SOURCES OF INFLATION IN TURKEY

AN ECLECTIC ANALYSIS

by

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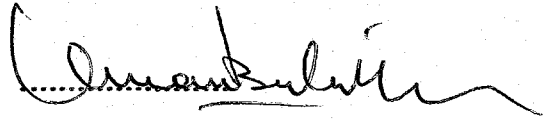Economy

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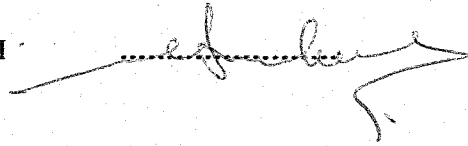
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Section I

I N T R O D U C T I O N

One of the most important economic problems - perhaps
the most important one - the world economy is faced with today
is inflation. A satisfactory solution to this problem
can not be found, although a large number of economists are
concerned with it to a great degree. Disagreement about the
source of inflation may be the reason for the lack of a solution
to the problem.

As it is known, one potential cause of inflation is the
perpetual increase in the money stock. Increased demand as the
result of an increase in the money stock leads to an increase
in the general price level. On the other hand, a decrease in the
money stock doesn't always lead to a declining price level as
might have been expected. In other words, the classical approach
which states that inflation is generated by a higher rate of
increase of money supply than the increase in real production is
not able to explain the increasing general price level in spite
of the decreasing money supply.

Furthermore the insufficiency of the Keynesian approach
was realized in the 1970's too. During these inflationary per-
iods which affected all of the world economy including the de-
veloped capitalist countries inflation took the form of univer-
sal event and was also accompanied by high unemployment rates.
This was seen to be contrary to the Keynesian propositions
about inflation. Government's applications of both financial
and monetary policy weren't sufficient enough to reduce inflation.

Hence, it might be a good idea to consider some other
factors such as the structural factors to explain inflation. This
might be useful in determining an appropriate solution for this
important problem which decreases production, increases spec-
ialists augments the social problems by disturbing the income
distribution and decreases the individuals' and families' pur-
chasing power.

Structuralist factors might be taken into account especially for periods after the second half of 1970's during which the inflation was very severe.

In our research aiming at explaining the inflationary period of 1965-1982 in Turkey, we study empirical models which are used to explain the causes of inflation in developing countries.

In the first section of the research, the monetary and structural studies about inflation in Turkey between 1950 and 1980 and their conclusions are discussed. In the second section, the inflation model that we've constructed and its variables are presented . In this section, the Granger test is described as well as the wage and price equations that will be used in the analysis of inflation. By using Granger's method, we will test whether there is a simultaneous interaction between prices and wages or not. Thus, the direction of the interaction will be determined.

We believe that the result obtained at the end of the Granger test will help us to model the inflation phenomenon in Turkey.

The last section constitutes the interpretation of the estimated equations. Estimations are made by the OLS method.

The data used for the research period are annual and are obtained from annual reports of the Central Bank, Annual Programs of S.P.O. and Turkish Statistical Yearbooks.

We can name two basic approaches used in the explanation
of inflation which can be described as "annual increases
in the general price level" : the monetarist approach and
the structuralist approach.

It would be useful to describe the main features of the
two approaches briefly, before examining the inflation
research in the Turkish economy using these two approaches.

According to the monetarist approach, inflation is the
result of a relatively and increase in the money supply compared to
the increase in real output. For this reason, it is argued
that the increase in the general price level is mainly a
monetary phenomenon. According to the famous economist M.
Friedman, "Inflation is always and everywhere a monetarist
phenomenon. "(1). He adds that, there can not be a continuous
inflation without the increase of monetarist factors, and the
inflation that emerges from   factors other than the monetarist
ones could be short-termed, and it would disappear, if it would
not be supported by increases in the money supply. (2)

The fact that inflation caused by factors other than
monetary ones could be short-termed and would come to an end
without any interference may be true for the industrialized
countries; but it may be hard to accept the same argument
for the underdeveloped countries. Contractionay monetary
policies may not be sufficient to stop the inflation which is
independent of the increase in the money stock, because these
policies may not be successful in removing the structural factors
which may be the cause of inflation, and therefore the inflation
itself. Experiences have shown that contractionary

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(1) M.Friedman, "Money and Economic Development - The
    Horowitz Lectures of 1972, " p.40.

(2) I.Aydın , "Enflasyonla Mücadele Modelleri",İ.Ü.İktisat Fakültesi
              P.4

monetary policies may decrease the inflation rate, but they
can not put an end to it totally. As a consequence of policies
which are being applied in Turkey since 1980, in the inflation rate
has declined by an important amount, although it is still considerably
high. But the policies have not been successful in pulling
down the inflation rate to acceptable levels.

Consequently, when analyzing the causes of inflation in
developing countries, structural factors besides the
monetary factors should be taken into consideration. " In our
times, inflation is not simple, on the contrary it may be
caused by a variety of factors and it may be rooted in the
different structural properties of each country's economy."(3)

This is how the structuralist approach looks at the
matter. The structuralist approach, which implies that inf-
lation is caused by the interaction of the structural and monetary
factors may be the proper one for the underdeveloped countries. For
example, "Turkish economy has always been an economy of excess-
demand with the exception of the last two years."(4)
Bottlenecks in production (saving and foreign exchange) have
restrained the use of the available capacity rather than
creating new capacity. (5) Hence, it is not surprising to
have the pressure of demand in such a country like Turkey
where a great potential of man-power is available and
economic growth is desired in a relatively short period of time.
According to the Keynesian theory, in an economy which is not
at the full-employment level the increse in demand is expected
to be followed by an increase in production rather than an
increase in the general price level. The observation of a
decrease in production accompanied by price increases is a good
sign indicating that the problem is emerging from the supply
side. In summary, in a country where the available capacity
for production can not be used fully, it is necessary to
analyse the effect of structural factors on the rate of inflation.

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(3)_____1979, Ibid, p.287,288

(4) F.Yağcı. "Türk Ekonomisi için Ekonometrik Bir Model Çalışması
     TEM 2",p.12

(5) _____Ibid, p.12

The structural model states that not only monetary factors
cause inflation, but structural elements of the economy are
also influential and responsible for inflation. Although
these structural elements usually change from country to
country, the most crucial ones are the rate of interest, the
wages level, the foreign exchange rate and the industrial
structure of the country in question. The relative impact of
both the labor unions and the employers associations on the
economic structure, and the monopolization rate of the economy
are other important factors that affect the inflation rate.

Now we can look at the applications of these models
in Turkey.

The research carried out by Ahmet Ertuğrul is an example
for the monetarist approach. In his study, he has searched
the relation between the money supply and the general price
level and the change in money supply caused by the public
sector deficits.(6) contrary to   P.Cagan's model which assumes
a one-way relation both from the money stock to the prices,
Ertuğrul assumes a two-way relation both from the money stock
to   prices and from   prices to the money stock. For
experimental confirmation, this model requires the definition
of an endogenous money stock which is influenced by the prices,
instead of an exogenous one. (7) Ertuğrul's research is based on
stock and   flow accounts leading to a definition of an
endogenous money stock. It is asserted that despite the
existence of laws and regulations aiming at the independence of
the central bank from the central goverment, the bank is
dependent on the goverment in making decisions and applying
them.

The central bank can not determine the money base and
the money stock independently, because the money supply is
determined according to the financial needs of the public
sector. Holding this in mind, the central bank is joined

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(6) A.Ertuğrul, "Kamu Açıkları Para Stoku ve Enflasyon", p.V
(7)_____,Ibid,p.44

with the public sector and their stock and flow accounts are consolidated for this research. (8) As a matter of fact, the public sector is not independent of the goverment when determining their policies concerning price, employment and investment. (9)

Since a great portion of the public sector's production is considered to be basic goods and services, the public sector can not treely determine their prices. The public sector balance is harmed as a result of the prices determined independently and freely below the cost of production. The losses of the public sector which are compensated by the budget sources, have in the past increased contin ously and led to significant increases in the ratio of the operating losses to the total sale revenue of the public sector. (10)

Public production may have been included in the group of basic goods and services mainly for two reasons: The first reason is to hold the prices of the goods constant in order to prevent an increase in the general price level; the second one is to provide cheap inputs to the private sector. However, to hold the prices of the goods constant in order to prevent the increase in the general price level leads to public deficits which are covered by increasing the public sector's net monetary liability. Increase in the monetary liability of the public sector increases the money stock which affects the general price level. (11) The variables affecting the public sector's net monetary liability are shown with the following equation in Ertuğrul's research. (12)

$$M = mA, \quad M = m(E+F+L+V)$$
$$A = E+F+L+V$$

(8)_____, Ibid,p.49

(9)_____, Ibid,p.49

(10)_____, Ibid,p.95

(11)_____, Ibid,p.97

(12)_____, Ibid,p.88

The fact that the money multiplier shows a decreasing trend during the research period indicates the existance of a stable relation between A and M. According to Ertuğrul's results, changes in the public's net monetary liability have caused important increase in the money stock. (13) In the equation E represents public deficits. F represents foreign exchange reserves, L represents net credits used by the private sector and finally V represents the residuals of the other accounts emerging from the consolidation of the sectors.

$$LnM = v_0 + v_1 LnE + v_2 LnE + v_3 LnL + v_4 Lnv + LnM$$

The coefficients of the equation have been found statistically significant for both the broad and the narrow definitions of money.(14) The fact that the coefficient of F has a high value which is also significant indicates that there is a close relationship between the money stock, foreign exchange reserves and the balance of payments in Turkey. The periods during which sterilization policies have not been applied due to the existence of high foreign exchange reserves, show an increasing money stock. Sterilization policies could not be applied because of Central Bank's internal financing of the imports which increased due to the existence of   · high foreign exchange reserves.(15)

It would be appropriate to determine the factors which E is a function of, because E-the variable representing the public deficits - hes strong explanatory power.(16)

$$E = f(W, N, Pg, Pd, U)$$
$$LnE = b_0 + b_1 LnW + b_2 LnN + b_3 LnPg + b_4 LnPd + b_5 LnU$$

In the equation, E represents deficits of the public sector, W represents the nominal wages N represents the employment capacity of the sector in question, P_g represents the ratio of the implicit input price deflator to the production prices of the goods produced by the public sector, P_d represents the support price index, U represents the proportion   of

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(13)_____, Ibid,p.88
(14)_____, Ibid,p.134
(15)_____, Ibid,p.106
(16)_____, Ibid,p.102

consolidated budget expenses to the consolidated budget revenues. Regression analysis shows that the parameter showing the impact of the employment level on the deficits is not significant. On the other hand, the coefficient of nominal wage rate is significant and has a high value. The other three variables - ratio of budget revenues, support prices and the ratios of the production and input price deflators - are found to be significant. (17) Hence, in the equation structured to estimate the coefficient for the public deficit, all the parameters with the exception of that of the employment level are significant. Actually both support prices and the rate of change between production and input prices have caused increases in public deficits and also in the net monetary liability of the public sector.

The other approach to inflation, the structuralist model may have great importance in explaining the inflation, especially today's one. The inflation from which the turkish economy has been suffering recently, is studied by Ataman Aksoy using the structural approach. In his study based on a two sectoral disaggregation of the economy, Aksoy argues that the excess demand emerging from the increase in the money supply may be eliminated partially by the price increases and partially by the increases in the supply of production. Excess demand will lead to an increase in the industrial production, while it causes increase in the prices of agricultural goods due to the inelastic supply of the agricultural sector.

The expansion of employment in the industrial sector based on the increase of production increases demand for the agricultural goods effectively. However, prices of agricultural goods increase more rapidly than those of the industrial goods since the agricultural sector can not easily respond to increase in demand. As a result relative prices change in favor of the agricultural goods. (18)

Increase in prices of agricultural goods will lead to an increased demand for higher wages in the industrial sector. The resulting increase in wages will increase the industrial good

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(17)_____, Ibid, p.136

(18)M.Ataman, Aksoy"Structural Aspects of Turkish INflation 1950-1979", p.2

prices in turn through the production function. To contract
the money supply in the economy in order to maintain stability
and decrease the inflation rate won't lead to a decrease of the
inflation rate, but in the level of production. According to this
approach, firms determine their markup prices above the cost
of production, but their production according to demand.(19) In
summary, inflation caused by the increase in money supply leading
to relative price increases on agricultural
goods will be perpetual as it becomes independent of the money
supply as a result of interaction between wages and prices.
This may be the reason of inflation which continues in spite
of the contraction in the money supply. The demand inflation
emerging from the increase in the money supply transforms into
a cost-push inflation as time passes by. Aksoy indicates
that in countries which are in a chronic bottleneck of foreign
exchange reserves, devaluations undertaken to increase exports
lead to increases in the costs of production because of the
relative increase in import prices. He adds that the increase
in costs of production will lead to an increase in general price
level and wages will increase due to this factor. (20) The
author asserts that developing countries are faced with scarcity
of capital because they don't have developed money markets.
Credits obtained from the userers with a higher interest rate
will also increase the cost of production and this will increase
the prices further.(21) In the research, relationship between
prices and the quantity of money is represented by Harberger's
monetary equation.(22) In fact all the structural models are
derived from this equation. Results show that there is a one-way
relationship between the prices and the quantity of money.

A conclusion that can be drawn from this is that increases in
the money supply make inflation occur within the first year.
It can also be deduced from this functional relationship that
monetary stabilization policies are effective for decreasing the
inflation rate in the short run.(23)

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(19)_____, Ibid, p.3

(20)_____, Ibid, p.3

(21)_____, Ibid, p.4

(22)_____, Ibid, p.7

(23)_____, Ibid,p.7

However, what Milton Friedman has said about the matter is quite different. "A speeding up of the rate of monetary growth tends to have its effect on inflation 15 to 24 months later; a slowing down of monetary growth has its effect on inflation 15 to 25 months later. That is why, it is a long road to hope to stop an inflation that has been allowed to start. It can't be stopped over night. "(24)

When applying the model to the Turkish economy, Aksoy has dropped the assumption that the output is determined exogenously. According to this assumption, inflation can be reduced without any decrease in production. (25) Such an assumption may be applicable to the developed, industrialized countries that have developed money markets. However, in under-developed countries with no developed money markets, conraction in money supply and the relative decrease in given credits will either decrease the production level, which is contrary to the assumption, or increase the inflation rate because the cost of production will increase as a result of the credits obtained from the userers with higher rates of interest. Therefore, it may be suitable to drop the assumption when testing the model.

The assumption has been dropped in Aksoy's model because production is thought to have an unexpected effects on the money supply. Such a relation is tested in the research. The coefficients of the equation, where the quantity produced is an endogenous variable are significant. Regression analysis has verified the hypothesis that the quantity produced is sensitive to unexpected changes in the money supply. Other than that the effect of the foreign exchange bottleneck on the output will change due to inflationary expectations(26)

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(24) M.Friedman, "Money and Economic Development The Horowitz Lectures of 1972" p.28

(25) M. Ataman Aksoy, "Structural Aspects of Turkish Inflation 1950-1979" P.15

(26) _____, Ibid, p.19-20-21,

At a later stage of his research, Aksoy uses simultaneous equation for the estimation of production and price equations.

Results have shown that all the variables except the alternative cost of holding money ($\hat{P}_e - \hat{P}_{e-1}$) and one period lagged money supply ($\hat{MS}_{-1}$) are significant.(27) Later simultaneous equations are transformed into the reduced form where prices are determined endogenously and this is tested. As it can be seen from the equation below, the effect of the money supply (MŜ) on prices declines to a great extent over time

$$\hat{P} = -.064 + 4.31\ \hat{MS} + .325\ \hat{P}_e + .143\ D_{fe}\hat{P}_e + .249\ \hat{MS}_{-1} + .132\ \hat{IMP}_{-1}$$

Thus, if the economy has sufficient amounts of foreign exchange reserves, the expansion of the quantity of money will increase the production level without leading to an increase in the rate of inflation.(28) However, the rate of increase in production will slow down in the long run parallel to the inflationary expectations.

In summary, purely monetary models which examine the relation between the price increases and the quantity of money are not adequate to explain the inflation phenomenon in Turkey.

At the second stage of research, Aksoy uses a structuralist model for explaining the inflation phenomenon in Turkey. As it can be remembered, at the beginning of the research, it was stated that it was the agricultural sector that started the inflationary process because the increases in money supply couldn't lead to increases of the production level in agriculture. Following this, the necessity for using a two-sector model to analyse the inflation in Turkey was expressed. Consequently, the author tries to estimate a functional relationship between the money stock and prices on a sectoral basis.

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(27)_____, Ibid, p.22
(28)_____, Ibid, p.24

The contribution of the agricultural sector to inflation has been examined thoroughly, because the agricultural sector is thought to have an important place in the Turkish economy. Regression analysis of the monetary equation shows that there is a one-way relationship between the money supply and agricultural prices. Other than that, the effect of the world agricultural prices is great on the implicit agricultural deflator. Regression analysis also shows that agricultural production is sensitive to unexpected changes in money supply.(29)

Monetary equation used in the previous sections of the research is again used for the industrial sector. Regression analysis gives significant results. Parameters of the variables other than ($\hat{MS}_{-1}$) & ($\hat{P}_e - \hat{P}_{e-1}$) are found to be significant. Especially, a one-to-one relation between the money stock ($\hat{MS}$) and prices ($\hat{P}_n$) is confirmed. (30) However, the results of both price and production equations with 3SLS method are different from those estimated by OLS, where

$$\hat{P}_n = -.010 + .438\ \hat{MS} + .539\ \hat{P}_e + .234\ D_{fe}\hat{P}_e + .137\ I\hat{M}P$$

$\hat{P}_e$ and $D_{fe}\hat{P}_e$ represent the effect of inflationary expectations on prices. Aksoy states that there is a simultaneous interaction between money supply and the relative prices.

In this research, it might be useful to explain this relation one more time. — Changes in relative prices in favor of the agricultural goods caused by the increase in money supply, lead to increases in wages and prices in the industrial sector, consequently. This increase in price of the industrial goods will decrease demand. Money will be increased once more in order to prevent the decreasing demand. This will again lead to increase in prices of agricultural goods and it will become a vicious circle as the result of the simultaneous interaction.(31) Other than that, due to the fact that the state is the most important buyer of agricultural goods and due to the application of price supports by the state, the public enterprises usually end up with deficits.

(29)_____, Ibid, p.27-33

(30)_____, Ibid, p.35

(31)_____, Ibid, p.44

Quantity of money in circulation increases because these deficits are compensated by expansion of the central bank sources. So, the increase in money leads to an increase in the inflation rate.

The wage equation used in the model represents the relationship between nominal wages, excess demand and the expected inflation rate.(32)

$$\hat{W} = \beta_0 + \beta_1 ED + \beta_2 \hat{P}_e$$

Excess demand is used among the explanatory variables instead of the unemployment rate, because of the lack of data on the unemployment rate in Turkey. Coefficient of the variable representing the expected inflation rate ($\hat{P}_e$) turns out to have a value near 1. This shows that inflationary expectations affect the wages directly.

In summary, wages are influenced both by the increase in production and inflationary expectations.(33) The dummy variable representing the periods during which military governments were in power, is also significant. This implies that military governments were successful in cutting down the wages(34)

The price equation in the industrial sector is as follows:

$$P = (1+k)(ULC+UMC) + h(ED)$$

where k is the rate of markup.

UMC is the cost of input per unit

ULC is the cost of Labor per unit

ED is the excess demand.

Prices which are independent of the excess demand, will change due to the increase of   costs, if the excess demand variable is found to be insignificant. This approach called cost-pricing does not take into account the effect of the excess demand variable and can not be applicable to the developing countries. According to this approach, prices increase as a a result of increasing costs.(35)

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(32)_____, Ibid, p.73

(33)_____, Ibid, p.75

(34)_____, Ibid, p.75

(35)_____, Ibid, p.77

In my opinion, the equation's original form given above
can be used for the economic structure of the developing
countries. An increase in the money stock increases the nominal
demand in these countries. Due to insufficient factors of
production in some industrial sectors and foreign exchange
bottlenecks, production can not be increased, and as a result the
general price level increases. Therefore, I suppose that the
variable representing the excess demand (ED) will give
significant results in the regression analysis, when applied to
developing countries.

According to the author, prices in the manufacturing sector
are determined by multiplying the costs with a constant
markup rate.

Another economist who defends a two-way relation between
the money stock and prices is   Fahrettin Yağcı. He asserts
that it is somewhat impossible for an independent monetary
policy to be followed by the Central Bank and adds that the
quantity of money is determined by the public deficits. His
assertion is based on the fact that the public sector has a
great importance on income distribution, growth, employment and
investment.(36) Besides it is explained in the research that
public revenues don't accompany the price increases as much as
public expenses do. It is indicated that all these factors are
the cause of Central Bank's becoming an institution that
finances mainly the public sector. This kind of inflation is
generally considered to be "self-generating" (37) He also adds
that "changes in the money supply are the result of changes in
the money base and the money multiplier doesn't have a great
importance. In the period of 1970-1981 money base grew about
17.5 % and the growth of the money stock was about 20 % .
This shows the close relationship between these two variables."(38)

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(36) F.Yağcı, "Türk Ekonomisi için Ekonometrik Bir Model Çalışması:
TEM 2", p.10

(37) _____ , Ibid, p.11, see A. Ertuğrul, "Kamu Açıkları Para
Stoku ve Enflasyon", p.61

(38)_____ , Ibid, p.24

F.Yağcı also states that the money base is composed of
net foreign assets, public sector credits of the Central Bank,
private sector credits of the Central Bank, agricultural support
credits and net other assets. Changes in these variables will
cause changes in the money base.(39) In the model credits with
the exception of those of the private sector are estimated
endogenously. As a result, a great part of the Central Bank
credits are found to be channeled to the public sector and the
support institutions.(40)

One of the aims of the model established by F.Yağcı is to
explain inflation.(41) He takes the GNP implicit deflator as
a proxy variable for the inflation rate. In the equation in
which the rate of inflation is determined endogenously, price
expectations, excess demand, and the price index of imports are
used as explanatory variables.

The regression analysis indicates that all the coefficients
are significant. (42) In the model, in which the labor market
plays a great role, nominal wages are considered to be a function
of the expected inflation, of the income tax rate, of the labor
productivity of the sectors other than the agricultural sector
and of the dummy variable representing the years 1971-1972.
The market is assumed to be subject to money illusion in the
model.(43)

Another inflation model that has been constructed for
the Turkish economy belongs to İ. Aydın.(44) In this research,
the Harberger model has been applied to the Turkish economy
for the period 1953-1974. Therefore, it is similar to the model
constructed by Aksoy.

At the first stage, the model has been regressed by using
all the assumptions and the variables. At the second stage,

(39)_____, Ibid, p.24, see Maxwell Fry"Money and Banking in
    Turkey" p.126 and Y. Akyüz "Money and Inflation in Turkey"
    p.139, SBF
(40)_____, Ibid, p.27
(42)_____, Ibid, p.21
(42)_____, Ibid, p.22-62
(43)_____, Ibid, p.19-20
(44) I.Aydın, (1979) "Enflasyonla Mücadele Modelleri", P.255,
    I.Ü.İktesat Fakültesi

the model was split, and the separate effect of each explanatory variable on inflation was searched. "It can be thought that this second method may cause a deviation from the specifications of the main model. However, this method provides us with the chance of comparing the effect of each independent variable on inflation. "(45) When testing the model using all the variables, higher correlation among the explanatory variables are effective on the dependent variable as an aggregate, their statistical impacts are not always significant, when considered individually. Due to the existence of correlation, which one of the variables has the most significant impact on the inflation rate and to what extent, can't be determined exactly. This suggests that it would be useful to split the model when testing individual variables.

At the end of the regression analysis, "It has been found that the coefficient of the real GNP is different from (-1), being between (-0,4 and -0.5)...."(46) This can be interpreted in the following way: In the case where other explanatory variables are constant, a 100 % change in the real GNP will decrease the rate of inflation between 0.40 and 0.50

1) $P_1 = 0.774 - 0.589 \, Yr + 0.728 \, M_{3t}$

$$SH \qquad (0.409) \qquad (0.192)$$

$$t \qquad 1.44 \qquad 3.79$$

$$F = 7.18 \qquad D.W. = 1.01 \qquad R^2 = 0.430 \qquad \bar{R}^2 = 0.370$$

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(45)_____, Ibid, p.255

(46)_____, Ibid,p.264

(47)_____, Ibid, p.264

$$2)\ P_1 = -3.811 - 0.435\ Yr + 0.466\ M_{3t} \quad 0.474\ M_{3t-1}$$

$$SH \qquad (0.373) \qquad (0.204) \qquad (0.200)$$

$$t \qquad 1.16 \qquad 2.28 \qquad 2.36$$

$$F = 7.81 \qquad D.W. = 1.09 \quad R^2 = 0.565 \qquad R^{-2} = 0.493$$

The coefficients of the current and one year lagged money supply variables turn out to be nearly (+1). "Hence, it can be deduced that the effect of the percentage change in the GNP on the rate of inflation isn't much, but the effect of the current and the lagged money supply is considerably high. " (48) It has also been found that there is a close relationship between the wage increases and the inflation rate.(49)

According to the point of view which states that inflation is generated by uncontrolled monetary factors, it is important to define the variables that determine the money supply and demand.

In my opinion, money supply and money demand act as a whole in generating the cause of inflation in this approach. Especially, based on the assumption that the demand for money function is stable, one can examine whether the inflation is self-generating or not.

Yılmaz Akyüz has tested the stability of the real money demand function, before studying the reasons of the increase in the money supply when examining the inflation in Turkey between the years 1950 and 1968.

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(48)_____, Ibid, p.292-293
(49)_____, Ibid, p.292-293

The real money demand is considered to be a function
of the real income,the nominal income, the wealth,the population, the non-
monetization ratio, the interest rate of the goverment bonds
and the money stock.

At the end of the regression analysis, the rate of
interest on government bonds is not found to be statistically
significant. Moreover, the D.W. statistic has a very low
value in all the versions of the model.(50) This is due to
the fact that the expected inflation rate which has a high
explanatory power is not included in the equations.(51)" In
general, it is accepted that the alternative cost of holding
money is represented by the expected inflation rate, and this
rate is important in determining the real demand for money
in periods in which the economy is suppressed under the
higher inflation."(52)

In many studies done in the developing countries the
elasticity of the real money demand with respect to the in-
terest rate is found to be very low.(53) Therefore, the
results of the regression analysis obtained at the second
stage where the expected inflation rate is taken to be an
explanatory variable are found to be satisfactory by Akyüz. The
variable representing the expected inflation rate appears to be
significant.(54)

After testing the real money demand and the variables
which it is a function of, the reciprocal of the circulation
velocity of money(k) is used instead of the real demand
(M/P) in annual models.

(50) Y. Akyüz, " Money and Inflation in Turkey 1950-1968",
     S.B.F. p.37
(51)_____, Ibid,p.42
(52) A. Ertuğrul," Kamu Açıkları, Para Stoku ve Enflasyon",
     p.113, (27) Campell (1970), Diz (1970), Deaver (1970)
(53)_____, Ibid, p.113, (28) Adekunle (1968)
(54) Y. Akyüz " Money and Inflation in Turkey 1950-1968",

Regression analysis has been undertaken with the full
list of the explanatory variables as well as using each
variable separately at seven different stages.
The findings can be summarized as follows:

The results of the equation in which income and the non-
monetization rate occur to be the explanatory variables are
more satisfactory than the results of the equation in which
(k) is just a function of the inflation rate (P) and the dummy
variables. Better results are not only due to the increase in
the $\bar{R}^2$ ratio approximately to 90 % , but also due to the
decrease of serial correlation between the error terms.(55)
A decrease in the expected inflation rate value is observed in
the case of dropping out the income from the equation. Regress-
ion analysis shows that the inflation rate doesn't repre-
sent the alternative cost of holding money as it is ob erved
in the previous analysis. This result is significant for the
economies in which the inflationary expectations are dominating.

$$\ln k_t = \alpha_0 + \alpha_1 P_t^* U_t$$

$$P_t^* - P_{t-1}^* = \beta(P_{t-1} - P_{t-1}^*)$$

$$\ln k_t = \alpha_0\beta + \alpha_1\beta_1 P_{t-1} + (1-\beta) \ln k_{t-1} + e_t$$

$$e_t = U_t - (1-\beta) U_{t-1}$$

These are the equations of the original model.(56) Based
on the results of the models described in the previous sections
of the research, Y. Akyüz states that the dynamics of the
inflation can be explained by questioning the circulating
velocity of money (v) and the expected inflation rate (P^*).

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(55)_____, Ibid, p.75
(56)_____, Ibid, p.52

He adds that an increase in money supply will increase prices
by the same proportion without causing any increase in the
real income level.(57) The rate of inflation in future periods
will depend on price expectations, being independent of the
money supply. In other words, the inflation is caused by the
individual expectations about the price increase in future
periods. The increase in expectations concerning the price
increase will lead to the increase of the circulation velocity
of money which in turn will lead to the increases in the rate of
inflation. " In accordance with increasing prices, expectations
affecting the velocity of circulation and the real price changes
in later periods will be adapted afresh.(58) As it is implied,
price expectations have a great importance in determining the
inflation rate. " Modern inflation theories are superior to
the traditional theories, due to the fact that expectations play
an important role in examining the inflation in modern theories. "
(59)

$$P_t = -\alpha_1 (P_t^* - P_{t-1}^*)$$

According to the author, the question whether the inflation
rate will increase or not depends on the question of whether
the difference between the price expectations at periods
(t) and (t-1) increases or not, given that the money supply
and the real income are constant in the periods concerned.

A rise in the above difference will increase the interaction
between the circulation velocity of money (v) and the inflation.
(60) The increase in the general price level will be as much
as the increase in the circulation velocity of money. I suppose
that it would be useful to examine the variables constituting
(k) (in other words (1/v))after stating the importance of

(57)_____, Ibid, p.109
(58)_____, Ibid, p.109
(59) A.Ertuğrul " Kamu Açıkları, Para Stoku ve Enflasyon" p.116,
      Frisch (1977) p. 1289-1317
(60) Y. Akyüz " Money and Inflation in Turkey 1950-1968"
      S.B.F. , p.110

(v) on the increase of the inflation rate. The circulation
velocity of money (v) depends on two variables: The first
one, α_1 is the elasticity of (v) with respect to the expected
changes in prices; and the other one β, is the elasticity of
the expected price changes with respect to the observed change
in the previous period. " Therefore,(α_1) and (β) are
determinants of the inflation rate in later periods. In accordance
with the values of (α_1) and (β), if the difference between
price expectations increases in periods following one another,
the inflation itself will change into the "self-generating
inflation" without requiring a continuous change in the money
supply; otherwise,it will vanish without a continuous increase
(more than the increase in real income) in the money supply.
"(61) In the regression analysis ($\alpha_1 \beta$) has a value less than
1.(62) This shows that the inflation isn't a self-generating
type. In the period covered by the research, it is observed
that prices haven't increased as much as the money stock and the
inflation could be decreased by the monetarist actions.

Akyüz asserts that these two concepts are contrary to the
concept of self-generating inflation,considering the fact that
the money stock hasn't declined in the research period
excluding the year 1958 and the increase rate has been above the
increase in the real income.(63) As a second factor it can be
stated that the monetarist policies were effective in pulling
down the inflation rate in a fairly short time during 1958-1959
through the changes in the money supply.

"In other words, inflation will not go on without the
expansion of the money supply. Hence, if the inflation is not
self-generating, changes in money supply pertaining to current
and previous periods can be explained by real income and non-
monetization ratio."(64)

According to Y. Akyüz who states that changes in money
supply cause an increase in the general price level in Turkey,

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(61)_____, Ibid,p.111
(62)_____, Ibid, p.127
(63)_____, Ibid, p.129
(64)_____, Ibid, p.129

it is required to determine the variables which the money
stock is a function of, in order to understand the dynamics
of inflation. For this reason, he has tested validity of two
hypothesis: (1) the money base is under the control of the
public authorities; (2) the relationship between the money
base and money supply is a stable one.

What we should understand from the word stability is that
the control of the money base will ensure the control of the
money supply, too.

Akyüz, who states that the action of the monetary authority
may not be dependent on the general economic conditions uses
the analysis of balance-sheets when examining the changes in
money supply.(65) In the research, he concludes that the
borrowing requirement's the public sector are the main source
of expansion in the money base as well as the money supply.
Because of the non-existence of a developed money market, the
Central Bank becomes the only source from which money can be
borrowed.(66) The expansion in the money base and the money
supply are caused by the financial needs of the public finan-
cial and economic sectors.(67) The public financial sector uses the
resources of the   Central Bank because of the deficits of the
institutions with the general and annexed budgets."With
the exception of 1951, the general budget of the central government
was in deficit. During the 1950's the average rate of increase in
revenues was slightly smaller than the increase in expenditures."(68)

One of the most important reasons of the fact that the
revenues of the Central governments don't increase, is the low tax
rate applied to the agricultural sector. " Despite the large
share of this sector in the economy, the contribution of the
agricultural sector to the total income tax revenue has been less
than 1 % for most of the period."(69)

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(65)_____, Ibid, p.131
(66)_____, Ibid, p.133
(67)_____, Ibid, p.165
(68)_____, Ibid, p.167
(69)_____, Ibid, p.168

The main reason for the operating losses of the public economic enterprises is the pricing policies of this sector. (70) Determination of the prices of the output below the cost of production by the relevant ministries is the major source of these deficits. Between 1950-1957, the prices of products produced by this sector (State Economic Enterprises = SEE) were behind the general price increases.(71) The discrepancies between the purchasing and the sale prices of these products have caused the losses of the public institutions which undertake the buying and selling of these products.(72) The deficits were closed by the Central Bank resources.

As it is stated in various sections of the research, the increase in the money base is mainly due to the fact that public financial and economic sectors can't determine their prices independently. According to the author, Y.Akyüz, inflation is the extension of the government's economic policy (the government policy is the reason of the inflation).

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(70)_____, Ibid, p.169
(71)_____, Ibid, p.169
(72)_____, Ibid, p.174

Section III

In the previous sections of the research, I tried to explain the main properties of the inflation models concerning Turkey.

Now, we can explain the inflation model that will be established in this research. The aim of the constructed model is to explain the inflation phenomenon in Turkey between 1965 and 1982. We have included the periods after 1980 on purpose since we wanted to test the changes in the economy due to the stabilization policies. "In some of the developing countries, the causes of the severe inflation in the process of growth are explained by both the monetarist and structuralist factors". (1)   Therefore, I think it would be appropriate to use both the monetarist and structuralist elements examining the   inflation in the framework of the constructed model. Hence, my aim is to use the Harberger model which is in fact a monetarist model in the analysis of inflation. But, the Harberger model can be transformed into an almost structuralist model by adding some structuralist elements.

At this stage, it may be required to define the " monetarist"   and the "structuralist" approaches of the inflation once more.

While monetarists state that the rate of inflation can be decreased by using monetary tools, "structuralists argue that, prices are determined by costs and output is determined by demand, and therefore, a decrease in demand due to a reduction in the money supply together with cost increase will just reduce the output, but not the prices."(2)

In   testing the model, the data has been obtained to a large extent from the Official Statistical Annuals, from the Central Bank annual reports and S.P.O. Annual Programs.

(1) I.Aydın(1979),"Enflasyonla Mücadele Modelleri"P.255 İ.Ü.İ.F
(2) M. Ataman, AKsoy (1981),"Structural Aspects of Turkish Inflation
     1950-1979", p.9

Apart from the determination of the relationship between wages and prices, it is also crucial to confirm the direction of this relationship.

In determining this, the Granger test of causality will be used. The Granger test for causality can be defined in the following way: In the estimation of the wage equation (w), if the price increases in the future periods have the explanatory power besides the current and previous periods' price increases' explanatory power, it is implied that there is a simultaneous (two-way) relationship between wages and prices. If this is the result the hypothesis that the prices and wages affecting each other simultaneously cause the increase in the general price level is confirmed.

1) $\dot{P}_t = \dot{W}_t + \dot{W}_{t+1} + \dot{W}_{t+2} + \dot{W}_{t+3} + \dot{W}_{t+4}$

2) $\dot{P}_t = \dot{W}_{t+1} + \dot{W}_{t+2} + \dot{W}_{t+3} + \dot{W}_{t+4}$

3) $\dot{P}_t = \dot{W}_t + \dot{W}_{t+1} + \dot{W}_{t+2} + \dot{W}_{t+3}$

4) $\dot{P}_t = \dot{W}_{t-1} + \dot{W}_{t-2} + \dot{W}_t + \dot{W}_{t+1} + \dot{W}_{t+2} + \dot{W}_{t+3} + \dot{W}_{t+4}$

5) $\dot{P}_t = \dot{W}_t + \dot{W}_{t-1} + \dot{W}_{t-2} + \dot{W}_{t-3} + \dot{W}_{t-4} + \dot{W}_{t-5} + \dot{W}_{t-6} + \dot{W}_{t-7}$

6) $P_t = \dot{W}_t + \dot{W}_{t-1} + \dot{W}_{t-2} + \dot{W}_{t-3} + \dot{W}_{t-4}$

7) $\dot{W}_t = \dot{P}_{t-1} + \dot{P}_{t-2} + \dot{P}_{t-3} + \dot{P}_{t-4} + \dot{P}_t + \dot{P}_{t+1} + \dot{P}_{t+2} + \dot{P}_{t+3}$

8) $\dot{W}_t = \dot{P}_{t-1} + \dot{P}_{t-2} + \dot{P}_{t-3} + \dot{P}_{t-4} + \dot{P}_{t-5} + \dot{P}_{t-6} + \dot{P}_{t-7} + \dot{P}_t$

9) $\dot{W}_t = \dot{P}_t + \dot{P}_{t+1} + \dot{P}_{t+2} + \dot{P}_{t+3} + \dot{P}_{t+4}$

10) $\dot{W}_t = \dot{P}_{t-1} + \dot{P}_{t-2} + \dot{P}_t + \dot{P}_{t+1} + \dot{P}_{t+2} + \dot{P}_{t+3} + \dot{P}_{t+4}$

11) $\dot{W}_t = \dot{P}_{t+1} + \dot{P}_{t+2} + \dot{P}_{t+3} + \dot{P}_{t+4}$

12) $\dot{W}_t = \dot{P}_{t-1} + \dot{P}_t + \dot{P}_{t+1} + \dot{P}_{t+2} + \dot{P}_{t+3} + \dot{P}_{t+4}$

It would be useful to find the trend equations of prices
and wages when examining the deviations from the trend values as
well as the relationship between prices and wages. This may
help us, in determining whether there is really a relationship
between price increases and wages.

It is also thought that the determination and the com-
parison of the rate of increase in profits ($\dot{\Pi}$), wages($\dot{W}$),
prices ($\dot{P}$) in the research period are also important, if
we take into consideration the fact that the distribution of
incomes among the wage-earners deteriorates.

Since it is difficult to calculate the profits directly,
this can be estimated from the total value-added. The value-
added is composed of interest-payments, salaries and wages,
profits, dividends, indirect taxes, of depreciations. Profits
can be calculated in the form of residual by subtracting
all the items, except profits, from the value-added.

In a more detailed work concerning inflation, calculating
the rates of profits may be important for determining the
causes of inflation.

The wage – equation:

In constructing the wage equation, we use a neo-keynesian
equation (Phillips' curve) that describes an inverse relation
between the percentage change of nominal wages and the unemployment
rate.
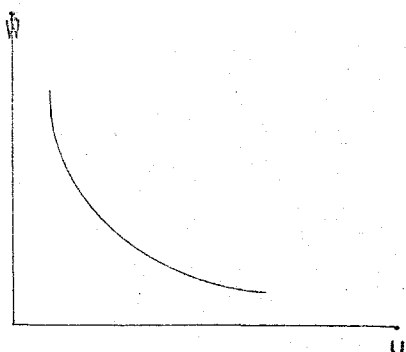
$$\dot{W}_t = f(\dot{U}_t), \quad W'_t < 0$$

My proposition about the wage-equation is based on the proposotion that the rate of percentage change in nominal wages depends on

1) the unemployment rate
2) the current inflation rate
3) one year lagged inflation rate
4) the strength of the labor unions
5) a dummy variable (explained below)

In summary there are five explanatory variables in the original form of the wage equation that will be used. I have tried to measure the wage bargaining power of labor unions with the variable depicting the percentage change in absolute numbers of unionized workers. A dummy variable has been used for periods in which the military governments were in power

The other two explanatory variables of the wage-equation are the current and one-year lagged inflation rates. A positive relationship may be expected between the inflation rate and the rate of percentage change in nominal wages.

There can be a time-lag between the rate of increase in prices and the nominal wages, since the impact of wages on price increases may not be realized in the same accounting period. Wages can only be increased at the periods for which the labor agreements are made. This is why the one-year lagged inflation rate has been used in the model.

$$\dot{W}_t = \alpha_0 + \alpha_1 \dot{P}_t + \alpha_2 \dot{P}_{t-1} + \alpha_3 \dot{U}_t + \alpha_4 \dot{CB}_t + \alpha_5 DV \qquad (1)$$

Dependent variable   : $\dot{W}_t$, the percentage change in nominal wages

Explanatory variables : $\dot{P}_t$, the percentage change in the current inflation rate

: $\dot{P}_{t-1}$, the percentage change in the one-year lagged inflation rate

: $\dot{U}_t$, the percentage change in the current unemployment rate

: $\dot{CB}_t$, the percentage change in absolute numbers of unionized workers

: DV , the dummy variable

THE PRICE EQUATION

As I have stated at the beginning of the second section, the Harberger Model has been used in the estimation of the rate of increase of the inflation rate. In the equation both the monetarist and the structuralist variables have been used. I suppose that the modified equation constructed by adding some structuralist elements to the Harberger model may be appropriate for analysing the inflationary processes in Turkey.

$$\dot{P}_t = \beta_0 + \beta_1 \dot{MS}_t \quad \beta_2 \dot{MS}_{t-1} + \beta_3 \dot{RINC}_t + \beta_4 \dot{IMP}_{t-1} + \beta_5$$

$$\dot{A}_t + \beta_6 \dot{W}_t + \beta_7 \dot{D}_t \tag{2}$$

The variable, P_t represents the rate of inflation. The retail price index, and the wholesale price index are generally used in representing the rate of inflation.

In this research the wholesale price index (1963 = 100) has been used as the dependent variable. According to my expectations, a positive relationship should be observed between all of the variables and the inflation rate, excluding the real GNP.

Dependent variable : $\dot{P}_t$, the percentage change of the general price level

Independent variables : $\dot{MS}_t$, the percentage change in the current money supply

: $\dot{MS}_{t-1}$, the percentage change in the one-year lagged money supply

: $\dot{RINC}_t$, the percentage change in the current real GNP

: $\dot{IMP}_{t-1}$, the percentage change in the one-year lagged import price index ($)

: $\dot{A}_t$, the percentage change in the alternative cost of holding money

$$: \dot{W}_t \quad , \text{ the percentage change in the nominal wage}$$

$$: \dot{D}_t \quad , \text{ the percentage change in the foreign exchange reserves}$$

After the fundamental price equation is defined, the equation can be disintegrated with the intention of testing the individual effects of the explanatory variables on the inflation rate. We can run the danger of misspecification when excluding some of the potential explanatory variables. But, our aim in using this method is to compare alternative combination of the explanatory variables in terms of their explanatory power of the inflation phenomenon.

$$\dot{P}_t = \beta_0 + \beta_1 \dot{MS}_t + \beta_2 \dot{MS}_{t-1} + \beta_3 \dot{RINC}_t + \beta_4 \dot{W}_t \tag{3}$$

$$\dot{P}_t = \beta_0 + \beta_1 \dot{MS}_t + \beta_2 \dot{MS}_{t-1} + \beta_3 \dot{RINC}_t \tag{4}$$

$$\dot{P}_t = \beta_0 + \beta_1 \dot{MS}_t + \beta_2 \dot{W}_t \tag{5}$$

According to M. Friedman, the effect of the current money supply will not be substantial on the inflation rate, because a time-lag is required before the money supply is effective on the general price level.

Friedman proposes that a period of about 12-18 months should pass before the increases in the money supply can influence on the general price level.

Therefore, we included the two-year lagged money supply in the price equation.

$$\dot{P}_t = \beta_0 + \beta_1 \dot{MS}_t + \beta_2 \dot{MS}_{t-1} + \beta_3 \dot{MS}_{t-2} \tag{6}$$

THE RESULTS OF THE GRANGER CAUSALITY TEST

	DEPENDENT VARIABLE	INDEPENDENT VARIABLES	F TEST	R^2
1)	$\dot{P}_t$	$\dot{W}_{t+i}$ $(i=0,\ldots,4)$	7.28	0.83
2)	$\dot{P}_t$	$\dot{W}_{t+i}$ $(i=1,\ldots,4)$	10.18	0.83
3)	$\dot{P}_t$	$\dot{W}_{t+i}$ $(i=0,\ldots,3)$	10.38	0.83
4)	$\dot{P}_t$	$\dot{W}_{t-i}$ $(i=1,2)$, $\dot{W}_{t+i}$ $(i=0,\ldots,4)$	2.71	0.86
5)	$\dot{P}_t$	$\dot{W}_{t-i}$ $(i=0,\ldots,7)$	41.56	0.99
6)	$\dot{P}_t$	$\dot{W}_{t-i}$ $(i=0,\ldots,4)$	4.20	0.75
7)	$\dot{W}_t$	$\dot{P}_{t-i}$ $(i=1,\ldots,4)$, $\dot{P}_{t+i}$ $(i=0,\ldots,3)$	173.74	0.99
8)	$\dot{W}_t$	$\dot{P}_{t-i}$ $(i=0,\ldots,7)$	1.29	0.91
9)	$\dot{W}_t$	$\dot{P}_{t+i}$ $(i=0,\ldots,4)$	22.10	0.94
10)	$\dot{W}_t$	$\dot{P}_{t-i}$ $(i=1,2)$, $\dot{P}_{t+i}$ $(i=0,\ldots,4)$	12.20	0.96
11)	$\dot{W}_t$	$\dot{P}_{t+i}$ $(i=1,\ldots,4)$	17.14	0.89
12)	$\dot{W}_t$	$\dot{P}_{t-i}$ $(i=1)$, $\dot{P}_{t+i}$ $(i=0,\ldots,4)$	10.07	0.93

TABLE -2.1.

$P_t = f(W_t)$ $\qquad$ $W_t = f(P_t)$ $\qquad$ N.O.D.= 17 $\qquad$ 1966-1982

	1	2	3	4	5	6	7	8	9	10	11	12
t−7					2.06 (−3.60)			0.57 (0.40)				
t−6					−0.23 (0.52)			0.26 (0.21)				
t−5					1.05 (2.54)			0.24 (0.52)				
t−4					2.05 (−5.34)	2.12 (1.79)	1.20 (6.50)	0.033 (0.058)				
t−3					−2.10 (−6.22)	−1.53 (−1.39)	0.78 (4.76)	−0.31 (−0.76)				
t−2				−0.25 (−0.32)	−1.69 (4.28)	−0.69 (−0.60)	0.49 (7.92)	0.097 (0.33)		0.73 (1.57)		
t−1				−0.46 (−0.60)	1.30 (5.10)	1.15 (1.27)	−0.27 (−3.66)	−0.11 (−0.32)		0.042 (0.22)		0.11 (0.50)
t	0.16 (0.35)		0.15 (0.36)	0.32 (0.44)	2.40 (8.78)	1.15 (1.55)	0.17 (3.21)	0.071 (0.16)	0.37 (2.29)	0.19 (0.92)		0.33 (1.49)
t+1	0.44 (1.04)	0.50 (1.33)	0.46 (1.22)	0.59 (0.92)			0.16 (4.29)		0.25 (1.37)	0.14 (0.67)	0.45 (2.35)	0.24 (1.03)
t+2	0.92 (2.05)	1.01 (2.94)	0.90 (2.23)	1.07 (1.75)			−0.15 (−3.26)		−0.019 (−0.21)	0.062 (0.53)	0.038 (0.34)	−0.007 (0.06)
t+3	−0.76 (−2.17)	−0.79 (−2.45)	−0.78 (−2.88)	−0.69 (−1.43)			−0.26 (−4.55)		−0.033 (−0.49)	0.004 (0.059)	−0.11 (−1.64)	−0.031 (−0.37)
t+4	−0.032 (−0.11)	−0.019 (−0.07)		−0.16 (−0.36)					0.23 (4.30)	0.020 (0.14)	0.26 (4.13)	0.23 (3.14)

	1	2	3	4	5	6	7	8	9	10	11	12
F Value	7.28	10.18	10.38	2.71	41.56	4.20	173.74	1.29	22.10	12.20	17.14	10.07
D.W. Statistic	1.16	1.33	1.20	1.43	2.55	1.40	1.29	1.29	2.18	1.22	2.12	2.45
R^2	0.83	0.83	0.83	0.86	0.99	0.75	0.99	0.91	0.94	0.96	0.89	0.93

TABLE 2.2

The   Relationship between the rate of percentage change of
inflation and that of nominal wages were examined based on the
annual data of 1966 - 1982. In general, the F- statistics of
all the equations are statistically significant at the 5% level
of significance. In accordance with these results of the F-
statistics, it is expected that all of the independent variables
have explanatory power. In other words, we can state that a
relationship exists between the explained variable and the
explanatory variables, due to the high values of the R^2 and F-
statistics.

Not only are the t- statistics significant for the current
and previous periods but also the ones belonging to the future
periods. Therefore, we may expect a two-way relationship
between nominal wages and prices, according to Granger's
criterion. It can be seen that the t-values of equations
(1,2,3,5,7) are relatively higher.

So, it can be concluded that the inflation is independent
of the money supply because of the vicious circle between the
nominal wages and the general price level. In this case, the
general price level will rise independently of the money supply,
due to the two-way relationship between the inflation rate and
the nominal wages.

The existence of the two-way relationship between the
rate of inflation and nominal wages implies that the inflation can
be decreased to some extent by the monetarist policies. The
results obtained from the Granger test assert that the structu-
ralist factors should also be taken into account, besides the
monetarist factors.

SEMI–LOGARITHMIC FORM TREND EQUATIONS OF THE PERCENTAGE
CHANGES IN THE WHOLESALE PRICE INDEX AND NOMINAL WAGE RATES

$$\text{Log}\overset{\bullet}{P}_t = \alpha + \beta T \qquad \text{Log}\overset{\bullet}{W}_t = \gamma + \beta T$$

	OLS	OLS
T	0.14 (5.99)	0.96–01 (7.46)
R^2	0.69	0.77
$\bar{R}^2$	0.81	0.87
F	35.88	55.72
D.W	1.43	1.13

TABLE – 2.3.

Semi-logarithmic form is used in the estimation of the
trend equations, so that they reflect the real changes in price
and wages.   The trend equations show the ratio of percentage
changes in inflation and nominal wages.

The regression analysis shows that both prices and
wages have an important time trend. Although a 14% increase
in prices is observed, the increase in nominal wages is
about 9 %. In other words, annual price increases exceed
the wage increases. This is also verified by graphs of the
real changes in prices and wages.

PERCENTAGE CHANGES IN THE
WHOLESALE PRICE INDEX
(1963=100, 95 items)

PERCENTAGE CHANGES IN THE
NOMINAL DAILY WAGES

1965	–	0.081	1965	–	0.108
1966	–	0.048	1966	–	0.088
1967	–	0.075	1967	–	0.098
1968	–	0.031	1968	–	0.092
1969	–	0.072	1969	–	0.138
1970	–	0.067	1970	–	0.099
1971	–	0.159	1971	–	0.113
1972	–	0.179	1972	–	0.115
1973	–	0.204	1973	–	0.239
1974	–	0.298	1974	–	0.254
1975	–	0.100	1975	–	0.253
1976	–	0.155	1976	–	0.347
1977	–	0.240	1977	–	0.270
1978	–	0.525	1978	–	0.419
1979	–	0.639	1979	–	0.415
1980	–	1.072	1980	–	0.450
1981	–	0.367	1981	–	0.273
1982	–	0.252	1982	–	0.270

I believe that the movement of the nominal wages during
the research period should be compared with the percentage
change in the wholesale price index in order to formulate
an appropriate approach to the problem of inflation in Turkey.
Here, the wholesale price index is used as the variable
representing the inflation rate.

As shown on the table, nominal wages have accelerated
faster than the wholesale price index during the periods
1965-1970, in 1973, and during 1975-78. In 1980 the wholesale.
price index exceeded the nominal wage index by a very significant
amount.

$$\dot{W}_t = \alpha_o + \alpha_1 \dot{P}_t + \alpha_2 \dot{P}_{t-1} + \alpha_3 \dot{U}_t + \alpha_t \dot{CB}_t + \alpha_5 DV$$

	OLS	OLS	OLS	OLS	OLS	OLS
$\dot{P}_t$	0.39 (2.49)	–	0.43 (6.58)	0.38 (2.40)	0.40 (2-37)	0.25 (1.32)
$\dot{P}_{t-1}$	0.78-01 (0.32)	0.62 (4.67)	–	0.74-01 (0.30)	0.94-01 (0.36)	0.20 (0.64)
$\dot{U}_t$	-0.22 (-1.12)	-0.19 (-0.79)	-0.22 (-1.17)	–	0.78-01 (-0.41)	-0.14 (-0.56)
$\dot{CB}_t$	-0.54-01 (-1.56)	-0.56-01 (-1.32)	-0.54-01 (-1.65)	-0.35-01 (-1.15)	–	-0.34-01 (-0.78)
DV	-0.13 (-2.77)	-0.94-01 (-1.69)	-0.13 (-3.01)	-0.12 (-2.60)	-0.11 (-2.34)	–
F	9.57	6.82	13.11	11.34	9.92	6.01
R^2	0.84	0.73	0.83	0.81	0.79	0.70
$\bar{R}^2$	0.86	0.79	0.88	0.86	0.84	0.76
D.W.	1.20	1.84	1.16	0.96	0.99	0.90

TABLE - 2.5.

In this multiple regression nominal wage is considered
to be a function of the current year inflation rate,the one year
lagged inflation rate, rate of unemployment, the ratio of the
workers under the labor agreement, and the dummy variables
representing the periods during which the military governments
were in power.

In the first step of the regression analysis, what we have
used is a wage equation which includes all the explanatory variables,
in.In the later steps of the regression analysis explanatory
variables are eliminated one at a time. As it can be seen from
the table, the obtained results are satisfactory. According to
the t-tests made at the significance level of 0.10 ($\alpha = 0.10$)
the coefficients of the current year inflation rate variable
and the dummy variable are significant. Despite the fact that
the sign of the unemployment rate coefficient is as might have
been expected, it isn't significant. This coefficient occurs
to be insignificant in other versions of the regression analysis.too.
Based on this, we can deduce that the Phillips curve approach
which examines inflation in the framework . of an indirect
relation between wages and prices and unemployment isn't
appropriate for the Turkish economy.The Phillips' curve is a part
of the Neo-Keynesian thought.

Beginning from 1970's the increase in unemployment
accompanied by increases   in prices at the same time decreased
the confidence for this model to a great extent. The regression
analysis of the first version of the equation indicated that
100% increase in prices will increase the nominal wages
by 39%. Other than that wages declined by 13% during periods
when the military governments were in power.Further
the coefficient of the dummy variable is as what might have
been expected. Although the variable representing the proportion
of workers who participate in the collective bargaining is
significant, its effect on the dependent variable isn't much.

Regression analysis have shown that the coefficient
of the one-year lagged variable is significant in all other
versions of the equation except the second one. In other
versions of the equations, it is indicated by the regression
analysis that the dummy variable caused 11 and 13% of decrease
in wages during the questioned periods. Wages were influenced about
40% by the inflation rate. In all the versions, R^2 values are
quite high. D.W. tests show that there was no autocorrelation
between the error terms.

$$\dot{P}_t = \beta_0 + \beta_1 \dot{MS}_t + \beta_2 \dot{MS}_{t-1} + \beta_3 \dot{RINC}_t + \beta_4 \dot{IMP}_{t-1} + \beta_5 \dot{A}_t + \beta_6 \dot{W}_t + \beta_7 \dot{D}_t$$

	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
$\dot{MS}_t$	0.75 (0.79)	–	0.35 (1.44)	0.68 (0.72)	0.95 (1.03)	0.74 (1.96)	1.59 (1.57)	0.57 (0.64)
$\dot{MS}_{t-1}$	−0.42 (−0.44)	−0.31 (1.24)	–	−0.27 (−0.29)	−0.70 (−0.76)	−0.41 (−1.22)	−1.08 (−1.02)	−0.23 (−0.26)
$\dot{RINC}_t$	−1.62 (−0.94)	−1.51 (−0.89)	−1.50 (−0.91)	–	−2.44 (−1.60)	−1.62 (−1.00)	−3.66 (−2.15)	−1.33 (−0.82)
$\dot{IMP}_{t-1}$	−0.19 (−1.02)	−0.22 (−1.23)	−0.21 (−1.24)	−0.27 (−1.66)	–	−0.19 (−1.14)	−0.115 (−0.52)	−0.16 (−0.92)
$\dot{A}_t$	−0.0029 (−0.006)	0.31 (1.72)	0.17 (1.11)	0.082 (0.19)	−0.15 (−0.37)	–	−0.31 (−0.66)	0.065 (0.15)
$\dot{W}_t$	1.03 (2.22)	1.18 (2.82)	1.09 (2.58)	1.26 (3.24)	0.94 (2.06)	1.03 (2.47)	–	1.15 (2.79)
$\dot{D}_t$	−0.018 (−0.67)	−0.012 (−0.47)	−0.015 (−0.58)	−0.012 (−0.45)	−0.012 (−0.46)	−0.018 (−0.72)	−0.044 (−1.46)	–
F	6.91	8.23	8.67	8.00	7.86	8.87	5.32	8.41
R^2	0.82	0.81	0.82	0.81	0.81	0.82	0.74	0.82
R^{-2}	0.84	0.84	0.85	0.84	0.84	0.85	0.77	0.85
D.W.	2.30	2.36	2.37	2.37	2.26	2.30	2.35	2.31

TABLE − 2.6.

In the general price equations, seven different explanatory variables are used, and the regression analyses have been undertaken in eight different forms. In the first one of the eight forms, we have tested a price equation in which all the explanatory variables are used. The other regression equations are generated by eliminating from the equation the explanatory variables one at a time. Results are as follows.

$k=8$, $n=18$, F_{n-k}^{k-1}, $\alpha=0.05$; $k=7$, $n=18$, $F_{11}^{6}=3.09$ critical value

$F_{10}^{7}=3.14$ critical value

H_{o}: $\beta_1=\beta_2=\beta_3=\ldots\ldots=\beta_7=0$

We reject the null hypothesis, and the explanatory variables are significant globally . Results of the t-tests used to decide whether each of the explanatory variables have a significant impact on the explained variable, show statistical significance (although some of the variables turn out to have statistically insignificant coefficients). Especially, the fact that t-statistics of nominal wages are found to be significant in all versions of the equation, strenghtens the hypothesis that this variable affects price increases. Although money supply is another important variable affecting the price increases, some t - statistics of current and one-year lagged money supply variables turn out not to be significant. We believe that this unrealistic result is due to the multi-collinearity between the variables. Large values of standard errors have caused the values of t-statistics to be insignificant. The problem with the existence of multicollinearity is that the calculated parameters of correlated variables have a relatively large standard error (sampling error). Large standard errors will cause the t - statistics to be small leading to the conclusion that an explanatory variable is insignificant in the sample, although it may actually be significant.

Later regression analyses are undertaken including only a subset of the variables in order to reduce the multicollinearity problem. The high value of R^2 (coefficient of determination) indicates that 80% of the change in the dependent variable (inflation rate) can be explained by the variation in the explanatory variables.

By the help of the results of D.W. test we can conclude that there is no autocorrelation between the error terms of the price equation. With this conclusion it can also be verified that the chosen explanatory variables are responsible for price increases to a great extent.

$$\dot{P}_t = \beta_o + \beta_1 \dot{MS}_t + \beta_2 \dot{MS}_{t-1} + \beta_3 \dot{RINC}_t + \beta_4 \dot{W}_t$$

	OLS	OLS	OLS	OLS	OLS
$\dot{MS}_t$	0.63 (1.73)	–	0.31 (1.34)	0.78 (2.03)	0.85 (2.06)
$\dot{MS}_{t-1}$	-0.38 (-1.13)	0.75-01 (0.33)	–	-0.43 (-1.21)	-0.37 (-0.97)
$\dot{RINC}_t$	-2.57 (-1.76)	-3.13 (-2.06)	-2.73 (-1.86)	–	-4.30 (-2.95)
$\dot{W}_t$	0.95 (2.34)	1.13 (2.66)	0.95 (2.31)	1.32 (3.48)	–
F	12.48	13.54	15.86	13.41	11.00
R^2	0.80	0.75	0.78	0.75	0.71
R^{-2}	0.86	0.83	0.85	0.83	0.80
D.W.	2.36	1.70	1.94	2.10	2.64

TABLE - 2.7.

As can be seen from the table above, regression analysis gives positive results. In all the versions of the price equations, current year's money supply variable is significant whereas the one-year lagged money supply variable is not. Prices are influenced by the money supply immediately in the same year. The sign of the real GNP coefficient is similar to what might have been expected. Real GNP ($\dot{RINC}_t$) variable seems to be significant in this equation, as it was in the previous ones. This shows that there is a trade-off between inflation and the real GNP.

The t - values associated with the nominal wage variable show that it explains some of the variations in the inflation rate. In the first and the third versions of the regression equation, a 100 % increase in nominal wages leads to an increase of 95 % in inflation, whereas the same 100 % increase leads to an increase of 113 % and 132 % respectively in the third and fourth variations of the equation. This will cause a fall in real GNP followed by a fall in demand.

F - test with $\alpha=0.05$ implies that explanatory variables as a whole have statistical power in terms of explaning the changes in the general price level.

We can conclude from the values of R^2 that the independent variables explain about 70-80% of the changes in the price level.

There is no autocorrelation between the error terms. The established functional relationship between the dependent variable-inflation rate ($\dot{P}_t$) - and the explanatory variables - $\dot{MS}_t$, $\dot{MS}_{t-1}$, $\dot{RINC}_t$, $\dot{W}_t$ - seems satisfactory and important variables that are the cause of inflation seem to have been already included in the equation.

$$\dot{P}_t = \beta_o + \beta_1 \dot{MS}_t + \beta_2 \dot{MS}_{t-1} + \beta_3 \dot{RINC}_t$$

	OLS	OLS	OLS	OLS
$\dot{MS}_t$	0.85 (2.06)	–	0.52 (2.17)	1.37 (2.92)
$\dot{MS}_t$	-0.37 (-0.97)	0.27 (1.06)	–	-0.50 (-1.05)
$\dot{RINC}_t$	-4.30 (-2.95)	-5.56 (-3.80)	-4.46 (-3.09)	–
F	11.00	11.66	16.09	7.81
R^2	0.71	0.62	0.69	0.52
$\bar{R}^2$	0.80	0.75	0.80	0.67
D.W.	2.64	1.88	2.20	2.34

TABLE - 2.8

$\dot{P}_t$ showing the change in inflation rate is dependent on three explanatory variables: a) percentage change in current money supply: b) percentage change in previous year's money supply; c) percentage change in real GNP.

Regression analysis of the price equation gives quite interesting result. Results of the t- and F - tests show that explanatory variables can explain the change in the dependent variable both individually and as a whole in a statistically significant way.

In the first regression analysis in which all three explanatory variables (MS_t, MS_{t-1}, $RINC_t$) are included, the explanatory variable representing the money supply of the current year is found to have a significant value. A 100 % change in this variable will be accompanied by a 85 % change in the price level. Therefore, it would not be wrong to consider the current year's money supply to be an important factor that causes inflation. On the other hand, an indirect relationship between the real GNP and inflation is observed along a priori expectations. This shows that there is a trade-off between inflation and the level of the real GNP. A 100 % decrease in prices will make the production increase by 400 % and vice versa.

As it can be concluded from the results above, we need to decrease the inflation rate to a great extent in order to increase the production in Turkey. A perpetual inflationary period will cause the speculative activity to increase rather than the production. The high value of R^2 proves that these variables can explain 70% of the variations in the inflation rate.

In the second version, the money supply of the current year is eliminated from the equation. In spite of the fact that the one year lagged money supply variable has an insignificant value, the real GNP variable is statistically significant.

In the third and the fourth variations both current year's money supply variable and real GNP variable appear to be significant. In the equation in which RINC is eliminated, the value of R^2 decreases to 50%. Thus, it is possible to conclude that real GNP is an important factor in explaining the changes in general price level.

D.W. tests show that there is no autocorrelation between the error terms in the estimated equations above.

$$\dot{P}_t = \beta_o + \beta_1 \dot{MS}_t + \beta_2 \dot{W}_t$$

	OLS	OLS	OLS
$\dot{MS}_t$	0.41 (1.75)	–	0.96 (4.01)
$\dot{W}_t$	1.33 (3.62)	1.74 (5.82)	–
R^2	0.73	0.67	0.50
$\bar{R}^2$	0.83	0.81	0.68
F	20.69	33.88	16.09
D.W.	1.65	1.25	1.80

TABLE – 2.9

Regression analysis of the equation in which the inflation rate ($\dot{P}_t$) is a function of current money supply and nominal wages, gives good results. t – tests at a significance level of $\alpha=0.10$ show that dependent variables current money supply and the nominal wage rate – are statistically significant. Stated differently, both $\dot{MS}_t$ and $\dot{W}_t$ explain some of the inflation. As shown by the table, a 100 % increase in current money supply will increase prices by 41%, whereas a 100 % increase in money wages will increase the inflation rate by 133%.

In other words, both the increase in nominal wage-rate
and the increase in current money supply play a great role in
the change of the general price level. The value of R^2 indicates
that 73% of price increases can be explained by the changes in
curneet money supply, MS_t and nominal wage rate, W_t. Moreover,
the F-test which is used to decide whether explanatory variables
as a package impact the dependent variable, gives statistically
significant results.

$$F^2_{0.05,15} = 3.68 \text{ critical value, } H_o: \beta_1 = \beta_2 = 0$$

We can reject the null hypothesis according to the results of the
F-test. Later, in other versions of the regression analysis,
the estimation is undertaken by eliminating the explanatory
variables from the equation one at a time.

In the other form generated in the above described
manner, the inflation rate is a function of only the money
wage-rate. Results show that the value of the t-statistic has
increased considerably. The estimated regression coefficient
implies that a 100 % increase in wages will be followed by a
174 % increase in prices. The value of R^2 isn't much different
from the value of R^2 of the previous equation in which both of
the explanatory variables were used.

This R^2 value indicates that only 67% of price increases
can be explained by variations in nominal wages.

The last equation is generated by the elimination of the
nominal wage. In this equation, the dependent variable is a
function of current money supply, MS_t. An increase of 100% in
current money supply causes the prices to increase by 96%.

In all three equations, autocorrelation between error terms
is non-existent.

$$\dot{P}_t = \beta_o + \beta_1 \ \dot{MS}_t + \beta_2 \ \dot{MS}_{t-1} + \beta_3 \ \dot{MS}_{t-2}$$

	OLS	OLS	OLS	OLS
$\dot{MS}_t$	1.32 (2.84)	–	1.46 (3.57)	1.35 (2.83)
$\dot{MS}_{t-1}$	0.75 (0.72)	2.04 (1.74)	–	-0.52 (-1.05)
$\dot{MS}_{t-2}$	-1.83 (-1.37)	-2.04 (-1.23)	-0.97 (-1.63)	–
F	5.62	2.84	8.49	7.01
R^2	0.58	0.30	0.56	0.51
$\bar{R}^2$	0.69	0.44	0.70	0.66
D.W.	2.03	1.05	2.32	2.36

TABLE - 2.10

Regression analyses in which dependent variable is a function of the current year money supply, one-year lagged money supply, . two years lagged money supply give positive results.

In the first regression analysis in which all the explanatory variables are included. t-values of $\dot{MS}_t$ and $\dot{MS}_{t-2}$ with a significance level of $\alpha=0.10$ are statistically significant whereas the t-statistics of $\dot{MS}_{t-1}$ can't be considered to be significant because of their small values.

A 100 % increase in current money supply will increase the price level by 132%. The sign of the regression coefficient $\dot{MS}_{t-2}$ (two years lagged money supply) is opposite of what might have been expected. High multicollinearity between the three explanatory variables may be the cause for such a result.

The result of the F - test with $\alpha=0.05$ also indicates that $\dot{MS}_t$ and $\dot{MS}_{t-2}$ together also influence the inflation rate. Explanatory variables can only explain 58 % of changes in the dependent variable.

Using the D.W. statistic we can conclude that there is no autocorrelation between the error terms.

Section V

CONCLUSION

One of the main goals of Economics is to secure and maintain the price stability.

Although a large volume of research has been undertaken about price stability, which should be understood as holding the rate of inflation at a reasonable level, the problem of inflation couldn't be cured fully.

The existence of various points of view concerning the cause of inflation renders the invention of a cure for the problem even harder.

In my opinion, one should give equal importance to the two main approaches to inflation -monetarist and structuralist- an analyzing the sources of inflation and finding effective solutions. In other words, satisfactory results can not be obtained by explaining inflation by one factor in our times.

Therefore, in our research we included the monetarist and the structuralist theories. Deficit financing policies have played an important role in the creation and growth of the inflationary process.

Especially, since 1972 Turkish governments have kept the output prices of the public sector constant altough the costs of production of these sectors have increased, due to increasing input prices.

In this period the Turkish governments have used subsidies in a very large scale.

As a consequence of the public sector pricing policies, the deficits of the public sectors have been covered by the resources of Central Bank, which led to significant increases in the money supply.

The expansionary policies should also be taken into account in analyzing the Turkish inflation.

The findings of the research on causes of inflation in Turkey between 1965-1982 turned out to be significant. These results imply that the role of the structural factors is as important as the role of the monetary factors in the creation of inflation.

The fact that an existence of a simultaneous relation between wages and prices appears to be proven by the Granger causality test may play a great role in the understanding the events of this inflationary period and the formation of an effective (anti-inflationary) economic policy.

It is observed that the current money supply is significant and its value changes between (+0.35 and 1.59) almost in all versions. Obtained results indicate that current money supply is an important variable in the explanation of inflation. However, one-year lagged money supply variable appears to be significant too.

An indirect relationship between real GNP ($RINC_t$) and the inflation rate is confirmed by the research. Moreover, both "t" statistics and the correlation coefficients support the idea that this variable plays an important role in the explanation of inflation. It is observed that the coefficients of regression change between (-1.33 and -5.56).

The current inflation rate, the proportion of workers' participating in the collective bargaining process, and the dummy variable representing the periods during which military governments were in power are found to be statistically significant in the wage equation. One-year lagged inflation rate and the variable representing the rate of unemployment are found to be statistically insignificant.

Based on these results, we can conclude that the Phillips' curve proposing a relationship between the nominal wage and the unemployment rate, isn't applicable to the Turkish economy due to the fact that the unemployment rate isn't statistically significant in the above research.

We might conclude that a decline in nominal wages parallel to an increase in the unemployment rate might not be valid for economies where strong labor unions are present (where perfect competition is not operative). In these economies increases in nominal wages are not a function of the unemployment rate but are determined directly by the negotiations between the unions of labor and employers. In other words wages might be assumed to be rigid downwards. Research results support the hypothesis that nominal wage increases are an important factor causing increases in prices. However, this does not imply that the only way for achieving a decrease in the inflation rate is to decrease nominal wages.

As a fact, it is possible to state that the most efficient and long lasting solution for the inflation problem may be increase in production and the elimination of deficit financing policies by the public sector. The elimination of inflation by contracting the aggregate demand without increasing the output is nothing but a palliative solution. However, if the inflation is caused by some bottlenecks of production-by some structural factors- the policies that contract the aggregate demand won't give satisfactory results unless they are applied in extreme. Hence, the idea that today's inflation can only be eliminated by emphasizing supply side oriented policies gets added credibility.

If we look at the problem, with the emphasis on the developing countries that are the importers of intermediate and capital goods, we realize that these countries are less successful in preventing price increases than the developed countries. We believe that a classification between the developing countries should be made at this point: a) oil exporting developing countries b) oil-importing developing countries. It is more difficult to solve the problems of these countries in the lack of a substitution possibility of petroleum with cheaper resources of energy leads to imported inflation in these countries. Price increases could be due to the following reasons:

a) the increased petroleum prices are reflected in goods that
are imported from developed capitalist countries; b) developing countries import raw petroleum from raw petroleum exporters. Other than these external factors, the structure of the
industry of the economy in question, the relative share of
agriculture in the economy, the dependency on foreign countries
in terms of energy, intermediate and capital goods, and external
borrowings with high interest rates due to the lack of their
own capital markets should also be taken into consideration
in the research of the inflation phenomenon.

We believe that if the present Classical and the Keynesian
approaches are not sufficient to solve the inflation problem,
inflation should be considered as a fact of the economy-observe
that this also holds for the Turkish economy and economic
policies should be formed on the basis of this fact. Here a
general system of indexation suggests itself naturally. Inde.
ation the public tax and factor payments of the wages and
savings of those with more or less fixed incomes may partly
solve the inflation problem.

We can consider Milton Friedman, Jean Marcel Jeanneney,
Herbert Giersch, Samuel Brittan and Ludwig Erhard among the
economists who recommend general or partial indexation models
to developed countries.

Prof. Herbert Giersch states "I believe monetary reforms
will not only prevent the social injustices, but also cure the
long-termed inflation".

It shouldn't be wrong to conclude that having indexes
of public tax and factor payments and making these sensitive
to price increases will lead to decreases in the public deficit
to a great extent or even eliminate them.

In the light of the same argument, I believe that having
indexes of wages, savings and incomes of fixed return financial
assets will prevent the wage-owners from being damaged by the
price increases. This system will also help to reduce the
impact of the worsening of the income distribution.

In the developed European countries, policies concerning
indexation are being prepared to be applied as a cure for long
lasting inflationary processes. Hence, the application of
similar policies with the intent of reducing the burden of the
inflation problem and the Turkish economy constitutes a viable
alternative.

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L I S T   O F   S Y M B O L S

$\dot{P}_t$: the percentage change of the general price level.

$\dot{P}_{t-1}$: the percentage change in the one-year lagged general price level.

$\dot{MS}_t$: the percentage change in the current money supply.

$\dot{MS}_{t-1}$: the percentage change in the one-year lagged money supply.

$\dot{RINC}_t$: the percentage change in the current real GNP.

$\dot{IMP}_{t-1}$: the percentage change in the one-year lagged import price index ($ \not{\$} $).

$\dot{A}_t$: the percentage change in the alternative cost of holding money.

$\dot{W}_t$: the percentage change in the nominal wage.

$\dot{D}_t$: the percentage change in the foreign exchange reserves.

$\dot{U}_t$: the percentage change in the current unemployment rate.

$\dot{CB}_t$: the percentage change in the absolute numbers of unionized workers.

$\dot{DV}$: the dummy variable.