

SOME CONSIDERATIONS ON THE MAIN DETERMINING VARIABLES IN THE MODELS USED TO ESTIMATE THE INFLATION

Assoc. Prof. Anca BĂNDOI, PhD
Prof. Ion TOMIȚĂ, PhD
University of Craiova

1. Theoretical models for estimating the impact on inflation

Inflation, the same as trade deficit, supports a major impact by the evolution of unit costs with labor work. Taking into account these concerns the monetary policy strategy is focused on exchange rate appreciation, considered the only able to produce visible effects on trade deficit, improving, in the same time, the negative effect on inflation.

One of the price's increasing mechanisms is the channel of the economic agents' costs. Thus, maintaining of a constant aggregate demand, productivity, competitive pressures and the rate of enterprises profit, increasing costs of labor remuneration, with taxes to the state and with raw materials will reflect in increasing the prices of companies' products.

Quantifying the impact of wages on inflation can be achieved estimating models as following:

$$I_s = f(I_{t-i}, CUS_nom_{t-i}, x_{t-i})$$

or

$$I_s = f(I_{t-i}, CUS_real_{t-i}, x_{t-i})$$

where:

- I_s is inflation;
- CUS_nom are nominal costs with labour;
- CUS_real are real costs with labour;
- x is a set of other explanatory variables.

There are for and against reasons of using nominal CUS, respectively real CUS in equations of

inflation. If we choose to use CUS denominations, we face a number of issues related to the properties of using estimators, the main difficulty being to determine the direction of contemporary influence of a series of nominal wages and inflation.

Estimation of an OLS equation including on the right sites lag inflation together with nominal CUS lags is not possible because the two variables are correlated, and estimated indicators don't get the effects of each variable separately.

A model that could capture this effect should be estimated with variables instrument, which would identify some tools that will be sufficiently related with nominal CUS in order to estimate better their effect on inflation and, in the same time unrelated with lag inflation.

There isn't a specification to match these requirements. It may, however, propose other estimation methods. A SVAR model, for example, capture the effects of each variable but only after a series of restrictions regarding the direction and influence time between variables, so it doesn't solve the problem described above.

In specialized literature often the relationship between inflation and increasing of nominal wages is investigated with the co integration methodology. If the variables meet the requirements of the integration order, it is verifying that the two time series are co integrated (if there is a long-term relationship from which the series differ only temporarily). If it is confirmed the existence of a relationship co integration,

the methodology makes it possible to find out the speed of adjustment variables back to the balance relationship and which of them shall be adjusted.

The methodology is potentially very profitably because it makes possible a much more rigorous identification of the relationship between variables and provides more information on the nature of interdependencies between variables (long-term relationship, short-term adjustments, etc.). The specific conditions of the Romanian economy in the period under review don't make possible applying this methodology because of its theoretical requirements.

However, being presented these methodological reserves, were estimated several models of co integration with nominal wages and inflation.

The results show that nominal wages are those that are adjusted to inflation and not reversed. By accepting these results, it might conclude that in Romania nominal CUS have no influence on inflation. We believe that the mentioned before problems are those who cause this result so we chosen the resumption of estimates with adjusted wages with productivity, expressed as a deviation from inflation (real CUS).

2. Analysis of determinated variables evolution on the inflation in Romania

Data provided by National Institute of Statistics and the quarterly bulletin of the National Bank of Romania, shows that in recent years, the labor markets in the euro area have improved significantly.

Employed population increased considerably, the degree of participation in the labor market has increased, and in early 2008, the unemployment rate reached its lowest level since the early 80's. Therefore, at the end of 2007 the labor markets were restrictive and wage pressures increased. More recently, the perspectives for the labor market have deteriorated considerably. Unemployment rate increased at the beginning 2008, while employment

growth was tempered. A survey relating to the employed population forecasts indicates a negative perspective in the future. In the given conditions where the demand for labor has fallen into a slower rhythm than the available offer, it is expected that pressures on the labor market will reduce in the coming quarters. In recent years, the labor markets in the euro area have improved significantly.

Studies show that apparently the dynamics of nominal gross wages was not significant for inflation or, according to some specifications that had a very low influence on inflation. This conclusion is consistent with the economic theory if real wages growth did not exceed the productivity and, where there were sectors in which wage growth was above that of productivity, can identify factors that have limited (for example, widening competition and fiscal reform) or compensated (for example, the appreciation of the exchange rate) the transmission of those "excessive" increases in inflation. The analysis will continue using the real cost unit labor as a determining factor for inflation and trade deficit.

The data show that wage increases have not exceeded productivity growth and that the absence of impact of nominal wages in the industry on inflation may be due to the fact that there were no increases of excessive nominal wage in this sector. Values above 100 indicate that wage increases exceeding productivity, series with fixed-base. Throughout the economy, however, wage increases have exceeded productivity. A possible explanation might be that GDP, unlike industrial production, includes also the tertiary sector. How service productivity growth is assumed to be lower than productivity growth in industry, the trend of equalization of wages in the economy leads to this gap. We experienced the assumption that the exporter sector should provide wage increases lower than the rest of the economy and because it is subject to pressures from the appreciation of the exchange rate.

Table 1. Unit cost of labor and labor productivity

Period	Total index (I ₀ =2000)	Total	Mining industry processing and energy	Construction	Trade, tourism, transport and communications	Financial services, real estate, renting and business	Public administration, health, education and other public services
Unit cost labor (UCL)							
2005	109.0	1.2	-1.1	2.9	1.4	2.0	2.0
2006	110.0	0.9	-0.7	3.3	0.1	2.6	2.1
2007	111.8	1.6	-0.6	4.0	1.4	2.6	2.1
2008	T1	113.5	2.5	1.2	2.1	2.4	2.9
	T2	115.2	3.3	2.1	2.2	3.6	4.7
	T3	116.0	3.7	4.9	2.0	5.1	2.9
Labor productivity							
2005	103.1	0.8	2.9	-0.9	0.7	0.3	-0.1
2006	104.4	1.3	4.3	0.2	1.4	-0.2	-0.6
2007	105.3	0.8	3.4	-0.9	0.8	-0.4	0.3
2008	T1	105.8	0.5	2.2	2.2	0.0	0.0
	T2	105.4	0.2	0.7	2.8	-0.9	-0.3
	T3	105.2	-0.2	-1.4	3.0	-0.9	0.0

Source: Monthly Bulletin of BCE, March 2009, pg.47

Certainly that industry does not overlap perfectly with the exporter sector, but it is a good enough approximation in order to provide clues regarding the different behavior of exporting firms.

Evolution of nominal gross wages in the industry but did not differ significantly from those in the rest of the economy. Thus, the differences between the CUS in industry and the rest of economy is due mostly to labor trends, which, unlike the growing trend of labor recorded in the rest of the economy in 2000 shows only decreases. Apparently, maintaining CUS in industry at a relatively low level was achieved through efficiency gains and estimation of some models that include the series of average wages in industry-adjusted with productivity does not provide results that support the hypothesis of existing an inflationary stimulus from the force employment costs in industry. Instead, the estimation of models that include the series of real gross wages on the economy adjusted with labor productivity shows a positive impact on the inflation.

Series of gross real wages adjusted with labor productivity in industry and throughout the economy may be calculated in euros, thereby providing a measure of external competitiveness. The data show that this time even in industry dynamics of wage costs in euro significantly exceeded the rhythm of productivity. This loss of competitiveness should be reflected in the trade deficit, a hypothesis confirmed by the empirical analysis. The results show that CUS growth in euro is an important parameter in the trade deficit, and real gross wages in Romanian currency reclaimed with productivity on the entire economy are a determining factor for inflation.

Following the parallel development costs of firms and their productivity, may see some pressure on costs that could not be covered by productivity gains. Because it is not in the interest of entrepreneurs to pay work more than its efficaciousness is assumed that they were forced to increase wages from other considerations. The impact

apparently reduced of inflation on gross wages can be explained both by developments of wages at sectorial level, and that there were a number of factors that have limited or offset wage increases transmission in inflation.

The number of employees in industry and in the public sector represents over 50% of total employment in the economy. We showed that the cost-push phenomenon inflation cannot due to these two sectors, in the first case because real wage increases in the industry until recently have not exceeded productivity growth, in the second because the public sector has no budgetary constraints which have private sector (mechanism of transmission of public expenses in inflation is different from that of the private sector).

It is therefore natural that an empirical analysis of the impact of adjusted gross wages with productivity throughout the economy on the inflation to result from a significant coefficient. Beyond these point of view, however, can be presented a number of factors that have contributed to furthering disinflation in terms of large wage increases.

In economic theory, in conditions of perfect competition, it is assumed that companies can not afford to grant real wage increases over the productivity without requiring them to be reflected in increased prices of their products. In practice, however, competition is not perfect, still less in an economy in transition, and factors such as achieving substantial profit margins may lead to temporary deviation from this principle (thus, the additional cost is not reflected in the increase of prices but in reducing the profit margin).

Coexistence of disinflation with high dynamic level of wages in the economy can be explained by the fact that the economy has been influenced that counteracts their incentive effect on rising prices. The first of these is the fiscal reform in 2005 which component for reducing profit tax from 25 to 16% allowed companies to pay large wage increases and currency appreciation.

Other possible factors in this regard are restrictive monetary conditions and positive supply shocks. In the case of the first mentioned factor, the evolution of non-governmental credit, one of the main channels of transmission of monetary policy impulses, don't suggest that it would be cause for limiting power prices increasing of economic agents. The second factor, in turn, could be an important determinant of inflation developments, especially in an economy in transition.

Judgments on which variables are included in models with the restrictions described above are as follows: trying a balanced division between games offer and demand, respectively the inclusion of those games that are considered a priori as the most important.

Thus, the variables such as real interest rate and real consumption are designed to capture the influence of games demand on inflation, while credit to firms, labor productivity and gross fixed capital formation (FBCF) represents offer elements. Series such as gross fixed capital formation and medium and long term credit toward traders have a double interpretation in this context.

First of all they show the investment in the economy, but this interpretation can be doubled by that the investments that are proxies for the degree of competition in the economy. The impact of investments on inflation takes place primarily through labor productivity and thus might be revealed by this variable.

If the two series are also good indicators for the degree of competition in the economy, this effect is not pointed by labor productivity, they becoming self-standing important in inflation's determination.

An alternative to the using of investments series in the economy as a proxy for the competition degree would be carrying out of estimates with profit series of economic agents. This series can be recovered by correcting earnings tax of public budget with taxation rate.

But series did not show a decline of profits in GDP share. This due, most likely, to enhance collection (observed large jumps in revenue in quarters in which the tax rate falls, without any lag that would justify another interpretation), which is why we choose to use in SVAR a series that is not in this way "bruise".

Theoretically, the increasing of competition degree would lead to a temporarily decrease of the inflation rate, by reducing of the *mark-up*. The main channels where could operate this mechanism are: (i) limitation of price increases in order to face competition, (ii) the perspective of market increases makes the players to limit price increases in order to monopolize a higher market share.

Empirical analysis shows that, among the variables included in the models, the degree of competition is the main determinant of inflation, the influence of games generated by FBCF variables and medium and long term credit to economic agents being, in all models, the most important, both on short or long-term horizons.

3. Conclusions

Analysis of development and wages determinants in the period 2005 – 2008T3 shows that they had a moderate dynamic from the perspective of correlation with labor productivity. After that period, the dynamics of wages accelerated, especially those in the public sector.

According to data for 2007, gross wage dynamics in the industry deflated by IPPI, the most "conservative" measure of wages growth has exceeded the increasing rhythm of labor productivity, the negative effects on inflation and trade deficit becoming more visible.

Given the accelerated rate of wages growth in the public sector, it is relevant the way of influence between public and private sectors wages. The result of previous analysis indicates the influence of wages from private sector by salaries from public sector and a strong

procyclic behavior (especially in recent years) in the case of public sector salaries.

They suggest that incomes policy has acted as a supply of excess demand, both directly and through the influence it has on determining wages in the private sector.

Analyzing the problem of wage influence on inflation in the economy, before any empirical tests it must be explained the apparent softness (until 2007) of the dynamics of salaries with sustained disinflation process. These two evolutions are compatible with economic theory if the increasing of real wages did not exceed productivity growth and / or, if there were sectors in which wage growth was above that of productivity, it can be identified factors that have limited or compensated transmission of these excessive increases in inflation.

Calculating a series of real gross wages (deflated by IPPI) adjusted with labor productivity in industry, the data show that wage increases have not exceeded productivity growth and that the absence of a nominal wages impact in the industry on inflation may due to the fact that there were no excessive increases of the nominal wage in industry. On the entire economy, however, wage increases have exceeded labor productivity, especially if wages are measured in euros. This loss of competitiveness should be reflected in the trade deficit, a hypothesis confirmed by empirical analysis.

The results show that growth in the euro of CUS is an important factor in the trade deficit and to a less extent; salaries in Romanian currency corrected with productivity are a determining factor for inflation.

Apparently reduced impact of the salaries on inflation may be explained also by the evolutions at sectoral level (such as those in the industry) but also by the fact that there were a number of factors that have limited or compensated the transmission of wage increases in inflation. Among the most important factors are fiscal reform from 2005 that

through reducing the profit tax from 25 to 16% made possible the involving of the private sector in "race" of increasing wage, launched by the public sector and also the appreciation of national currency, but may be considered games positive offers factors, which partially cancel pressures from aggregate demand. One of them could be widening of the competitive pressures in the economy, which would act through mechanisms as following:

- limiting price increases in order to face competition and

- the perspective of market increases makes that the players to limit current price increases in order to get a higher market share. In estimations, for the competition degree in the economy was used a series of gross fixed capital formation and medium and long term credit for economic agents.

The results reveal the dominant influence of these variables on the variation of core inflation relative to the other factors.

During the period, empirical analysis of the gross wages impact on inflation and trade deficit shows that they exercised an influence on both variables, the appreciation of the exchange rate being that one that determined the production of much more visible effects

on the trade deficit, while improving negative effect on inflation. Also, positive games of offer that influences the economy in recent years characterized by restructuring and investment have allowed the recording of substantial rate of wages growth in parallel with continuing disinflation.

Influences in order to stimulate increasing wages in private sector (like the deficit of employment and accelerated wage growth and of the number of employees in the public sector) have continued to show even in 2007. Starting from this year, however, it observes a deterioration of the developments that have previously favored reducing the impact of the salaries on increasing prices (the high dynamics of productivity, a strong appreciation of exchange rate), which amplify the risk of registration of some inflation rate slippages.

In conclusion, it is not desirable that the mechanism which has acted so far - compensation (partial) of unit cost increases with labor by the appreciation of national currency - to continue, given the impact of these two factors effects on the external competitiveness deterioration.

REFERENCES

Aristide O.	Impact on wage inflation in the economy and commercial deficit, BNR, Caiet de studii nr.24/ 2007
Christou, C., Klemm, A. Tiffin, A.	„Romania: Selected Issues”, <i>International Monetary Fund</i> , (2007)
Mehra Y.	<i>Wage price dynamics: are they consistent with cost-push?</i> , Federal Reserve Bank of Richmond Economic Quarterly, 2000
Popa A., Băndoi A. *****	<i>Teorii și politici monetare</i> , Editura Tribuna Economică, București, 2005 Bulletin lunar BCE, March 2009