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WORKING PAPER

INCOME, EMPLOYMENT AND DISTRIBUTION EFFECTS OF INFLATION

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INTRODUCTION

Chapter 1

1.1 Inflation and its causes

Definition

Inflation is a process in which the average level of prices increases at a substantial rate over a considerable period of time. In short, more money is required to buy a given amount of goods and services. One can measure the rate of inflation as either the annual percentage rate of increase in the average price level or decrease in the value of money (Darby 1998).

Causes of inflation

There are many causes of inflation, but in general we can divide them to the ones at the demand-side and the ones at the supply side of economics. Demand-pull inflation occurs when aggregate demand exceeds existing supplies, forcing price increases and pulling up wages, materials, and operating and financing costs. Cost-push inflation occurs when prices rise to cover total expenses and preserve profit margins. A pervasive cost-price spiral eventually develops as groups and institutions respond to each new round of increases. Deflation, as a reverse process, occurs when the spiral effects are reversed (Jones 1999). Even though today's inflation is more of a mix between these two basic inflation causes and inflation inertia, this is a good classification to start with.

1.2 Outcomes of price instability

Effects of inflation

Effects of inflation, on the other hand, are also as many-layered as its causes. Inflation is usually thought as a negative phenomenon on the basis of traditional experiences with hyperinflation, but more exact

analyses of the inflation effects have shown that they depend on the form of inflation and situation in national economy (Ger. *Angebots-Nachfrage-Konstellation*). One therefore can no longer simplistically speak of "effects of inflation". Despite the progress in understanding this phenomena, there are still many subjects uncleared and need consideration (Cassel 1995, 311):

Subjects to consider

- Inflation processes do not only bring individual and national disadvantages (costs), but potentially also advantages (benefits);
- Besides the advantages and disadvantages of inflation, we also have to take into account costs of disinflation[1];
- Decisions of stabilizing economic policy for or against the disinflation depend on results of a two-fold cost-benefit analysis;
- Results of inflation-effects analysis are important component of explaining inflation, because inflation can be politically desired (caused) for its potential net benefits;
- Costs and benefits of inflation essentially depend on whether it is fully or only partially anticipated;
- Important regulation factors are also individual institutional circumstances, such as presence of index and revision clauses in long-term contracts;
- Caused by economic effects, non-economic effects of inflation can also appear, like tax-refusal, citizens' reluctance, strikes etc.

Different situations in national economy can lead to different effects of inflation. These situations as well as effects of inflation will be presented in the following chapter of this research.

[1] The specific effects of inflation and deflation are mixed and fluctuate over time. Deflation is typically caused by depressed economic output and unemployment. Lower prices may eventually encourage improvements in consumption, investment, and foreign trade, but only if the fundamental causes of the original deterioration are corrected.

In many countries economic policies are fighting against inflation with different means. Result of such anti-inflation policy is often stagnation or even a decrease of Gross Domestic Product (GDP) and increase is unemployment. Compared with costs of inflation (allocation and distribution effects), costs of disinflation (loss of output and higher unemployment) are much higher. That is why it is often said, that inflation is an irreversible process.

CONSEQUENCES OF INFLATION

Chapter 2

2.1 Inflation and its impacts

Example to start with

Let us take for example an economic participant (individual, firm etc.) that borrows a long-term loan in worth of 10,000 € at a fixed interest rate and annual annuity of 1,000 €. Let us assume now that an unexpected inflation doubles prices and wages. Real worth of the wages has not changed, since the prices also doubled (for double nominal wage this economic participant can now buy the same amount of goods and services as before), but the real worth of the annual annuity of his loan decreased. Nominal annual annuity is still 1,000 €, but the economic participant (borrower) has to work for that amount only half as much as before the inflation occurred (Žižmond 1998, 124-125; Samuelson and Nordhaus 1998, 583-584). Hence the real worth of his annual annuity cut in two, the borrower increased his wealth, whilst the lender decreased his real income (wealth). The other way around happens in a case of disinflation or evendeflation, where the real worth of annual annuity of a loan increases and the borrowers wealth decreases (lender's wealth increases).

That kind of outcome occurs if the inflation has been stable for several years (inflation rate has neither increased nor decreased) and it increased suddenly, which means that it was not anticipated. However, if the increase in inflation rate is expected (on basis of different data about movements of economic variables in national economy and global markets), economic participants (individuals, firms, banks etc.) anticipate this increase. This means that the interest rates on financial and capital markets will rise according to

Fisher's effect

the inflation-rate increase (Burda and Wyplosz 1994, 305-306; Senjur 1999, 226-227):

$$i_n = i_r + \pi^e \qquad (1),$$

where "i_n" is nominal interest rate, "i_r" is real interest rate and "π^e" are inflation expectations. This expression is also known as the Fisher's effect and it shows that the negative effect of anticipated inflation on real money demand is already included in nominal interest rate. When market interest rate accommodates to the inflation expectations, then the effect of inflation on income and wealth are mainly eliminated.

Costs and benefits of inflation

Besides redistribution of income, inflation also has real effects on national economy. On one hand it affects output (GDP), which is a macroeconomic effect (Žižmond 1998, 125) and on the other it affects allocation of resources in national economy and economic efficiency, which is a microeconomic effect (Frenkel and Mehrez 1997, 20-21; Card and Hyslop 1996, 36-37; Volgy, Schwarz and Imwalle 1996, 1233).

Anticipation and balance

All this factors cause the so-called inflation costs (Rothbard 2000). On the other hand, it has already been stated that inflation can also lead to some benefits. In order to analyze these effects more precisely, two characteristics of inflation or behaviour of economic participants have to be defined (Žižmond 1998, 126).

1. Inflation can be anticipated or unanticipated, which means that it is / it is not built into all economic relations (contracts)

2. Inflation can be balanced or unbalanced, which means that all prices rise / do not rise with the same rate (relative prices remain / do not remain unchanged).

In reality these characteristics of inflation and behaviour of economic participants combine and cause different economic situations, which are presented in Table 1.

Table 1: Some effects of inflation in different economic situations

Inflation	Balanced	Unbalanced
Anticipated	no inflation-effects	allocation effects
Unanticipated	distribution effects	allocation and distribution effects

Source: Žižmond (1998, 126).

Economic effects of inflation

To summarize, we can divide effects of inflation into two groups: economic and non-economic effects. We could also understand them as costs (disadvantages) and benefits (advantages) of inflation to a national economy. Economic effects are the following (Cassel 1995, 312-318; 1987, 274-289; Issing 1995, 238-239):

- Income effects; by these effects we understand deviations of growth rate of the GDP below or above its natural growth rate, caused by inflation. They do not include possible decreases in the natural growth rate of the GDP;
- Employment effects; which are in strong connection with income effects, hence they are usually defined as difference between natural and actual rate of unemployment;
- Distribution effects; of which two are traditionally subjects of practical research and scientific analysis: effect of inflation on distribution of income and effect of inflation on distribution of wealth;

- Allocation effects; which are the most obvious with money (cash): in terms of high inflation people (economic participants) want to get rid of the money because real interest rate in usually negative and their demand for other assets increase. Prices of inputs for production that are based on long-term contracts cannot rise as high as inflation rate either; therefore missed investments are a common phenomenon. These are all allocation effects of inflation, also known as microeconomic effects;
- Effects on economic growth; connection between inflation and natural growth of the GDP definitely exists (at least on short term), but it is still for the most part unsolved. Phenomena, such as barter trade, parallel economy (also known as "grey economy") and corruption can appear or intensify and they all decrease natural growth rate of the GDP[2]. These effects of inflation are also known as macroeconomic effects and are in strong connection with allocation (microeconomic) effects.

Non-economic effects of inflation

Non-economic effects of inflation are caused by economic effects and are the following: tax-refusal, citizens' reluctance, strikes, revolts, risings etc. These effects are not a part of our research.

In the following chapters of our research mainly the first three groups of economic inflation-effects will be more closely examined: income, employment and distribution effects. Of course, all of these categories are connected with each other and cannot be completely separated[3].

[2] These phenomena are (were) typical mainly for socialist economies, however they can also appear in capitalist economies and especially economies in transition.

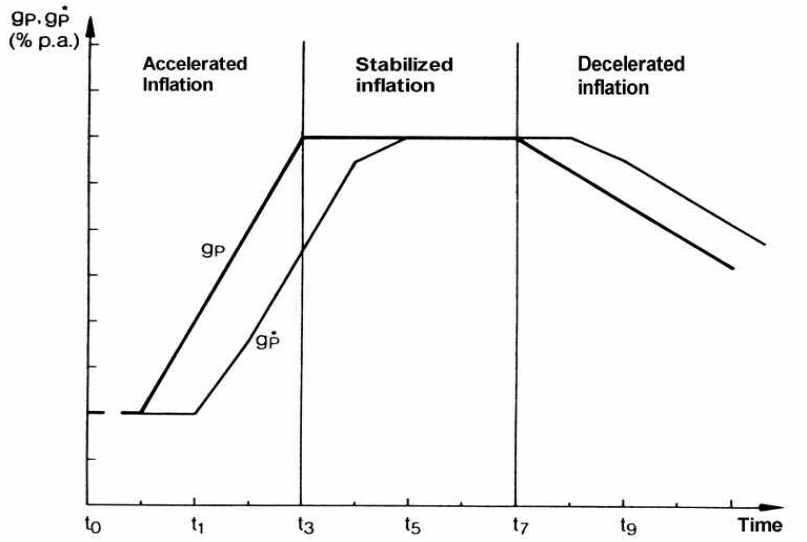
[3] Joint effects of inflation rise on national budget can be found in Appendix 1. Table A presents these effects if inflation is 1 percentage point higher per year in case of the USA economy.

2.2 Income and employment effects of inflation

Definition

As we already mentioned in the previous chapter, income effects of inflation are deviations of growth rate of the GDP below or above its natural growth rate, caused by inflation. Employment effects are usually defined as difference between natural and actual rate of unemployment and are therefore in strong connection with income effects. That is why these two types of inflation effects are examined together. Income and employment effects of inflation are known in two forms: as temporary and permanent effects (Cassel 1995, 312-314). Let us look at these two versions more closely.

Figure 1: Phases of inflation through time



Note: Denotation "g_P" stands for actual growth rate of price level, while "$\dot{g}_P$" is expected growth rate of price level.

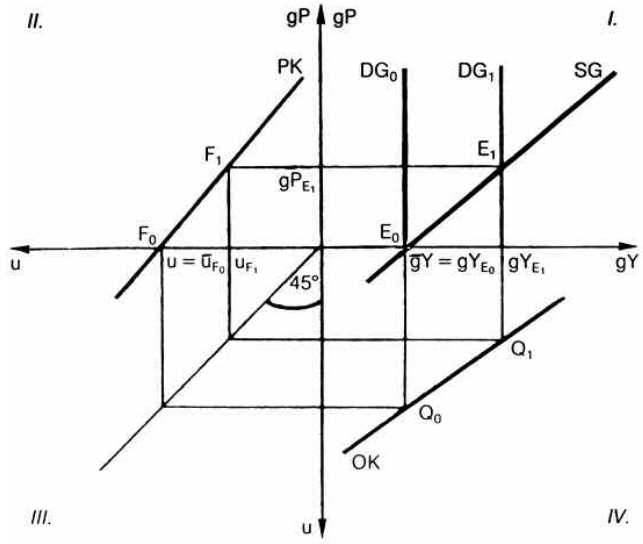
Source: Cassel (1995, 275).

Theoretical model

Inflation usually passes over three typical phases: at first it is accelerated, then it is steady (stabilized) and at last it decelerates. Temporary effects are mainly connected with accelerated and decelerated inflation, hence these two phases are assumed to last for a shorter time, while permanent effects are connected with steady

(stabilized) inflation. The following Figure (2) represents the basic theoretical model for explaining both mentioned effects of inflation.

Figure 2: Basic theoretical model



Notes: Curve PK represents Phillips curve, SG represents curve of aggregate supply growth, DG represents curve of aggregate demand growth and OK represents linear version of Okun's law (inverse relationship between the unemployment rate and the growth rate of the real GDP), which connects PK with SG.

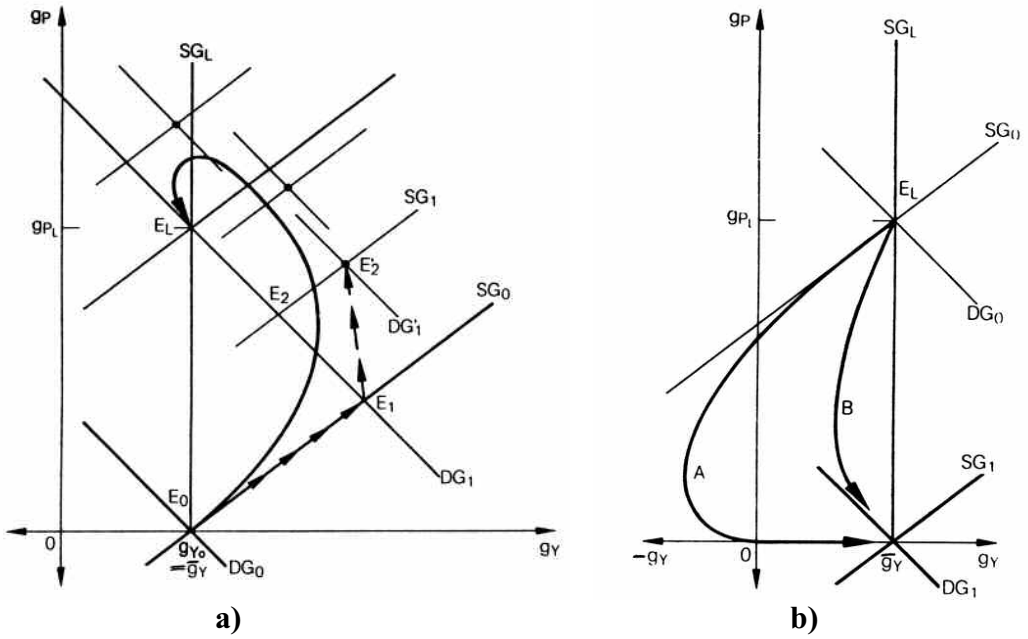
Denotation "g_P" stands for growth rate of price level, "g_Y" represents growth rate of income level, "$\bar{g}_Y$" stands for natural growth rate of income level, "u" represents rate of unemployment, "$\bar{g}_u$" stands for natural growth rate of unemployment and point E is the equilibrium.

Source: Cassel (1995, 281).

2.2.1 Temporary effects

Income and employment effects of inflation are mainly temporary phenomena that last only as long as inflation is not yet fully anticipated. Whether these effects have positive or negative consequences for a national economy depends on the stage in which inflation is discovered and situation in which economy is found (Cassel 1995, 312). Let us examine two inevitable types of inflation now: accelerated (Figure 3a) and decelerated inflation (Figure 3b).

Figure 3: Accelerated and decelerated inflation



Note: Figure 3a represents accelerated inflation, while picture 3b represents decelerated inflation.

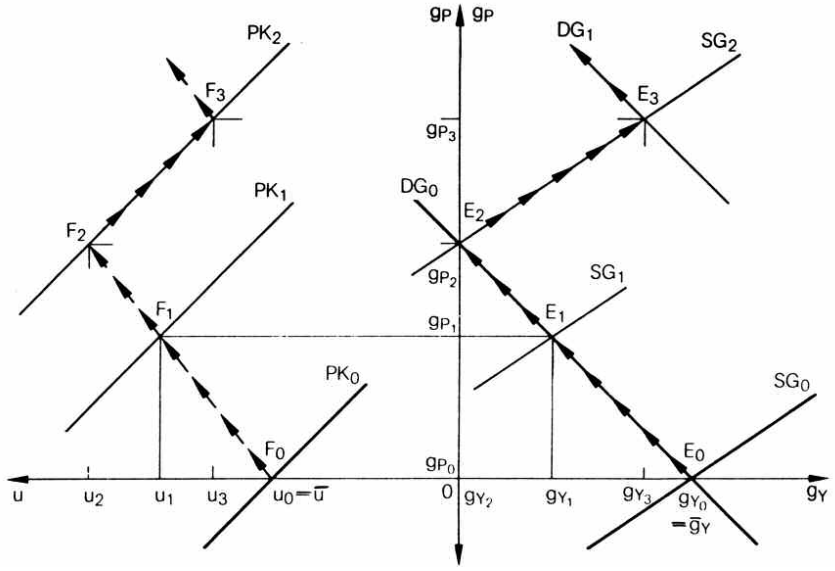
Source: Cassel (1995, 300).

Accelerated inflation

Accelerated inflation is often accompanied by positive income and employment effects (inflation-accompanied prosperity). However, these effects can only be expected, when the increase of inflation rate is caused by monetary demand-pull and induced supply-push (Ger. *induzierte Angebotsdruck*) is delayed (a time-lag has to emerge between decreased monetary demand-pull and induced supply-push). If the growth rate of the money volume in the further course of adaptation process remains unchanged, positive real effects are only temporary, because of the subsequent supply-push, induced by expectations and wage bargaining (Ger. *erwartungsinduzierten und verteilungskampfinduzierten Angebotsdruck*). Lasting real inflation-effects can only be achieved, if growth rate of the money supply (money volume) rises continuously and by that permanent inflation acceleration is provoked. This means that there can no longer be any applicable long-term trade-off between given inflation rate and

unemployment rate (which is in accordance with Keynesian assumption of a stable Phillips curve).

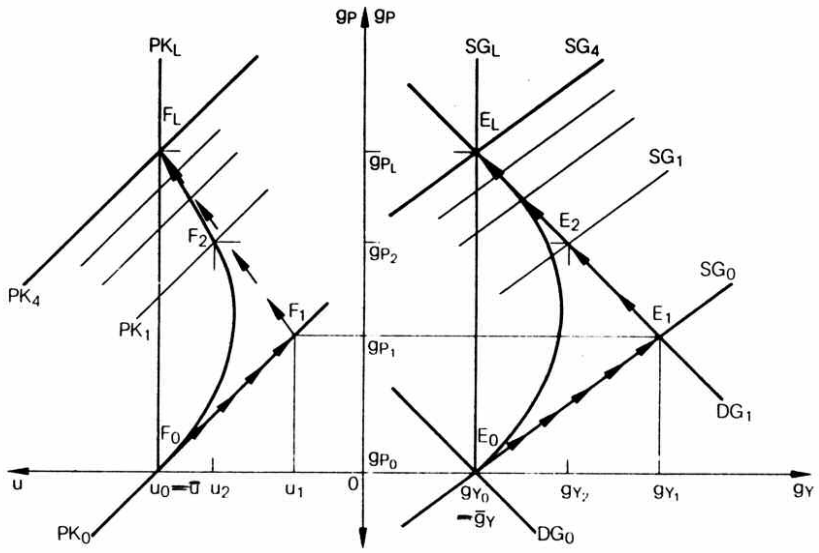
Figure 4: By wage bargaining induced supply-push and demand-pull



Source: Cassel (1995, 294).

If inflation rate increases, the Phillips curve will move upwards because of the already mentioned causes (Figures 4 and 5).

Figure 5: By expectations induced supply-push



Source: Cassel (1995, 299).

In other words, Phillips curve exists (or is valid) on short term, but it is unstable. This monetary counter-position was a subject of many empirical tests (ibidem, 312).

Decelerated inflation

While negative income and employment effects are exception with accelerated inflation, there are quite common (almost a rule) with decelerated inflation. Necessary prerequisite for a lasting decrease in inflation speed is a tight monetary policy of the central bank. When the monetary-policy authorities are confident in their knowledge of the amount of tightening that is needed, they can move quickly to the required higher level for interest rates. However, to the extent that there is more uncertainty on the effects of monetary policy changes, *inter alia*, due to the development of financial markets, it argues for implementing a more gradualist approach (Mylonas, Schich and Wehinger 2000, 13). Such uncertainty could increase the risk that a strong policy action might lead to undesirable outcomes. By following a gradualist strategy central banks sacrifice the speed with which their (inflation) target is obtained in order to avoid overshooting the target[4]. In some cases, the degree of gradualism will be dictated by other considerations, such as central banks' anti-inflationary credibility. If it is poor, there is heightened risk that a gradual policy response would increase inflation expectations.

Anti-inflation economic policy

Following a policy of gradualism can create tension between pre-emptive and reactive policy moves. An increasing risk of "falling behind the curve" suggests that a gradualist policy may need to be followed by more aggressive moves, if events appear to be turning out differently than expected[5] (ibidem, 11). For example, if healthy

[4] Uncertainty about the length of the lag in the monetary transmission mechanism also suggests that central banks may prefer to move more gradually.

[5] The term "falling behind the curve" is used to suggest that monetary policy authorities have reacted too little, too late in changing their policy rates to achieve their objectives.

balance sheets were to weaken the effects of higher interest rates, at the same time that wealth effects were stimulating consumption, monetary policy would face an increasing risk of "falling behind the curve"[6]. These tensions raise the importance of the monetary authorities' credibility and transparency. If inflation expectations are well anchored, policy actions will be more effective and thus the size of any move to achieve a given objective is likely to be smaller. A credible commitment to low inflation thus provides some insurance against "falling behind the curve". Transparency reduces the risk that policy changes will destabilize markets. Such a strategy would allow markets to adjust their anticipations appropriately and in this way, the risk of a disorderly adjustment of asset prices can be reduced[7] (ibidem, 11).

Summary

To summarize: the more distinctive monetary policy is and the weaker supply side reacts to such policy (with a downward correction of price level), the higher are inflation costs (expenses of such inflation fighting) and danger of premature collapse of tight monetary policy increases. Anti-inflation policy therefore has to keep inflation costs as low as possible, i.e. it has to pursue an adaptation path that is as close to SG_L as well as PK_L as it can be. To achieve this, anti-inflation policy has to include well-measured and above all continuous decrease of money-supply growth rate and a series of accompanying measures for adaptation of expectations and for softening the wage bargaining (Cassel 1995, 312-313). Effect on output stabilization may well be positive and the same is true for overall social welfare, but we cannot forget that uncertainty about the

[6] A more aggressive policy stance may also be required in other cases. First, if the economy is subject to persistent effects, such as from wage indexation, this could offset the initial bias towards gradualism. Second, in a low inflation environment, a rule that reacts more pre-emptively to deviations from the bank's targets may reduce the likelihood that the economy hits the zero bound for nominal interest rates – although, in practice in the world, this has only been an issue for Japan (Mylonas, Schich and Wehinger 2000, 13).

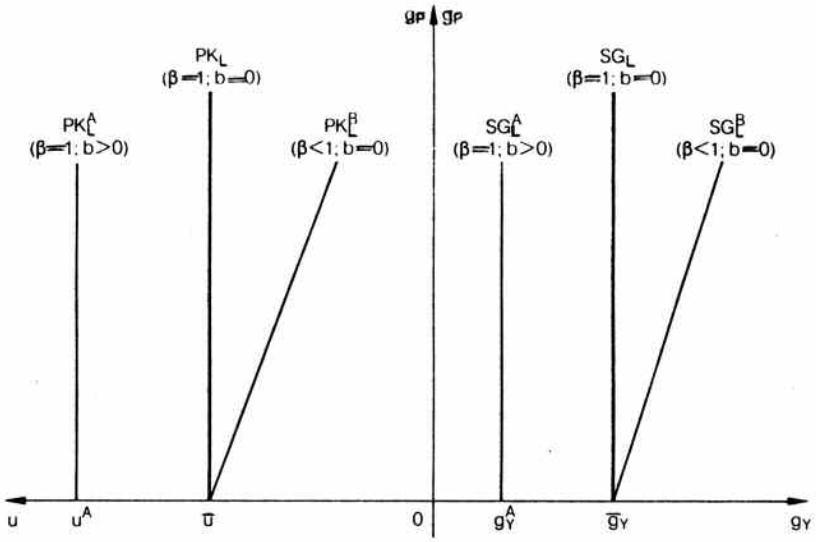
[7] Approaches of three main schools of economic thought will be presented in Appendix 2.

policymaker's preferences leads to a higher inflationary bias and also inflation costs (Eijffinger, Hoeberichts and Schaling 1997, 1213).

2.2.2 Permanent effects

If we presume that inflation was on long term correctly expected and completely anticipated and that there was no wage bargaining, the (long-term) curve of aggregate supply growth SG_L and the (long-term) Phillips curve PK_L in the presented basic model become vertical functions of natural income-level growth rate as well as natural unemployment rate (Figure 6).

Figure 6: Long-term curve of aggregate supply growth and long-term Phillips curve



Note: Denotation "β" represents anticipation coefficient.

Source: Cassel (1995, 313).

Friedman-Phelps hypothesis

This corresponds to the so-called Friedman-Phelps hypothesis, by which no income and employment effects can appear with completely anticipated inflation, i.e. each on short term possible trade-off vanishes on long term and income-growth rate as well as unemployment-growth rate persevere on its natural level (Cassel 1995, 313).

Two possible permanent effects

However, debate about existence of permanent income and employment effects of stabilized inflation exists for many years. In Figure 6 two possible cases are presented (ibidem, 313-314):

- Firstly it is possible, that constant wage bargaining[8] exists while inflation is correctly expected and completely anticipated, from which vertical SG_L^A and PK_L^A curves are derived as variations of long-term curve of aggregate supply growth and long-term Phillips curve. Permanent income and employment effects can therefore appear independently of the height of inflation rate;
- Secondly it is held as a possibility that inflation rate is correctly expected on long term, but not completely anticipated. In this case institutional impediments[9] (e.g. only periodical renewal of contacts concerning wages) or too high anticipation costs can be crucial. From this presumption SG_L^B and PK_L^B curves are derived also as variations of long-term curve of aggregate supply growth and long-term Phillips curve. These curves imply a long-term trade-off between inflation and income level as well as unemployment rate.

Summary

Both cases consequently come to opposite results: while the first case covers theses of stagflation theoreticians, the second one supports opinions of theoreticians that see in inflation a suitable method of supporting national economic growth. Empirical tests have shown that for anticipation coefficient a value in range of $\beta < 1$ can be assumed. Therefore anticipation coefficient in times of conjuncture is functioning pro-cyclically and it approaches in the "boom" phase the value of $\beta = 1$ (ibidem, 314).

[8] By term "wage bargaining" (Ger. *Verteilungskampf*) a phenomenon is meant, where every economic participant is eager to get as large share of total income as he can to improve his position.

[9] Slovenia is facing rising budget deficit for the last few years. Therefore a proposition is being made that wages would be formed on the basis of expected (around 90 per cent of expected inflation in the following year should be taken as basis) instead of actual inflation rate (Cajnko-Javornik and Zagorac 2000, 3). Inappropriate carrying out of such political decision can result as institutional impediment.

2.3 Distribution effects of inflation

John Maynard Keynes

These effects of inflation were beautifully expressed already by J. M. Keynes himself: “As inflation proceeds and the real value of the currency fluctuates widely from month to month, all permanent relations between debtors and creditors, which form the ultimate foundation of capitalism, become so utterly disordered as to be almost meaningless; and the process of wealth-getting degenerates into a game and a lottery” (Samuelson and Nordhaus 1998, 582).

Definition

The impact of inflation on individuals depends on many variables. People with relatively fixed incomes, particularly those in low-income groups, suffer during accelerating inflation, while those with flexible bargaining power may keep pace with or even benefit from inflation (Thorbecke 1997, 20-21). Those dependent on assets with fixed nominal values, such as savings accounts, pensions, insurance policies, and long-term debt instruments, suffer erosion of real wealth; other assets with flexible values, such as real estate, art, raw materials, and durable goods, may keep pace with or exceed the average inflation rate (Encyclopædia Britannica 1999). Workers in the private sector strive for cost-of-living adjustments in wage contracts. Borrowers usually benefit while lenders suffer, because mortgage, personal, business, and government loans are paid with money that loses purchasing power over time and interest rates tend to lag behind the average rate of price increases. A pervasive “inflationary psychology” eventually dominates private and public economic decisions (Jones 1999).

Each income and wealth formation as well as each income holder and wealth owner is principally involved when inflation strikes, hence

distribution effects can appear on all possible distribution levels (Cassel 1995, 317):

- Between owners of financial, physical and human capital (wealth); between cash, bond and stock holders; landowners, homeowners, antiquarians as well as creditors and debtors;
- Between claimants of contract and residual income as well as input and transfer income, i.e. between those entitled to wages, dividends, interests, rents, subsidies, pensions, child allowances, insurance money etc.;
- Between retardatory and propulsive economic sectors, i.e. between agriculture, industry and service sector; householdsand businesses; private and state sector as well as inland and foreign countries.

To sum up, two distribution effects of inflation can be emphasized: effect of inflation on distribution of income and effect of inflation on distribution of wealth. Let us examine these two effects more closely[10].

2.3.1 Distribution of income

Double aspect

Context between inflation and income distribution has to be seen under double aspect (Issing 1995, 216): as effects of income redistribution and as already mentioned wage bargaining, i.e. the struggle of individual groups to improve their position in distribution (which is an important cause of inflation, Ger. *Anspruchsinflation*). The first aspect is to be explained mainly in this contribution.

[10] Situation in national economy, explained at the beginning of Section 2.1, is groundwork for our further research.

Some aspects of redistribution will however not be explained in this research, because it would exceed our purpose: for more information about redistribution between public and state sector see Cassel (1995), whilst for more information about redistribution between inland and foreign countries as well as foreign exchange-rate effects see Mishkin (1997) or Sloman (1995).

Four hypotheses

At first, four hypotheses about the influence of inflation on income redistribution should be mentioned (Issing 1995, 216-217; Cassel 1987, 284-289):

- Wage-lag hypothesis is based on belief, that businesses can protect themselves against price increases as a result of negative inflation effects, since there is a possibility for taking measures daily. Wage raises are however subjects of considerable postponements, hence wages are set according to tariff contracts. Despite this fact, raises of effective wages prevent real wages to decrease too much;
- Interest-lag hypothesis: inflation has a negative effect on interest incomes, if nominal interest rate does not adapt to inflation rate increase (this statement subordinates that, in Wicksells terminology, inflation does not influence natural interests). This argument refers to lack of preparation of interest-holders to inflation-conditional money illusion as well as their weaker position vis-à-vis big credit demanders;
- Degree of adaptation of non-market incomes, such as pensions (that is why this thesis is often called Pension hypothesis) in terms of inflation is determined by political decisions as well as law regulations. From the temporal discrepancy between climbing prices, wage increases and pension increases can therefore considerable inflation losses of the pension-holders emerge, if special measures are not taken by the legislator;
- Interest and pension-holders' collected inflation losses should reflect at profit-holders. The thesis, which says that prices of goods can temporary overtake wages and interests, however applies only to the situation of evident demand-pull inflation. In what extent on the other hand entrepreneurs can avoid profit declines in terms of cost-push inflation depends on size and speed of the reaction of the prices on the costs pressure.

Interest-lag hypothesis

Interest-lag hypothesis was already presented with expression (1). However, if taxation of interest profits is included, this expression does not distinguish inflation increases from real earnings. In order to put interest-holders in terms of inflation and taxation into the same position as in terms of price stability, the following connection has to stand (Issing 1995, 217):

$$(1 - t) \cdot i_n = (1 - t) \cdot i_r + \pi^e \qquad (2),$$

where "t" represents constant marginal tax rate. Bearing interest of 100 € worth of capital at 5% interest rate, 50% marginal tax rate and in terms of price stability makes a real income of 2.5€ after taxation. But with an expected inflation rate of 5% nominal interest rate would have to rise to 15% in order to assure the same income. Nominal interests have to triple in terms of taxation in this case, instead of doubling, to assure that no income redistribution will occur (in the private sector). If nominal interest rate rises to 10% merely, the rate of nominal income-increase after taxation corresponds exactly to the (expected) inflation rate and profit on initial capital equals zero.

Bracket creep effect

If taxation is not taken into account, the so-called "bracket creep" effect[11] (Ger. *kalte Progression*) can be noticed (ibidem), i.e. income claimants come, because income increases are merely nominal, to a higher progression level. Actually, even from wages and annuities that hold step with inflation remain less of real worth after taxation in such cases. Similar impacts affect nominally fixed tax allowances. If these effects, which are caused by government's unchanged tax-tariffs in dependence to inflation rate of additional tax-revenues,

[11] Let us consider a progressive income tax, i.e. average tax rates increase with taxable income. Whenever income (before tax) increases at the same rate as prices do, the real income (before tax) is constant. But the real income after tax decreases, i.e. the tax burden has increased although real income did not increase. This phenomenon is called "bracket creep" effect or "rate escalation due to inflation", since the progression (increase of the average tax rate) is not visible in the tax schedule, at least not at first sight (Musgrave and Musgrave 1984, 371).

should be avoided, corresponding corrections in the taxation need to be done.

In times of the inflation, purchasing prices of capital goods of the following purchase are usually higher (in real worth) for businesses as of the previous one. Authentic profits therefore do not appear until higher prices of the following (substitute) purchases are taken into account. Hence taxation law acknowledges only write-offs in their nominal value, fictive profits are taxed in this way.

Summary

These are the most important income-redistribution effects of inflation. To what extent these theoretical statements describe the reality adequately has been determined till now only on the basis of empirical examinations (ibidem, 218); their results almost inevitably turned out differently from country to country and from period to period. Nevertheless, for the most important western economies has been shown that inflation influenced the income distribution less than economists expected originally. The most strongly pensioners and interest-holders are disadvantaged, while for wage incomes a remarkably high inflation-elasticity has been established as well as their overtaking of price increases not rarely cause profit decreases. The Wage-lag hypothesis has been therefore mainly not confirmed.

2.3.2 Distribution of wealth

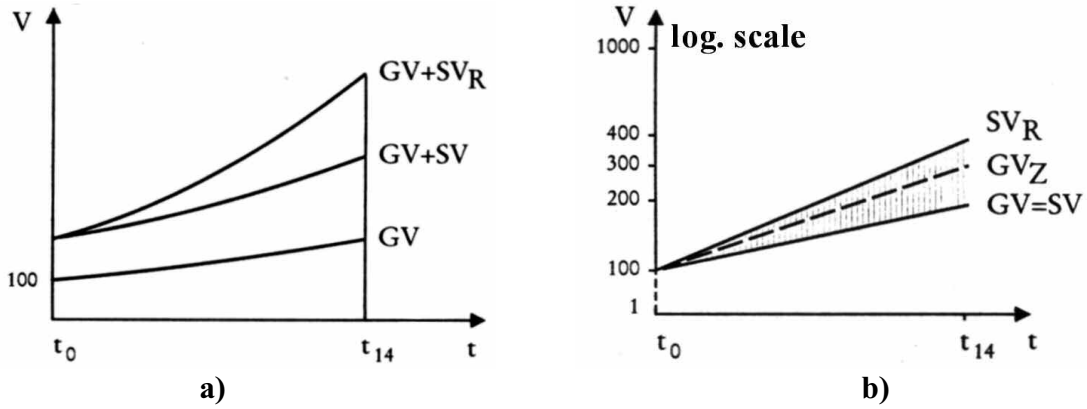
Definition

Distribution effects of inflation always emerge, when different income formations are adapting to the price increase in different extent and with various speed. Hence this can also occur with wealth in terms of inflation process, the following two effects can be defined (Issing 1995, 224-225; Romer 1996, 430-433):

- Inflation favours the owners of assets, which value rises quicklier than inflation rate increases and handicaps those, whose value of assets rises more slowly. To the first category belong mainly land and soil, while to the second group fixed-interests securities could be put as the most obvious example;
- Inflation favours the debtors of nominal values, since they pay back their debts in "debased" money according to the height of inflation rate and duration of credit relationship; these advantages go to the burden of creditors' wealth.

Wealth distribution effect is even more evident when both mentioned circumstances appear together (Issing 1995, 225-226), i.e. in case of wealth structure where owners of inflation-secured real wealth are debtors of money wealth as well (Figure 7a).

Figure 7: Wealth effects of inflation



Notes: Denotation "V" represents wealth (in nominal values), while "t" represents time. Curve GV represents money wealth curve, while SV stands for physical wealth curve.

a) Let us assume that at t_0 the worth of physical as well as money wealth is 100 €. If this wealth structure rises at an annual rate of 5 per cent, the joint worth will double in a little more than 14 years. If there is no inflation, no postponements emerge and wealth structure does not change. If inflation at a rate of 5 per cent occurs and we assume that nominal value of physical wealth rises according to inflation, while money wealth however remains unaffected, the joint worth of wealth structure does not rise by GV+SV curve any more, but by GV+SV$_R$. The wealth structure after 14 years alters significantly: share of money wealth falls from one half to one third, while share of physical wealth rises accordingly. Nominal worth of money wealth has doubled, however interest rate was neutralized by inflation, which means that real worth of money wealth remained

unchanged. On the other hand, worth of physical wealth was not only increasing according to inflation but also its nominal "initial worth" doubled, which means that real "initial worth" remained unchanged.

b) Let us assume the following ownership structure. Households are financing businesses with their savings. At t_0 household has money wealth in worth of 100 €, while the physical wealth of a business (capital, which was financed with household's savings) is also worth 100 €. From economical aspect we could say that the household owns physical wealth of the business. In terms of price-stability the worth of money as well as physical wealth rises by GV=SV curve. In terms of 5 per cent inflation-rate however worth of physical wealth rises by the SV_R curve. Shaded surface on Figure 7b therefore represents real write-off of the business vis-à-vis the household. From economical aspect half of the household's money worth of money wealth has transformed to the business' physical wealth at t_{14} because of inflation. Net savings of the household were completely neutralized by the price increase, while the worth of physical wealth increased adequately. According to this, an inflation rate as low as 5 per cent is (under certain presumptions) an effective "machine" for wealth redistribution. However, increase in nominal interest rate usually weakens this effect. If interest rate fully corresponds to inflation at t_0, incomes from money and physical wealth are balanced, otherwise a portion of business' real write-offs vis-à-vis the household remains. The worth of physical wealth rises by SV_R curve, while the worth of money wealth rises by GV_Z curve.

Source: Issing (1995, 225-227).

However, the most problematic are effects of inflation on the structure of entire national wealth (Issing 1995, 226-227), when the ownership of physical and money wealth is not at least approximately proportionally distributed among different individual groups of economic participants (Figure 7b).

Debased money

As already has been mentioned, inflation favours the debtors of nominal values, since they pay back their debts in "debased" money according to the height of inflation rate and duration of credit relationship, but also according to scope and distribution of money wealth. Besides the private sector, government is usually the largest debtor and households are mainly the creditors (which, among others, also causes so-called crowding-out effect). The larger is public debt, the bigger are government benefits as debtor in terms of inflation. It should also be mentioned that inflation causes redistribution among the private sector: older families that usually posses more wealth gain vis-à-vis younger families that are usually

burdened with debt and the same goes for richer families visà-vis "middle class" (ibidem, 227).

Indexation

Because of these undesirable effects in terms of high inflation the so-called "small-fortune owners" that in general own only nominal values have to be protected. That is usually done by special clauses (Ger. *Wertsicherungsklauseln*), which are built into contracts and by that nominal values adapt to price-increases expressed through price index (price changes of some good that serve as basis of adaptation, e.g. gold can become questionable this way). Inflation-secured amount of capital K_W can therefore be expressed as follows (ibidem, 227-228):

$$K_W = K \cdot (1 + \pi) \qquad (3),$$

where "K" represents initial capital and "π" represents inflation rate. This removes debtor's advantages of inflation if of course all interest payments are affected in this way:

$$Z_W = i_n \cdot K \cdot (1 + \pi) \qquad (4),$$

where "Z_W" represents inflation-secured amount of interests. By indexation secured sum (E_W) of principal and interests can therefore be presented with the following expression:

$$E_W = K \cdot (1 + i_n) \cdot (1 + \pi) \qquad (5).$$

Summary

However, the more application of indexation stretches in an economy, the more money loses its informational quality as (real)unit

of account[12] (Ger. *Recheneinheit*) or it works imperfectly (Issing 1995, 228). As soon as money is devaluated, persistence at nominal values causes incorrect business calculations. Profit calculations show fictitious profits, since e.g. write-offs are not sufficient enough to replace worn-out investment goods and to start new production cycle (nominal prices of these goods have risen because of inflation). Without indexation the credit demand artificially inflates because of those "inflation profits", while on the other hand credit supply (savings) loses its attractiveness. Under these circumstances indexation can be discussed as the last way to handle with such inflation distortions (ibidem, 228).

[12] For more information on how wealth redistribution affected the former Yugoslav economy and for connection between wealth distribution and money devaluations see Mihaljek (1989). These effects affected all republics of the former country, i.e. Slovenia as well.

CONCLUSION

Chapter 3

3.1 Inflation as an inevitable phenomenon

Inflation as enemy No. 1

Inflation is intensely disliked in the world today. In periods when inflation is moderately high it is often cited as the most important problem facing the country. It appears to have an important political effect (e.g. on elections) and it is blamed for a wide array of problems. Yet economists have difficulty in identifying substantial costs of inflation, hence there is a wide gap between the popular (already mentioned) view of inflation and its identifiable impacts.

Many-layered effects of inflation

Impacts of inflation are often thought as comprehensible and transparent phenomena. However, in this research we have shown that inflation's effects are not well understood and that they are as many-layered as its causes. Inflation does not only lead to costs, but also to potential benefits that depend on form of the inflation and on situation in national economy.

3.2 Essential statements and further propositions

Resume

As it has been stated in this research, five different economic effects of inflation can be indicated: income, employment, distribution, allocation and growth effect, of which first tree were mainlysubject of our study. However, the other two effects cannot be separated and are therefore highly integrated with the ones studied. Effects of inflation depend mainly on the type of inflation (anticipation and balance) and on the phase in which inflation is found (accelerated,

decelerated or stable), but each income and wealth formation as well as each income holder and wealth owner is principally involved when inflation strikes, hence distribution effects can appear on all possible distribution levels.

Income effects of inflation are deviations of growth rate of the GDP below or above its natural growth rate, caused by inflation. Employment effects are usually defined as difference between natural and actual rate of unemployment and are therefore in strong connection with income effects.

The main redistribution impact of inflation occurs through its effect on the real value of economic participant's wealth. In general, unanticipated inflation redistributes wealth from creditors to debtors, helping borrowers and hurting lenders. An unanticipated decline in inflation has the opposite effect. But inflation is mostly mixing income and assets, randomly redistributing wealth among the population (all economic participants, as already said) with little significant impact on any single group.

Further propositions

It should also be mentioned that there are different approaches of main schools of economic thought to inflation and stabilizing economic policy (Appendix 2), which should be more thoroughly examined. It is true that well-measured and above all continuous tight economic policy is the most effective way to fight inflation and its negative effects, but one of the main points is also to reduce inflation expectations (danger of inflation inertia) and soften the wage bargaining. Nevertheless, there are still a lot of uncleared points in the area of inflation and its impacts being left for further research.

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APPENDICES

Appendix 1: Effects of inflation on national budget[13]

Effects of inflation in the USA economy

The effects that inflation produces in the USA on federal revenues and outlays partly offset each other. CBO's third rule of thumb shows the budgetary impact of inflation that is 1 percentage point higher than the baseline projects. If no other economic variables were affected, higher inflation would lead to larger taxable income and hence greater revenues. It would also boost spending; making nearly all benefit programs cost more (although with a lag). An increase of 1 percentage point in projected inflation each year would increase revenues by $338 billion in 2010 (see Table A). That effect is a little stronger than CBO estimated a year ago because projections of taxable income are higher now (largely because wages and salaries are expected to represent a larger share of GDP). In the inflated and capped baselines, discretionary spending is assumed to increase at the same rate as inflation for all or part of the projection period. Thus, under those baselines, discretionary programs would cost more if projected inflation was higher (the effect would be smaller under the capped baseline than under the inflated baseline because discretionary spending would not begin to grow at the rate of inflation until 2002, rather than 2000). The freeze baseline, by contrast, eliminates the effects of inflation by freezing discretionary spending at its 2000 level, so an increase in projected inflation would have no effect on discretionary programs.

CBO's estimates

[13] Summarized upon CBO (2000, 124-125), entirely.

Table A: Effects on the budget if inflation is 1 percentage point higher per year (by fiscal year, in billions of US dollars)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Discretionary Spending Grows at the Rate of Inflation After 2000											
Change in Revenues	11	32	56	81	108	138	172	208	248	291	338
Change in Outlays											
Net interest and excess cash											
Higher rates	4	12	15	15	14	14	13	10	7	4	*
Debt service	*	-1	-1	-2	-4	-5	-8	-12	-16	-22	-29
Discretionary spending	0	6	13	20	28	36	44	53	62	72	82
Mandatory spending	1	7	17	30	43	59	74	93	115	138	165
Subtotal	5	25	44	62	82	103	123	144	168	192	219
Total Change in Surplus	6	7	12	19	27	35	49	64	80	99	119
Discretionary Spending Is Frozen at the Level Enacted for 2000											
Change in Revenues	11	32	56	81	108	138	172	208	248	291	338
Change in Outlays											
Net interest and excess cash											
Higher rates	4	12	15	14	14	13	11	7	2	-4	-11
Debt service	*	-1	-2	-4	-7	-12	-17	-25	-34	-46	-60
Mandatory spending	1	7	17	30	43	59	74	93	115	138	165
Subtotal	5	19	30	40	50	60	68	75	83	89	95
Total Change in Surplus	6	14	26	42	59	78	105	133	166	203	243
Discretionary Spending Equals CBO's Estimates of the Caps Through 2002 and Grows at the Rate of Inflation Thereafter											
Change in Revenues	11	32	56	81	108	138	172	208	248	291	338
Change in Outlays											
Net interest and excess cash											
Higher rates	4	12	14	14	13	11	8	3	-3	-9	-18
Debt service	*	-1	-2	-4	-7	-10	-14	-20	-27	-36	-46
Discretionary spending	0	0	0	6	12	18	25	32	40	48	56
Mandatory spending	1	7	17	30	43	59	74	93	115	138	165
Subtotal	5	19	30	45	61	78	92	108	125	141	158
Total Change in Surplus	6	14	26	36	48	60	80	100	124	151	180

Note: Denotation " * " stands for a value lower than $500 million.

Source: CBO (2000, 125).

Under each baseline, most of the increase in total outlays would result from higher spending for entitlements and other mandatory programs. Many of those programs have statutory cost-of-living adjustments that automatically raise spending to keep up with inflation; in other programs, spending grows as prices for the goods

and services that the programs provide increase. A 1 percentage-point rise in the annual inflation rate would boost spending for entitlements and other mandatory programs by $165 billion in 2010, similar to the effect estimated last year. In deriving this rule of thumb, CBO assumes that nominal interest rates rise in step with inflation, thus increasing the cost of financing the government's debt as well as increasing the proceeds from the government's excess cash. As increasing surpluses reduce the government's need to borrow, higher interest rates will have a progressively smaller impact on the cost of financing the federal debt (and a greater impact on interest received from excess cash). Under each baseline, the impact of higher rates on government outlays begins to decline in 2003.

Overall effect on the USA budget

Also as a result of the diminishing need to borrow, debt-service savings will improve the budget's bottom line. Debt service provides savings of $60 billion in 2010 under the freeze baseline, $46 billion under the capped baseline, and $29 billion under the inflated baseline. Overall, CBO estimates that an increase of 1 percentage point in the annual rate of inflation would raise total outlays by $219 billion in 2010 under an inflated baseline. That increase would be smaller in the capped and freeze baselines. In previous years' estimates of this rule of thumb, higher inflation had relatively little effect on the total budgetary outcome because revenues rose nearly in tandem with outlays. In these projections, however, the additional revenue from higher inflation would exceed the additional spending. As a result, the projected surpluses would increase by $119 billion (slightly less than 1 percent of GDP) by 2010 under the inflated baseline, $243 billion (about 1.5 percent of GDP) under the freeze baseline, and $180 billion (slightly more than 1 percent of GDP) under the capped baseline.

Appendix 2: Aspects of three schools of economic thought[14]

Output and price responses, divided by three schools of economic thought (classical, new classical and new Keynesian) are presented in Table A as three economic models.

Table A: The three models

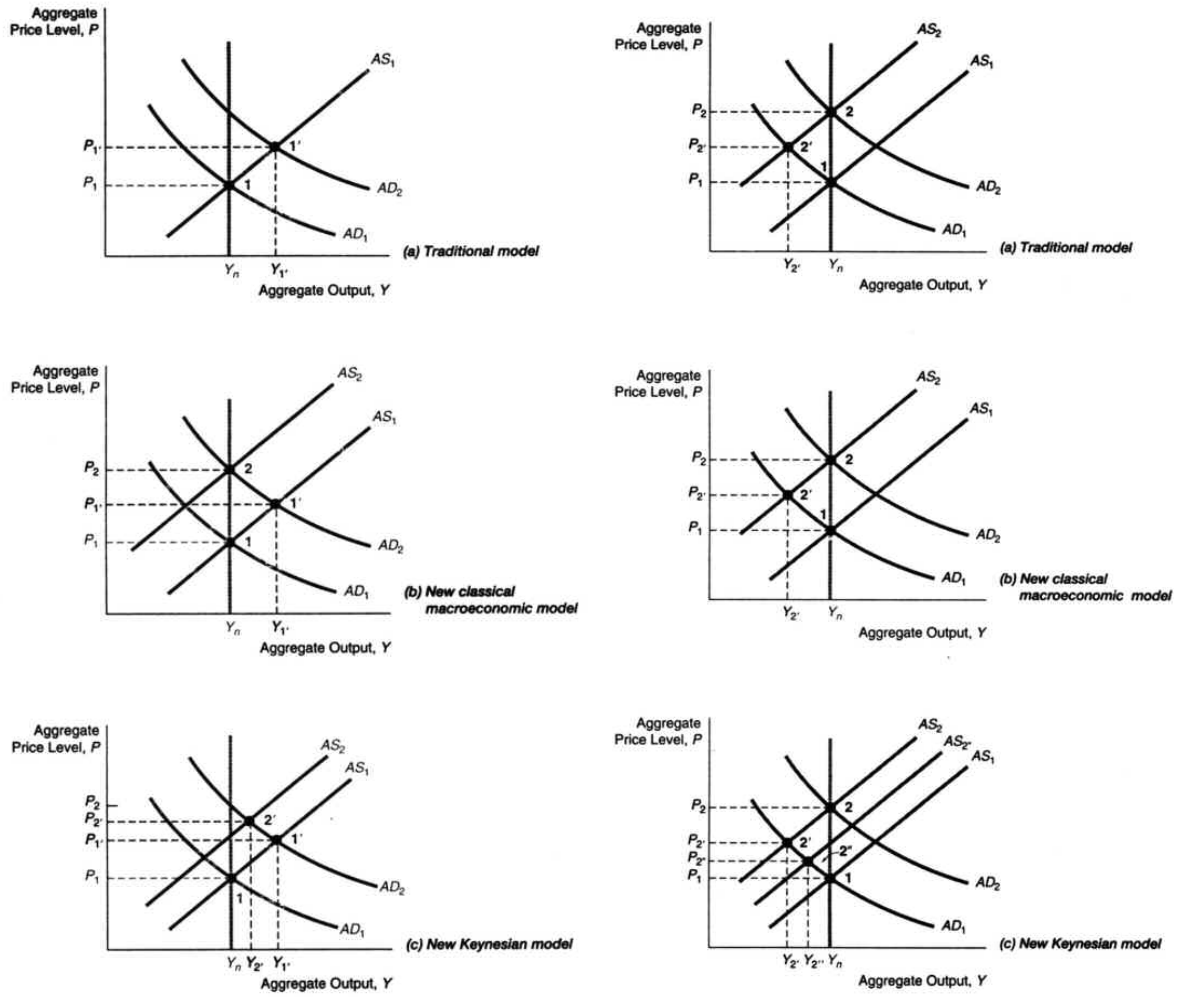
Model	Response to Unanticipated Expansionary Policy	Response to Anticipated Expansionary Policy	Can Activist Policy Be Beneficial?	Response to Unanticipated Anti-inflation Policy	Response to Anticipated Anti-inflation Policy	Is Credibility Important to Successful Anti-inflation Policy?
Traditional model	$Y\uparrow, P\uparrow$	$Y\uparrow, P\uparrow$ by same amount as when policy is unanticipated	Yes	$Y\downarrow, \pi\downarrow$	$Y\downarrow, \pi\downarrow$ by same amount as when policy is unanticipated	No
New classical macroeconomic model	$Y\uparrow, P\uparrow$	Y unchanged, $P\uparrow$ by more than when policy is unanticipated	No	$Y\downarrow, \pi\downarrow$	Y unchanged, $\pi\downarrow$ by more than when policy is unanticipated	Yes
New Keynesian model	$Y\uparrow, P\uparrow$	$Y\uparrow$ by less than when policy is unanticipated, $P\uparrow$ by more than when policy is unanticipated	Yes, but designing a beneficial policy is difficult	$Y\downarrow, \pi\downarrow$	$Y\downarrow$ by less than when policy is unanticipated, $\pi\downarrow$ by more than when policy is unanticipated	Yes

Source: Mishkin (1997, 722).

The following Figure (A) shows how anti-inflation and stabilization policy affect a national economy according to three different approaches. The three models have different views of the effectiveness of stabilization policy, whose intent is to eliminate fluctuations in output. Source of these differences are expectations: traditional model implies adaptive expectations while other two models imply rational expectations. Left three graphs represent expansionary economic policy, whilst right three graphs represent anti-inflation policy.

[14] Summarized upon Mishkin (1997, 720-729), entirely.

Figure A: Expansionary and anti-inflation economic policy



Notes: *Comparison of the short-run response to expansionary policy in the three models* . Initially, the economy is at point 1. The expansionary policy shifts the aggregate demand curve from AD_1 to AD_2. In the traditional model, the expansionary policy moves the economy to point 1' whether (he policy is anticipated or not. In the new classical model, the expansionary policy moves the economy to point 1' if it is unanticipated and to point 2 if it is anticipated. In the new Keynesian model, the expansionary policy moves the economy to point 1' if it is unanticipated and to point 2' if it is anticipated.

Anti-inflation policy in the three models . With an ongoing inflation in which the economy is moving from point 1 to point 2, the aggregate demand curve is shifting from AD_1 to AD_2 and the short-run aggregate supply curve from AS_1 to AS_2. The anti-inflation policy, when implemented, prevents the aggregate demand curve from rising, holding it at AD_1. (a) In the traditional model, the economy moves to point 2' whether the anti-inflation policy is anticipated or not. (b) In the new classical model, the economy moves to point 2' if the policy is unanticipated and to point 1 if it is anticipated. (c) In the new Keynesian model, the economy moves to point 2' if the policy is unanticipated and to point 2" if it is anticipated.

Source: Mishkin (1997, 722).