. Even if the demand falls, a monopoly firm sets the price at the expected level and adjusts the quantities[5]. In Mankiw's approach,

[5] Note that Mankiw does not specify what kind of commodity the monopoly firm produces.

however, the changes in demand affect the changes in prices and quantities. Moreover, the contraction in demand produces an increase in price level. An important issue results from the above stressed considerations: An increase in price is likely to be impossible if the demand decreases.

Mankiw's approach to the costly price adjustment also raises methodological questions. Both New-Keynesians and New Classics express the stickiness as sub-optimal behavior. There is little doubt that the rigid prices and wages are not optimal from the social point of view. However, if the price adjustment is costly, an optimizing firm must take into account the small menu costs. Hence, if the agents leave the price level unchanged subject to insufficient demand shifts, they display strictly optimizing, rational behavior. Unfortunately, the author treats this problem ambivalently. Although Mankiw notes that the firms optimize (see Mankiw (1991, p. 36)), it is underlined that the *business cycle results from the suboptimal adjustment of prices in response to a demand shock* (p. 29)[6].

4.3. Second-order results – first-order question

The difference between neo(new)classical microeconomics and the near-rational behavior concerns the loss' order. The shocks are usually considered to be a source of first-order losses to the non-maximizing firms. Contrary to the neoclassical paradigm, A&Y suggest that the losses are very small in the sense of being second-order. Hence, the most important result of their paper is:

$$\left.\frac{d\left(\Pi_t^m - \Pi_t^n\right)}{d\varepsilon}\right|_{\varepsilon=0} = 0.$$

A demand shock does not produce any important difference between the profits obtained by maximizers and non-maximizers. Since the derivative equals 0, there is a reason for assuming that at least a cluster of entrepreneurs does not follow the

[6] The other critical remarks are summarized by Gordon (1990), who underlines four main problems: 1. *A consideration of symmetry brings the basic conclusion* of social costs *into question*; 2. *Menu--costs approach totally ignores costs of output adjustment*; 3. *Two-period comparison neglects the calculus of costs and benefits in future periods*; 4. *Menu-costs approach fails to explain why sticky prices of some products are more flexible than others over the business cycles*. Raising the former, since the sub-optimal behavior is caused by the changes in demand, there is a symmetry over the cycle, and the menu-costs produce the second-order consequences. A decreasing output during the recession is compensated by an increase during the boom. This question is strictly connected to the third point which stresses the dynamic nature of the calculus. If an agent sets the sub-optimal price, a stream of losses is equalized by a similar stream of gains over the cycle. Moreover, calculations of the total costs require the calculation of the output adjustment. Finally, Gordon emphasizes the low explaining power of the reductionistic model.

optimizing procedure. Analyzing an impact of the demand shock on this result, however, the final statement must be treated with caution.

Let the demand shock represented by ε occur in the period *t*. Evidently, Π_t^n differs from the optimum level Π_t^m. The optimal level is available to the non-maximizers in the next period $t+1$, if $\varepsilon=0$. This situation is presented in figure.

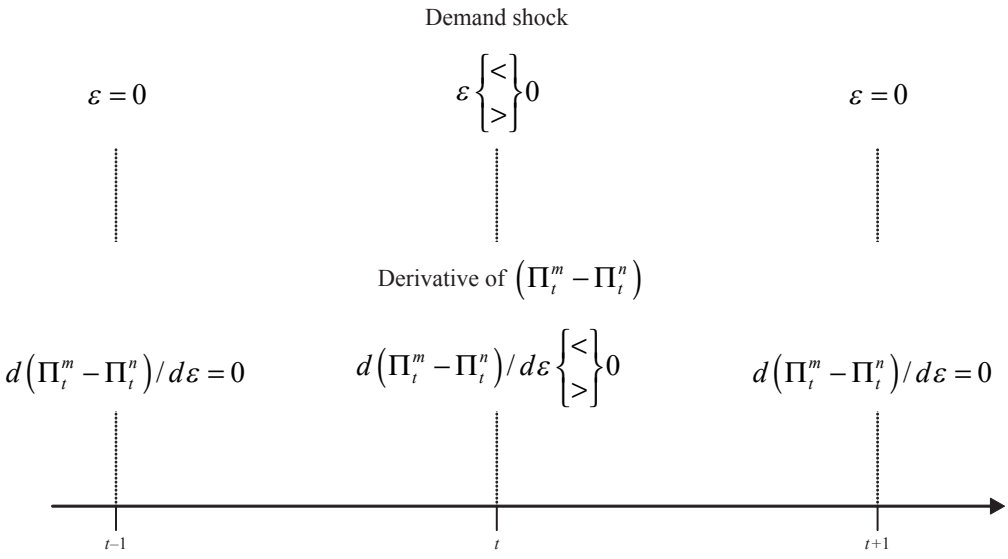

Figure 4. Demand Shock and $\left(\Pi_t^m - \Pi_t^n\right)$

Such a condition implies that the demand shocks are of the 'discontinuous' nature: a shock appears in a certain period, and disappears in the very next one. Hence,

$$M_t = M_{t-1}. \tag{34}$$

A similar situation was described by Friedman (1977). If the unemployment level deviates from its long-run path in a period t, and goes back to the initial level in the next period $t+1$, a demand shock does not occur in period $t+1$.

But it is stressed by A&Y that the non-maximizing firms do not adjust the prices even if the agents fully recognize the demand changes. Moreover, even after imposing the Muth-rationality on their perception and assuming perfect information the results remain unchanged. Thus, comparing the causes of shocks ε_t^F in Friedman's (35a) and $\varepsilon_t^{A\&Y}$ in A&Y's (35b) models one obtains:

$$\varepsilon_t^F = \sum_{i=1}^{n} \psi_i \varepsilon_{t-i} + \vartheta_t.$$

$$M_t = {}_{t-1}E(M_t) + \vartheta_t \qquad \vartheta_t \sim N(0, \sigma_\vartheta^2), \tag{35a}$$

$$M_t = M_{t-1}\left(1 + \varepsilon_t^{A\&Y}\right) \qquad {}_{t-1}E\left(\varepsilon_t^{A\&Y}\right) = \varepsilon_t^{A\&Y}. \tag{35b}$$

This implies that the term shock, despite a suggestion that ε is a demand shock, should be described as a *shift*. Unfortunately, it is quite impossible to find a country where money supply does not fluctuate in the short-run (e.g. monthly). Although an impact of the near-rational behavior on the employment level is an important issue, the near-rational behavior, due to 'continuous' changes in money supply, yields the first-order loss.

The empirical results are often contradictory to the New-Keynesian statements. A&Y explicitly underline *the need for a model without money neutrality* (A&Y 1991, p. 44). The line of research started by influential papers written by Christopher Sims, however, questions that *need*. Moreover, the *abundant empirical evidence for the phenomenon of wage and price sluggishness* is challenged as well (Hall and Yates 1998).

5. Instead of conclusions – market clearing price and the New-Keynesians

A popular interpretation of the New-Keynesian Economics underlines the micro-foundations of those models. Unlike the first generation of Keynes' successors, the Keynesian renaissance in the 1970s concerned the microeconomic basis of the macroeconomic models. An element similar to the market clearing price appears in each of the above described models. Its significance is further analyzed using the model presented by A&Y.

A factor $\overline{p}_{t-1}$ is identical to the market clearing price. A long-run equilibrium requires $p_{t-1}^m = p_{t-1}^n = \overline{p}_{t-1}$, and hence $\overline{p}_{t-1} = M_{t-1} / X_{t-1}$. Evidently, this equality follows the quantity theory presented by Fisher (1931)[7]. The demand simply depends on the disposable amount of money and the equilibrium price. Once the demand shock occurs, the market clearing price in the long-run equilibrium becomes an average price in the short-run (dis)equilibrium. The demand each firm faces depends now on money supply, average price, and the price set by the agent. The negative parameter η 'penalizes' the firms for not being a maximizer if $\varepsilon < 0$: if the money supply decreases the demand X^m (see eq. (18)) is greater than the demand X^n. Following the assumptions, $\overline{p}_t$ loses its initial nature if a demand shock occurs.

[7] Fisher described T as an output effectively demanded (in the Keynesian sense), thus, the variable X in A&Y is identical to the variable T in the Fisher's $MV \equiv PT$.

The first factor in (18), $\left(p/\overline{p}\right)^{-\eta}$, contains information on how the consumers behave. Since η is negative, an individual prefers the lowest price available on the market. However, the standard maximizing problem faced by the consumer yields only one accepted price – the market clearing one[8]. A rational consumer would not accept the price set by the non-maximizing firms, if she or he follows the maximizing procedure of the one-argument utility function, which contains only the quantities consumed. It might be the leisure[9] which decides on acceptance of the non-equilibrium price: an individual would prefer to have more free time instead of spending time looking for the cheapest commodities. In this particular case the demand function (18) must be enlarged by a factor representing the elasticity of substitution between leisure and (low) price.

Unfortunately, A&Y do not answer the question how the consumers behave. Moreover, the profit functions (25)-(26) are likely to be inappropriate. The price set by the non-maximizers should be compared to the market clearing price rather than to the geometrical average one. A reformulation of the revenue is one of the potential consequences of this. Note, however, that the common term f(ε) in (25)-(26)[10] is smaller if the firm sets its price suboptimal.

There is little doubt that the New-Keynesian Economics challenged the line of papers led by Lucas. A 'classical' New Classical model should be derived from the utility maximization problem (a perfect example could be Lucas (1972)). In those models price is by definition a market clearing one (see footnote 8). Obviously, the differences between those two paradigms reflect the assumed vision of the world. It is hence impossible to view the economy built on the New Classical cornerstone through New-Keynesian optics.

One could ask why there is an unbridgeable gap between the two main paradigms. The naive vision of scientific development supported by Popper-like approach could interpret the Post-Keynesian models as a falsification of their New Classical opponents. However, a completely new structure has been built. Since the New-Keynesian models ignore the foundations of consumer's behavior, there is no room for any falsification or even for comparison. Fischer's approach only partially describes the decisions undertaken by employees. Contracts are likely to be influenced by managers, while the staff's preferences are rather neglected. Decreasing demand together with increasing price as well as shifts along the budget line N in Mankiw's model are likely to be inconsistent with the consumer behavior. Coexistence of maximizing and non-maximizing agents in A&Y's approach left unanswered the main problem of behavioral macroeconomics (as Akerlof

[8] Let an individual maximize the utility function of the form: $U=a \ln q$, subject to $pq \leq I$, where q represents the quantities consumed, p their price, and I the disposable income. Using the Kuhn-Tucker conditions one obtains: $q = I/p$, which is presented by the second factor in (18).

[9] Since it is assumed by A&Y that the firms are identical, the causes of such a choice do not depend on the factors influenced by the suppliers (e.g. the brand).

[10] The common term $f(\varepsilon)$ is equal to $M_t / \left(\overline{p}_t\right)^{1-\eta}$.

(2002) called this approach), i.e.: *how do they behave*? It was the lack of specified utility function maximized by consumers that let the authors assume the two clusters of producers.

New Classical attitude is based on the continuous maximizing behavior of each consumer and producer. New-Keynesians adopted this procedure only partially, considering the entrepreneur as a decision maker. However, this process of explanation is rooted in the Post-Keynesian holistic tradition. The optimizing behavior seems to be an artificial ornament settled between holism and reductionism. The employed method of explanation is the crucial, though unrecognized, distinction between the mainstream paradigms. It permits to consider an ambivalent structure of behavior and at the same time it does not allow to compare the New- Keynesian conclusions to the New Classical remarks.

Answering the question hidden in the title it seems reasonable to conclude that the New-Keynesians have not yet found what they are looking for.

References

Akerlof G.A. (2002), *Behavioral Macroeconomics and Macroeconomic Behavior*, American Economic Review, vol. 92, no 3.

Akerlof G.A., Yellen J.L. (1985), *Can Small Deviations from Rationality Make Significant Differences to Economic Equilibria?*, American Economic Review, vol. 75, no 4.

Akerlof G.A., Yellen J.L. (1991), *A Near-Rational Model of the Business Cycle, with Wage and Price Inertia*, in: N.G. Mankiw and D. Romer (eds), *New Keynesian Economics*, vol. 1: Imperfect Competition and Sticky Prices, MIT Press: Cambridge, Mass.

Fischer S. (1991), *Long-Term Contracts, Rational Expectations, and the Optimal Money Supply Rule*, in: N.G. Mankiw, D. Romer (eds), *New Keynesian Economics*, vol. 1: Imperfect Competition and Sticky Prices, MIT Press: Cambridge, Mass.

Fisher I. (1931), *The Purchasing Power of Money. Its Determination and Relation to Credit Interest and Crises*, The MacMillan Company, New York.

Friedman M. (1977), *Nobel Lecture: Inflation and Unemployment*, Journal of Political Economy, vol. 85, no 3.

Gerrard B. (1995), *Keynes, The Keynesians and the Classics: A Suggested Interpretation*, Economic Journal, vol. 105, March.

Gordon R.J. (1990), *What is New-Keynesian Economics?*, Journal of Economic Literature, vol. XXVIII, September.

Greenwald B., Stiglitz J., (1993), *New and Old Keynesians*, Journal of Economic Perspectives, vol. 7, Winter.

Hall S., Yates A., (1998), *Are There Downward Nominal Rigidities in Product Markets*, Bank of England, Working Paper, no 80.

Howitt P.W. (1986), *The Keynesian Recovery*, Canadian Journal of Economics, no 4, November.

Keynes J.M. (1960), The General Theory of Employment Interest and Money, MacMillan&Co. Ltd., London.

Lucas R.E., Jr. (1972), Expectations and the Neutrality of Money, Journal of Economic Theory, vol. 4.
—(1973), *Some International Evidence on Output-Inflation Tradeoffs*, American Economic Review, vol. 63, no 3.
Mankiw N.G. (1991), *Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly*, in: N.G. Mankiw and D. Romer (eds.), *New Keynesian Economics*, vol 1: Imperfect Competition and Sticky Prices, MIT Press: Cambridge, Mass.
Vroman S.B. (1989), *Inflation Uncertainty and Contract Duration*, Review of Economics and Statistics, vol. 71, no 4.