

348

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CONFLICT BETWEEN EMPLOYMENT AND
INFLATION: THEORY AND FACTS

By

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CONFLICT BETWEEN EMPLOYMENT AND INFLATION : THEORY AND FACTS *

C. Rangarajan

Is there a trade-off between inflation and employment? Can policy-makers generate more employment through a deliberate policy of inflation? These questions have been debated at length since the introduction of the celebrated Philips Curve¹ which empirically showed a negative relationship between the rate of change in money wages and unemployment rate. The study of Philips which related to England has been replicated for many countries. Apart from the empirical studies, there has been a growing volume of literature on the theoretical basis for such a trade-off². Professor Tobin once described the Philips curve as an empirical finding in search of a theory³, while there are some who regard it as a case of 'measurement without theory'. If, in fact, there is a trade-off between the rate of change in money wages (or price level) and employment, a policy directed towards ensuring a rise in price level can be justified on the ground of generating additional employment.

1. THEORETICAL DEVELOPMENTS

Wage Rate Change and Unemployment

In the discussions on Philips curve, two main issues have emerged. One relates the conditions under which such a trade-off

* This paper was presented at the International Round Table Conference on Employment Policies in Developing Countries organised by International Economic Association and Indian Economic Association at Pune during March 16 - 24, 1980.

can exist and two, whether such a trade-off is temporary or permanent. The original explanation for a negative relationship between rate of change in wages and unemployment rate ran in terms of excess demand for labour relative to its supply. Lipsey⁴ gave an elaboration of the micro foundations of the Philips curve. He derived the curve from the behaviour of the labour market. Lipsey's analysis of the labour market behaviour is based on two propositions : (1) The supply and demand for labour determine the equilibrium wage level and (2) the rate of change of the wage level in disequilibrium is positively related to the extent of the disequilibrium as measured by the excess demand for labour. The greater is the proportionate disequilibrium the more rapidly will wages be changing. Since excess demand for labour is not directly observable and quantifiable, this was taken to be the percentage of labour force unemployed. The unemployment rate, however, is inversely related to excess demand as a proportion of the labour force. Thus emerges a negative relationship between rate of change in money wage and unemployment rate. The major weakness of this explanation is that while Philips curve deals with the change in money wage rate, the supply and demand analysis of labour market deals with the determination of the real wage rate. Obviously the two concepts are interchangeable only under conditions of price stability. It has therefore been argued that to understand Philips curve relationship, one has to introduce into the model the expected rate of price change. In fact in recent empirical

studies of the rate of change in money wage in the developed countries, the researchers have found it necessary to include the rate of change in price level as an independent variable beside the unemployment rate.⁵

Wage settlements are made at discreet intervals and at the time of each settlement, it is the expected price level that plays a role in determining the real wage. Thus the Philips curve will shift and for every expected rate of price inflation, there will be a different curve. Even if it were possible to lower the unemployment rate by increasing the wage rate, this advantage could be wiped out if the Philips curve shifts to the right. The unemployment rate then falls back to the original level. Whether or not it falls back to the original level depends upon the extent to which the curve shifts outward. When the expected rate of inflation becomes almost equal to the actual rate, the shift in the curve may be perfect and the original unemployment rate may return. Hence the argument that wage rate changes unaccompanied by rising labour productivity may have only a temporary effect in reducing the unemployment rate. It must be noted that even in the context of the labour market behaviour, the Philips curve relationship is only an explanation of a phenomenon in disequilibrium. The existence of such a disequilibrium in the developed economies is sought to be explained in terms of costs of search and information.

Price Level Change and Unemployment

The original Philips curve was transformed into a relationship between the rate of change in price level and unemployment by Samuelson and Solow⁶ while replicating the Philips' study for United States. In their study this transformation had only a limited meaning. They equated the rate of change in price level to that of the rate of change in money wage less the rate of change in labour productivity. However, later writers have used a wage-cost mark up equation to relate the change in price level to the change in money wage. In fact it was thought that the Philips curve supplied the missing equation in the Keynesian system. The IS-LM curves yield the real output and from the production function relating output and employment, it is possible to derive the level of employment given the real output. By calculating unemployment rate and by using the Philips curve, the rate of change in wage rate can be obtained. Using a wage-cost mark up equation, the rate of change in price level can in turn be obtained. Relating the change in price level to unemployment rate goes beyond the labour market dynamics.

Why should an increase in price level generate additional employment? Suppose the economy is operating at a certain level of unemployment. If the authorities want to reduce the unemployment rate by increasing the rate of monetary growth, what could happen? It is possible that producers might respond to the initial expansion

in aggregate demand by increasing output. It is also possible that prices of products can increase. However, since wage settlements are made at discreet intervals, as mentioned earlier, real wages may go down. This can increase the profitability of the firms and may make them increase their output and thereby employment. But, however, as employees realise the loss in the real wages and begin to agitate for higher nominal wage in order to keep the real wages at the original level, the initial advantage gained by the firms will disappear. Thus the temporary trade-off between inflation and unemployment arises as Friedman pointed out in his presidential address 'not from inflation per se but from unanticipated inflation.'⁷ However, even Friedman found from his historical studies that the initial effects of a higher and unanticipated rate of inflation may last for two to five years. Thus to retain the benefit of an unanticipated inflation, the price level must keep rising.

Does the original Philips curve or its modified version help us in any way in identifying whether a particular inflation is 'demand pull' or 'cost push' ? Some have argued that while a movement along the curve indicates 'demand pull', a shift of the curve indicates 'cost push'. But a shift of the curve occurs not only because of 'union power' but also as a result of 'expectations'. In the latter case, the 'cost push' is not separated neatly from 'demand pull'. As Lipsey once remarked, the Philips curve left

3

Inflation theory where it found it. Indian data for example reveal that real wages of workers have not increased over the period 1961-1975 implying thereby that the shifts in the curve must have been primarily to adjust money wages to price increases.

Inflation and Growth

Discussions in under-developed countries have centred around more on the relationship between the change in price level and the growth rate in the economy than with unemployment rate. In the developing economies, the amount of labour flowing through the 'market' is only a part of the labour supply particularly in relation to sectors like agriculture. Therefore attention has been focussed more directly on the relationship between inflation and the growth rate of national income. Therefore the question that is raised is whether there is a positive relationship between the rate of change in price level and the rate of growth of the economy. In linking the two, one is not looking at the functioning of the labour market. The link between inflation and growth rate in income is the result of the dynamic interaction of a number of important relations. One can, however, raise at the outset the question whether there is any historical evidence which throws light on the association between inflation and economic growth. All available historical studies

indicate that there is no convincing evidence of any clear association positive or negative between the rate of inflation and the rate of economic growth. In Table 1 we have provided the data for the rates of growth in national income and in price level for a variety of countries during the period 1969-76. It is interesting to see that high inflation rates are found in countries with high and low growth rates in national income. Similarly there are countries with low inflation rate and with low growth rate. The absence of any neat relationship between rate of change in price level and rate of change in national income can be attributed to the fact that the economic and financial structure can be **adapted** to changing conditions. There are countries which have learnt to live with inflation by suitably modifying the financial structure. Countries which are not capable of modifying the financial structure in the face of inflation suffer a great deal more. We shall refer to the historical experience of India in this context in the next section.

In discussing the relationship between change in price level and economic growth, one has to make a distinction between two different positions. One stand is that in the process of growth a certain degree of increase in price level is inevitable. In this kind of analysis the change in the price level is not given a **causal** role. It is treated as a consequence of growth. The opposite position is that inflation itself can be used as an instrument

for generating economic growth. The implications of the first position for policy is that the policy-makers should not aim at absolute price stability but should be content to allow the increase in price level inherent in the process of growth. It is the second position that calls for a closer scrutiny.

The arguments that are usually put forward in favour of inflation are well-known.⁸ It is deemed to assist in the task of mobilising resources for development. The level of investment is sought to be raised by expanding bank credit. If the government wants to secure additional resources, it can obtain it by issuing currency or by borrowing from the central bank and commercial banks. In this process as the price level increases, it brings about a reduction in real terms the purchasing power in the hands of others. It is this reduction in the purchasing power which results in the transfer of resources into the hands of the government and thereby becomes available for investment. Hence the description that inflation is basically a form of 'forced savings'. In this sense the transfer is basically from the holders of money balance to the creators of money balances. Whether or not there is net addition to the savings of the economy will depend upon how the gainers from inflation, namely, the government in this case, utilises these resources. If all of this is saved, then the purpose of raising resources for investment will be met. It has not

always been the case that those who gain by inflation are less prone to consumption than those who lose from it. However, the rationale for inflation as a means of mobilising resources rests on the proposition that the marginal propensity to save of the gainers is greater than the marginal propensity to save of the losers. The net increase in the savings also depends upon the reactions of the losers from inflation. The argument put forward so far rests on the assumption that the losers will react to the increase in the price level by reducing consumption. If, however, they react to the increase in price level by cutting their savings, then the total effect on the economy may be a net reduction in savings so long as the marginal propensity to consume of the gainers is greater than zero. In the same way as the government, the business community can also acquire more resources for investment through the resort to bank loans. Even this brief description of the mechanism by which inflation can promote savings points to the fact that it is possible to transfer the resources only if labour were to acquiesce in a reduction of consumption and allow a shift in the share of total output going to investment. However, if the other sections of the society are able to compete effectively and prevent their share of the cake being reduced, the impact of inflation can only be ^{at} best a one-shot increase in investment. The permanent effect if any will come from the income flow generated by the increase in investment. Any attempt to continually rise the investment through this method will require a

rate of change in price level which is always kept at a level higher than what wage earners and others anticipate and can build into their wage bargains. But sooner or later, expectations are likely to coincide with the actual and the rise in price level will no longer accomplish any transfer of resources. It can also happen that even when it accomplishes the task of transferring resources, there may be other costs to inflation. The redistributive distortions which may be treated as the cost of inflation may sometimes outweigh the benefits of mobilisation and at that point also inflation ceases to be a 'useful' instrument.

Inflation can result in a transfer of real resources only to a limited extent and that too only temporarily, the question can be asked as to how high growth rates are associated with high inflation rates in some countries. The answer is that inflation is not doing the trick. Ultimately the growth rate in real output is dependent upon such fundamental factors as resource endowments, technical and managerial capabilities and the improvements in organization. In the long run each economy gets adjusted to whatever rate of monetary growth it experiences. In many of the economies where inflation rate is high, attention is focussed on institutional arrangements such as indexation to avoid the harmful effects of inflation.

There is, however, one sense in which the relationship between price level change and output changes becomes important. When an economy gets used to a certain rate of growth in credit, an attempt to put a brake on it suddenly gives such a jolt to the economy that it results in a fall in production. The process of money creation is also a process of credit creation. The rate of growth in money supply can be restrained only by restricting the credit flowing either to the private sector or to the government sector. If with a view to avoiding the distortion effects of inflation, an attempt is made to control the growth of rate in money supply, the sectors of the economy used to a larger volume credit may find it difficult to adjust to the lower levels of credit. This cannot but result in some shortfall in production. That is why whenever the central bank wants to introduce a restrictive monetary and credit policy, there is a hue and cry from the business sector that this will affect production. This is not a totally imaginary fear even though the purpose of the restrictive credit policy is to force the credit using sectors to manage their business more efficiently with less credit. It is difficult to quantify how much this negative impact is and how long it will last.

II. EMPIRICAL RELATIONSHIP IN INDIA

Changes in Price Level, Output and Employment

What does the historical experience of India reveal on the relationship between price level change and growth rates in output and employment? Table 2 provides the data on employment in the organised sector. It gives data separately for the public sector and private sector. It also gives separately data on employment in the manufacturing sector which includes establishments in both private and public sectors. Table 3 provides data on industrial production and on manufacturers separately. In Table 4 data on price level are provided. In this paper we have considered only employment in the organised sector defined as establishments which employ ten and more. For the kind of relationship that we are seeking employment in the unorganised sector is not immediately relevant.

As is to be expected there is a close correlation between employment and output. In the log form the correlation coefficient between index of industrial production and employment in the private sector is 0.72 while that with total employment was 0.90. However, as is well-known by now, production has grown at a faster rate than employment. During the period 1960-77 the compound rate of growth in the index of industrial production is 5.7 per cent while that of

employment in the private sector is 1.97 per cent. The index of manufacturers rose by 5.0 per cent during this period while employment in manufacturing sector increased by 3.0 per cent. From a double log relationship, it is seen that the elasticity of employment in relation to output in manufacturing sector is around 0.45 of 1 per cent. However, employment fluctuates less severely than output.

In Chart 1 we have shown the relationship between annual percentage change in price level and annual percentage change in industrial production. The chart shows that in general low rates of changes in price level are associated with high rates of growth in industrial production. During the period studied, there were seven years in which the rate of growth in industrial production was six per cent and above. Of these, in four years the price increase was less than four per cent. Only in one year of high growth rate, price rise was more than eight per cent. Of the eight years in which the growth rate was less than six per cent, in five the price increase was more than eight per cent. In 1973-74 when prices rose by about 20 per cent, industrial production grew by only two per cent. Thus while there are exceptions, the general drift of the observations indicates a negative correlation between price level change and output change. The correlation coefficient between the percentage change in price level and percentage change in industrial production is 0.56.

The correlation coefficient between the percentage change in price level and percentage change in private employment is positive but very low at 0.11. The correlation coefficient between price change and output change in relation to manufacturers is - 0.28.

We have also examined the relationship between price level change and output changes in several groups of industries over the period 1962 to 1973. If the Philips relationship held true, there should be a positive association between changes in real output and changes in prices. It must be admitted that when we study the relationship between the changes in price level and changes in output over a period of time, the observations for the various years are a combination of the shifts in the demand and supply curves. However, an examination of the data at a disaggregated level would still reveal whether an industry tends to grow when prices rise. In Table 5 columns 1 and 2 show ^{respectively} the average annual percentage change in output and in prices for 10 industry groups. In column 3 we have computed the correlation coefficient between the percentage change in output and percentage change in price level for the period 1962 to 1973 for each of the industry groups. We have shown in column 4 the correlation between the relative change in output defined as the rate of change in output of that industry less the rate of change in the total industrial production and the relative change in the prices

defined as the percentage change in the price level of that industry less the rate of change in the wholesale price index. It is interesting to observe from column 3 that in most of the industry groups the correlation turns out negative, i.e. the rate of change in price level and the rate of change in output are inversely related. This corresponds to the general picture that emerged regarding the relationship between the change in price level and the change in the index of industrial production. However, column 4 shows that only in the case of five industries the correlation between the relative change in output and relative change in price is negative. These are industries in which price changes measured as deviation from the general price level were negatively associated with output changes measured as deviation from the general production index.

In a study of United States,⁹ Houthakker found in fact a stronger negative correlation between price changes and output changes by industry groups. On the basis of the correlation between relative change in output and relative change in prices, he was able to reach the conclusion that inflation had been more rapid in industries that grew slowly. Our data also reveal that even at the disaggregated level there is a negative association between price changes and output changes. It is difficult to explain this phenomenon except in terms of shifts in the supply and demand curves. A negative association can only mean that shifts in supply curves outweigh shifts in demand curves.

Both the aggregate and the disaggregated data tend to lead to one general proposition viz. that, that the growth rate in industrial production is much better in a situation of low inflation rates than high inflation rates. The question of cause and effect is difficult to unscramble. A year in which there is a shortage of output, prices can go up. Thus causation can run in either direction. However, the general belief that rising prices are good for industrial production is not supported by the data collected by us.

One of the issues normally discussed in this context is whether the trade-off between inflation and unemployment even if it existed is temporary or permanent. It has been suggested that one way of testing this is to regress the percentage change in price level on unemployment rate (or some proxy of it) and expected price level. If the argument that the impact is only temporary were true, the coefficient for the expected price variable must be equal to 1. This should be so, for otherwise there would be a relation between price change and unemployment even when the price change is fully and correctly anticipated. If price expectations follow the 'adaptive expectations model', the trade-off equation can be expressed, in terms of current and previous year's unemployment rate and the rate of change in price level in the previous year.¹⁰ We tested this model with Indian data for the period 1961-62 to 1974-75. The proxy used for unemployment rate was the average rate of growth in industrial production over the period less the actual rate of growth in industrial production in a year. The resulting questions are :

$$(\Delta/P)_t = 7.24 + 1.574 U_t \quad \bar{R}^2 = .32$$

(4.6) (2.9)

$$(\Delta P/P)_t = 6.37 + 1.596 U_t - 0.582 U_t + 0.145 (P/P)_{t-1}$$

(2.33) (- .68) (.434)

$\bar{R}^2 = .19$

Where U_t = Average rate of growth in industrial production less the rate of growth in industrial production in t .

$(\Delta P/P)$ = Rate of change in wholesale price index.
 t values are given in brackets.

From the first equation it can be seen that there is no trade off between inflation and unemployment. It confirms the result already obtained that high growth rates are associated with low price level changes.

Price Level and Savings.

One of the favourable effects expected of inflation is its impact on savings. As elaborated earlier, the favourable effect depends on whether there is a redistribution of income in favour of groups which have a higher marginal propensity to save. However, inflation can also undermine the basic motivation to save and thereby lower for everyone the propensity to save. To some extent, the impact of price changes on the propensity to save also depends on the form in which the savings are held. Price changes make the holding of fixed income financial assets unattractive. If a larger proportion of savings is held in the form of physical assets it may promote savings. It has also been argued that higher prices usually arise from cheap money policies which may have the

effect of also lowering the interest rates and this can discourage savings. Thus, a large number of factors which pull in opposite directions are in operation.

The analysis of the data on domestic savings in India does not reveal any close relationship with change in price level. Broadly speaking, net domestic saving to net national product rose during the period 1955 to 1966. Thereafter there was a sharp decline and it was only in 1972-73 the level attained in 1966-67 was achieved. From the data published by the CSO, there was no appreciable change in the savings ratio in 1973-74 when prices rose by 20 per cent. We have analysed the savings pattern separately for the household sector, the corporate sector and the government sector. Using the data for the period 1961-74, we estimated separate saving functions for the household sector, for the corporate sector and for the government sector. Only in the case of household sector one gets a reasonably satisfactory relationship. But even here the role of change in price level is not significant. We give below the estimated equations :

$$\text{HHS} = -1537.41 + 0.19009 \text{ PDY} - 5.0787 \left(\frac{\Delta P}{P} \right)_{t-1}$$

(7.27) (-0.5308)

$$\bar{R}^2 = 0.798$$

$$\text{HHS} = -1501.59 + 0.18613 \text{ PDY} - 0.89699 \left(\frac{\Delta P}{P} \right)$$

(6.64) (-0.0854)

$$\bar{R}^2 = 0.793$$

where HHS = Savings of the household sector in crores of rupees
in constant price

PDY = Personal disposable income in crores of rupees
in constant price

$\frac{\Delta P}{P}$ = Rate of change in price level

$\left(\frac{\bar{\Delta P}}{P} \right)$ = Two year average of rate of change in price level

We had estimated other equations with several modifications of the price variable. We also studied the impact of unanticipated inflation measured as the difference between actual change in price level and the expected change in price level. In none of these equations was the price level significant. We are not reporting the function estimated for government savings since it has not been possible to fit a reasonably satisfactory relationship. We give below the function estimated for the corporate sector using the data available from the REI sample of large and medium public limited companies :

$$\frac{\text{Profit retained}}{\text{Profit after tax}} = 0.338 + 0.01122 \left(\frac{\bar{\Delta P}}{P} \right)$$

(7.85) (2.59)

$$\bar{R}^2 = 0.251$$

The fit of the above equation is not good. It shows, however, that retention ratio in the case of companies is positively influenced by change in the price level.

Our examination of the savings data both in its aggregate and in its components does not reveal any relationship between savings and the rate of change in the price level. They are not related

strongly either positively or negatively. In the absence of detailed savings and income data for different income groups, it is difficult to establish the direction of contribution of the different factors.

III. CONCLUSIONS

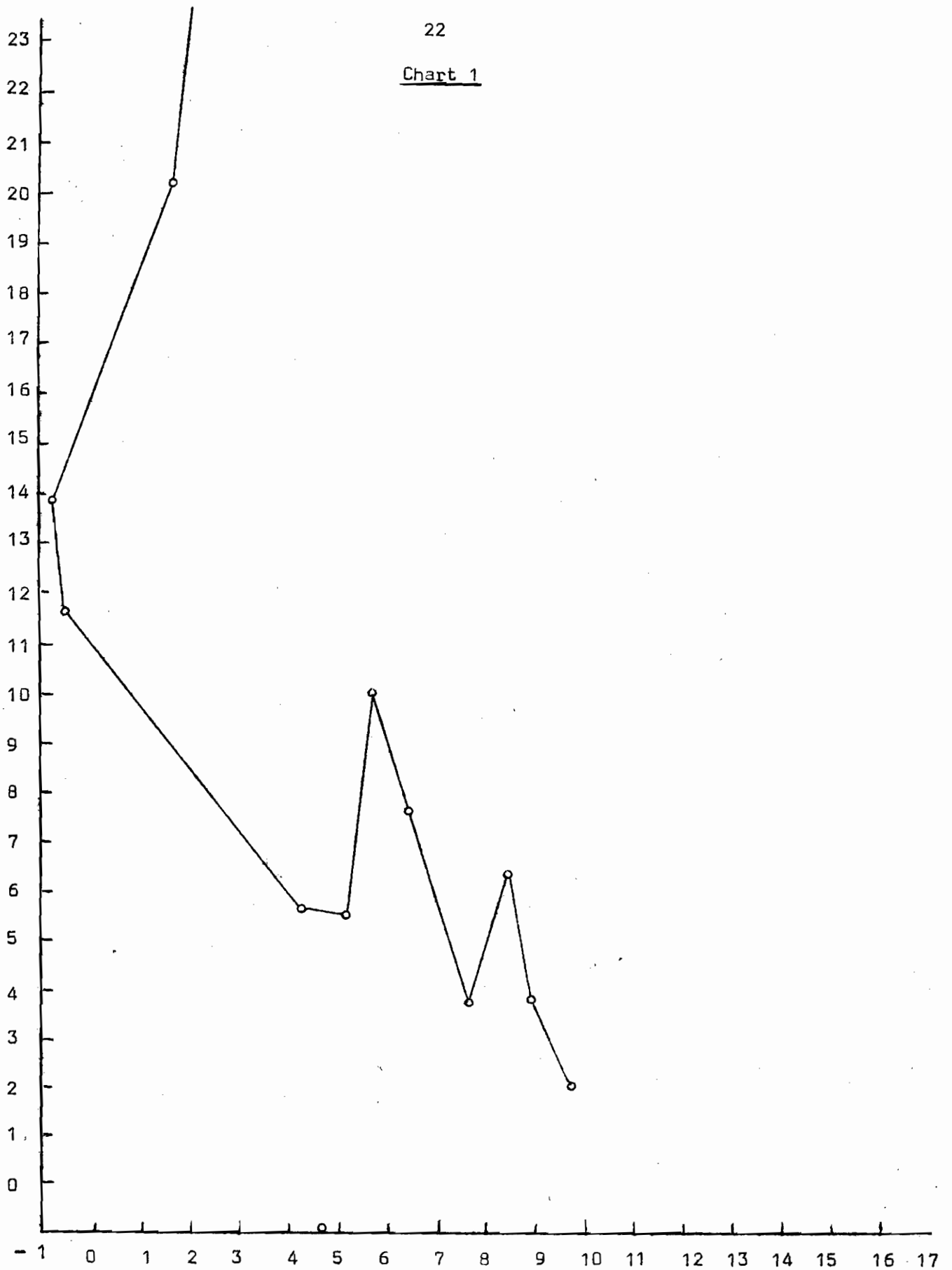
The Philips curve, as its best, is an explanation of the trade-off between wage changes and employment in a disequilibrium situation. In the long run, such a trade-off can exist only if expectations of price changes continually remain below the actual changes. The link between price changes and employment goes beyond the dynamics of the labour markets. The same is true when one thinks of the relationship between price change and growth rate of the economy. Price changes can ensure a transfer of real resources only if the marginal propensity to save of the gainers from inflation is greater than the propensity to save of the losers of inflation. In the long run such a transfer can occur only if the losers from inflation are not able to restore their share of the cake. However, in the short run for a variety of reasons there can be a trade-off.

We have examined the Indian data in relation to price changes and output changes in the industrial sector. Employment and output are well correlated but the rate of growth of the former is lower than

that of the latter. In general, it appears that periods marked by sharp increase in price level are associated with lower growth rates output and years of low price changes with high growth rates in industrial output. A disaggregated analysis of the output and price changes relating to various industry groups also indicates a negative association between price change and output change. There can be several explanations for this phenomenon. Causation can run in either direction. However, the general conclusion is that contrary to the general belief, industrial output has grown faster in periods of small price increases than in periods of high price increases. There is also no evidence to show that price changes have had any effect upon savings.

wholesale
rice
index

Chart 1



Rate of change in
Index of Industrial
Production.

Table : 1 Rates of Growth in National Income and Inflation
(1969 - 1976)

Countries	High inflation Rate (7% and above)	High Growth Rate (5% and above)
Brazil	21.4	17.2
Colombia	16.2	6.3
Peru	13.5	5.0
Jamaica	12.3	7.0
Phillipines	12.0	6.6
China	9.8	6.2
Mexico	8.8	5.9
France	8.0	5.5
Iran	7.5	16.3
	<u>High Inflation Rate</u>	<u>Low Growth Rate (Less than 5%)</u>
Chile	205.7	0.2
Pakistan	12.9	2.2
U.K.	11.7	1.7
India	9.7	2.5
Trinidad & Tobago	10.2	2.9
Italy	10.1	3.4
Australia	8.9	4.4
Newzealand	8.9	4.3
South Africa	8.1	4.3

Contd..24..

Countries	High Inflation Rates	Low Growth Rate (Less than 5%)
Zambia	7.5	3.5
Belgium	7.1	4.4
Argentina	52.9	4.5
	<u>Low Inflation Rate (Less than 5%)</u>	<u>High Growth Rate</u>
Libya	5.9	10.6
Iraq	5.9	8.2
Thailand	6.6	6.7
	<u>Low Inflation Rate</u>	<u>Low Growth Rate</u>
Cyprus	6.1	(-) 0.2
Canada	6.5	4.5
U.S.A.	6.3	2.6
Switzerland	5.8	2.5
Germany	5.1	3.5

TABLE 2 : EMPLOYMENT IN THE ORGANIZED SECTOR

	No. of Persons Employed (in lakhs)			Annual rate of growth of Employment in			Employment in manufac- turing sector (in lakhs)	Annual rate of growth
	Public Sector	Private Sector	Total	Public Sector	Private Sector	Total		
1960-61	70.50	50.40	120.90	-	-	-	33.89	-
1961-62	74.17	51.60	125.77	5.2	2.4	4.1	34.71	2.42
1962-63	79.53	54.50	134.03	7.1	5.8	6.5	37.79	8.87
1963-64	84.54	57.8	142.34	6.3	2.6	4.8	40.01	5.87
1964-65	89.57	60.4	159.97	6.0	8.1	6.8	42.45	6.10
1965-66	93.78	68.1	161.88	4.7	1.0	3.2	45.78	6.67
1966-67	96.34	66.8	163.14	2.7	(-) 1.9	0.8	44.45	(-) 1.83
1967-68	98.02	65.2	163.22	1.7	(-) 2.4	0.1	44.41	(-) 0.09
1968-69	100.95	65.3	166.25	2.3	1.2	1.8	45.27	1.94
1969-70	103.74	67.0	170.74	2.8	2.6	2.7	46.80	3.38
1970-71	107.31	67.6	174.91	3.4	0.9	2.4	47.61	1.73
1971-72	113.05	67.7	180.75	4.4	0.2	2.8	48.67	2.23
1972-73	119.75	68.49	188.24	5.9	1.2	4.1	50.66	4.09
1973-74	124.75	67.92	192.79	4.3	(-) 0.8	2.4	52.06	2.76
1974-75	124.68	68.04	196.72	3.1	0.1	2.1	51.28	(-) 1.5
1975-76	133.63	68.45	202.08	3.8	0.6	2.7	52.71	2.79
1976-77	138.49	68.67	207.16	3.6	0.3	2.5	53.79	2.05
Compound growth rate	4.3%	1.95%	3.4%				3.00	

Source : Reserve Bank of India Bulletin, Feb. 1975 and Oct. 1978.

Table 3 : Industrial and Manufacturing Production

	Index of Industrial production	Annual Growth rate in industrial production.	Index of Manufacturing	Annual Growth Manufacturing In
1960	100.0	-	100.0	-
1961	110.6	10.6	109.2	9.2
1962	120.6	8.95	119.6	9.5
1963	130.6	8.38	129.1	7.9
1964	142.4	9.03	141.2	9.4
1965	151.5	6.39	154.0	9.1
1966	151.9	0.26	151.7 (-)	1.5
1967	152.6	0.46	149.6 (-)	1.4
1968	163.0	6.82	158.7	6.1
1969	175.3	7.55	170.6	7.5
1970	184.3	5.13	178.9	4.9
1971	192.0	4.2	178.9	0.0
1972	203.1	5.7	191.4	6.9
1973	206.4	1.6	193.4	1.04
1974	210.7	2.0	202.2	4.6
1975	220.6	4.7	207.7	2.7
1976	242.2	9.8		
1977	254.9	5.2		
Compound Growth Rate	5.7%		5.0%	

Table 4 : Price Level Changes

	Index wholesale prices	Annual growth in wholesale price index	Index of Manufacturing prices	Annual growth rate in manu- facturing price
1961-62	100.0	-	100.0	-
1962-63	103.8	3.8	102.4	2.4
1963-64	110.2	6.2	104.8	2.3
1964-65	122.3	10.9	107.5	2.6
1965-66	131.6	7.6	115.3	7.3
1966-67	149.9	13.9	125.5	8.8
1967-68	167.3	11.6	130.9	4.3
1968-69	165.4	(-) 1.2	132.7	1.4
1969-70	171.6	3.7	140.9	6.2
1970-71	181.1	5.5	151.7	7.7
1971-72	191.2	5.6	164.4	8.4
1972-73	210.4	10.0	180.5	9.8
1973-74	252.9	20.1	202.9	12.4
1974-75	316.7	25.2	247.4	21.9
1975-76	313.3	(-) 1.1	262.6	6.1
1976-77	319.8	2.0	260.5	(-) 0.8

Table : 5 Average Annual rates of Change in Output and Prices by Industry Groups, 1962 to 1973.

Industry	Rate of Growth (in %)		Correlation between	
	Output	Prices	Change in output and change in prices	Relative change in output and relative change in prices
1. Food Manufacturing	3.28	9.78	(-)0.495	0.278
2. Manufacture of Textiles	0.87	5.58	(-)0.459	(-) 0.432
3. Manufacture of Paper and Paper Products	7.23	3.39	0.038	(-) 0.089
4. Manufacture of Leather except Footwear	(-) 3.25	0.78	0.361	0.090
5. Manufacturing of Rubber Products	7.02	4.24	(-)0.089	0.517
6. Manufacture of Chemical Products	8.59	3.89	(-)0.107	0.093
7. Basic Metal Industries	5.43	7.13	(-)0.524	(-) 0.082
8. Non-Electrical Machinery	12.56	6.08	(-)0.263	(-) 0.173
9. Electrical Machinery	11.96	5.12	(-)0.279	0.631
10. Manufacture of Transport Equipment	2.93	3.8	(-)0.555	(-) 0.386

1. Philips, A.W. "The relation between Unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957". Economica, n.s. 25, November, 1958.
2. See for example, Regstrm A.R., Catt A.J.C., Peston M.H., Silverstone B.D.J., Stability and Inflation, A volume of essays to honour the memory of A.W.H. Philips, John Wiley & Sons, 1978.
3. Tobin J., "Inflation and Unemployment", American Economic Review, March, 1962.
4. Lipsey, R.G., "The relation between Unemployment and the rest of change of money wage rates in the United Kingdom, 1952-57: A further analysis", Economica, n.s., 27, February, 1960.
5. See Brechling, Frank "The trade-off between inflation and Unemployment", The Journal of Political Economy, July/August, 1968. The estimated equation for U.S. was -

$$W_t = 0.026 - 0.0051 U_t + 0.0027 U_t - 1 +$$

$$(0.0013) \quad (0.0013)$$

$$0.386 P_t - 0.008 D_2 - 0.013 D_3 - 0.002 D_4$$

$$(0.093) \quad (0.002) \quad (0.002) \quad (0.002)$$

$$R^2 = 0.63$$

In this equation W_t is the quarterly proportionate change in straight time earnings in U.S. manufacturing; P_t is the quarterly proportionate change in the consumer price index; U is the Unemployment percentage; and the D's are dummy variables for the second, third and fourth quarter. The period covered is 1948, first quarter to 1965, fourth quarter.
6. Samuelson, P.A. and Solow, R.M., "Analytical Aspects of Anti-Inflation Policy", American Economic Review May, 1960.
7. Friedman, Milton, "The role of Monetary Policy", American Economic Review, March, 1968.

8. See, Pernstein, E.M. and Patel, I.G., "Inflation to Economic Development", IMF, Staff Papers Vo. II, 1951-52.

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9. Houthakker, H.S., "Growth & Inflation : Analysis by Industry" Brookings Papers on Economic Activity 1, 1979

10. For a discussion on this see : R.M. Solow, Price expectations and the Behaviour of the price level (Manchester University Press).

Bomberger WA and G.E. Makinen, "Inflation, unemployment and expectations in Latin America : Some simple tests" Southern Economic Journal, Oct, 1976.

Edmund J. Sheehey. "A Comment", Southern Economic Journal, April, 1979.

11. There have been some studies to find out the impact of price level on savings. In a study of five Asian countries, Williamson found that price played no role in the case of Korea, Taiwan and India. See Williamson, J.G., "Personal Savings in Developing Nations", Economic Record, June, 1968.

However a numbers of studies on the American inflationary experience have established a positive relationship between inflation and personal saving. See Paul Wachtel, "Inflation uncertainty and the composition of personal saving" in Sametz, A.W. and Wachtel.P. (Ed), Understanding Capital Markets. Vol.II.