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Malte Krüger*

Inflation and Growth

A Discussion of Robert Barro's Recent Findings

A recent empirical study conducted by Robert Barro and published by the Bank of England¹ finds surprisingly little evidence for harmful effects of inflation on growth, seemingly refuting the many theories purporting the contrary. Have the costs of inflation been exaggerated in the past? Is inflation in fact essentially harmless?

Barro summarises the results of his study as follows: "... an increase in average inflation of 10 percentage points per year reduces the growth rate of real per capita GDP by 0.2 - 0.3 percentage points per year."² This effect is not only very low, it is also statistically significant only for the group of countries whose average inflation rate lies above 15 per cent per year.

As Barro shows, even small effects on growth rates may have strong effects in the long run, as they accumulate over time. Still, given the small magnitude of the effect and the fragility of the results, a sceptic would hardly be convinced – at least as far as moderate inflation is concerned. Not surprisingly, therefore, in the press these results were sometimes interpreted to imply that inflation is "harmless".³ However, the case against inflation becomes more convincing once the argument is turned around. As Barro and Brittan point out,⁴ the study clearly shows that there are no positive effects of inflation on growth. Thus, the argument that a little inflation may be useful to promote growth is refuted. Once the problem is taken into account, however, that there is always a short-term incentive for the authorities to inflate a little, driving the inflation rate slowly into more harmful zones, there may be a strong case for low and stable inflation, after all.

Even if Barro's findings do give some support to inflation foes, the comparatively weak influence of inflation on growth merits an explanation because it

also refutes the many theories which propose much more harmful effects of inflation.⁵ Clearly the question has to be raised whether the costs of inflation have been exaggerated in the past. This question can be answered negatively, with some confidence. For one thing, other studies show much larger, negative effects of inflation on growth.⁶ Second, as will be argued in this article, empirical studies are likely to underestimate the costs of inflation if they do not account for the influence of the exchange-rate regime. Under fixed exchange rates, the relationship between inflation and growth is shaped by two offsetting mechanisms. On the one hand inflation can, indeed, be expected to be harmful when it is due to monetary factors. But on the other hand, in a system of fixed exchange rates, relative inflation is endogenous. It is the result of real factors which determine the long-run balance of payments development of the countries with pegged exchange

¹ Robert J. Barro: Inflation and Economic Growth, in: Quarterly Bulletin of the Bank of England, May 1995, pp. 1-11.

² Ibid., p. 1.

³ Cf. The Economist: The Cost of Inflation, May 13 (1995).

⁴ Robert J. Barro, op. cit.; Samuel Brittan: Elusive Case for Stable Prices, in: Financial Times, May 18, 1995.

⁵ For a recent survey of the literature on the costs of inflation cf. Clive Briault: The Costs of Inflation, in: Quarterly Bulletin of the Bank of England, February 1995, pp. 33-45. An early theoretical analysis of the costs of inflationary monetary policy which is still remarkable is provided by F. A. Hayek: Prices and Production, 2nd ed. (1935), London: Routledge and Kegan Paul.

⁶ Cf. for instance Stanley Fischer: The Role of Macroeconomic Factors in Growth, NBER Working Paper No. 4565, 1993 and Javier Andrés and Ignacio Hernando: Inflación y Crecimiento a Largo Plazo: Evidencia Para la OCDE, Bank of Spain, 1995, mimeo. A recent survey is provided by Clive Briault, op. cit.

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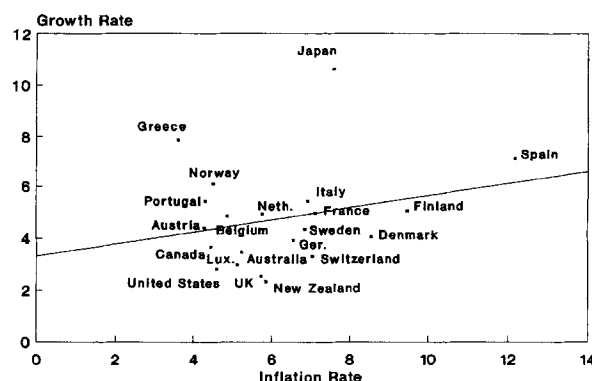
rates. One such factor is real growth. As Balassa and Samuelson have shown,⁷ a country with relatively high productivity growth will experience a real appreciation if productivity growth is generally higher in the tradeables than in the non-tradeables sector.⁸ This theory has been supported by empirical studies.⁹ Thus, there is a positive link between growth and the real exchange rate. If exchange rates are free to move, real appreciation can be brought about by exchange-rate changes. But in a fixed exchange-rate system, real appreciation corresponds to a higher inflation rate (lower depreciation rate) in the appreciating country. Thus, there is a positive relationship between inflation and growth in systems with pegged currencies – the causation running from growth to inflation.

Bretton Woods

Like many other economists,¹⁰ Barro chose for his study a period starting in 1960. For a number of years, this period was characterized by fixed exchange rates for most industrialized countries. During the 1960s nearly all of them had pegged their currencies under the Bretton Woods system. After the breakdown of Bretton Woods, there were a number of attempts by European countries to peg their currencies which proved successful – at least temporarily. Given the great weight of fixed exchange rates in the past, it could even have been expected that an empirical investigation of inflation and growth would render a positive relationship between the two variables. The finding that such a positive relationship cannot be observed is due to the fact that many countries abandoned fixed exchange-rates in 1973 and that exchange-rate adjustments frequently occurred even when exchange rates were pegged.

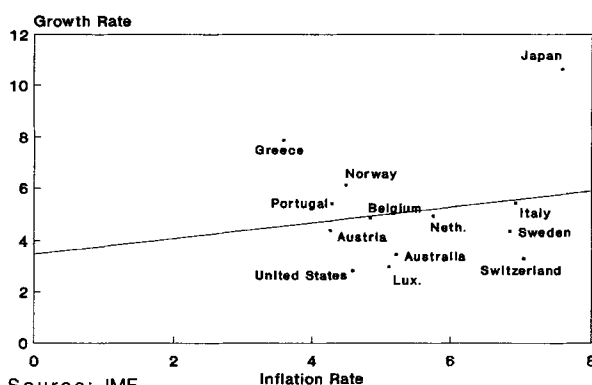
A look at the data displays the importance of the exchange-rate regime. In the 1960s, which were characterized by a high degree of exchange-rate stability, there is a clear positive relationship between growth and inflation (cf. Figure 1).¹¹ If those countries which revalued their currencies in this period (Canada, Denmark, Finland, France, Germany, New Zealand,

Figure 1
Inflation and Growth
1960-1970



Source: IMF.

Figure 2
Inflation and Growth
1960-1970



Source: IMF.

Spain and the United Kingdom) are omitted the value of the X-coefficient (0.3) becomes even higher (cf. Figure 2).¹² In the post-Bretton Woods years the coefficient is slightly negative (cf. Figure 3). However, given the small magnitude of the coefficient (-0.018) and the low t-value (-0.44), there seems to be no discernible relationship between inflation and growth for the entire group of countries. This is not

⁷ Cf. Bela Balassa: The Purchasing Power Parity Doctrine: A Reappraisal, in: *Journal of Political Economy*, Vol. 72, 1964, pp. 584-596; Paul A. Samuelson: Theoretical Notes on Trade Problems, in: *Review of Economics and Statistics*, Vol. 46, 1964, pp. 145-154.

⁸ Balassa and Samuelson were concerned with absolute price levels. They tried to explain why the price level is lower in poor countries than in rich countries. However, their theory implies that there will be real appreciation in a country which is catching up. For a different explanation of price levels cf. Irving B. Kravis and Robert E. Lipsey: Toward an Explanation of International Price Levels, in: *Princeton Studies in International Finance*, No. 52, Princeton, 1983; and Jagdish Bhagwati: Why are Services Cheaper in Poor Countries?, in: *Economic Journal*, Vol. 94, 1984, pp. 279-286.

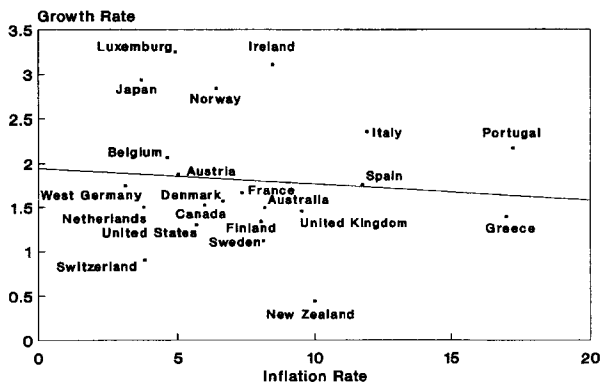
⁹ Cf. Irving B. Kravis and Robert E. Lipsey, op. cit.; Richard C. Marston: Real Exchange Rates and Productivity Growth in the United States and Japan, in: Sven W. Arendt and J. David Richardson (eds.): *Real-Financial Linkages Among Open Economies*, Cambridge, Mass. 1987, pp. 71-96; and Mohsen Bahmani-Oskooee: A Time-Series Approach to Test the Productivity Bias Hypothesis in Purchasing Power Parity, in: *Kyklos*, Vol. 45, 1992, pp. 227-236.

¹⁰ For instance Stanley Fischer, op. cit.; and Javier Andrés and Ignacio Hernando, op. cit.

¹¹ The value of the X-coefficient is 0.23 (t-value: 1.1).

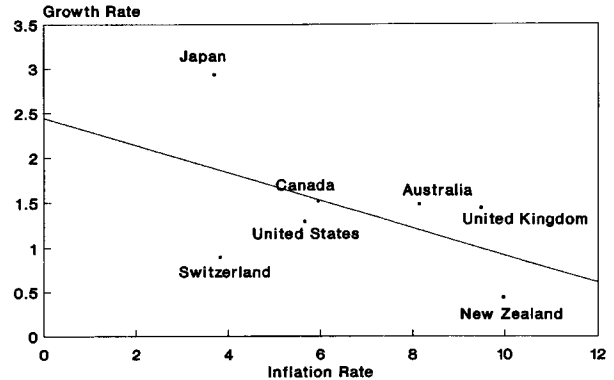
¹² However, the t-value is reduced to 0.6.

Figure 3
Inflation and Growth
1973-1993



Source: IMF

Figure 4
Inflation and Growth
1973-1993



Source: IMF

astonishing because the former member countries followed different strategies after the end of the Bretton Woods system in 1973. There were fixed exchange-rate systems with frequent revaluations and changing membership as well as more or less floating exchange rates. Therefore, it is not possible to single out a group of countries adhering to fixed exchange rates throughout the period.¹³ However, a number of countries had more or less floating currencies. For these countries (Australia, Canada, Japan, New Zealand, Switzerland, the UK and the

USA), the statistical results are better (cf. Figure 4). There is a negative correlation between inflation and growth. However, this result is not very robust, because the number of countries is small and these countries did not always follow a clean float.¹⁴ Still, the result suggests that the costs of inflation become

¹³ The exchange rates between Austria, Germany and the Netherlands were fairly stable throughout this period, but this group is too small for empirically meaningful results to be derived from it.

¹⁴ Still, the results are much better than in the other regressions: the inflation coefficient is -0.15, the t-value is -1.32.

Hans-Eckart Scharrer (ed.)

Economic and Monetary Policy Cooperation: The EC and Japan

Any meaningful discussion about "managing macroeconomic interdependence" must take into account the national policy objectives, institutional arrangements, and socioeconomic challenges. This collection of papers presents seven contributions of European and Japanese economists relevant to that issue.

Peter Bofinger analyzes potential conflicts between policy coordination on the European and international levels. The following studies deal with the scope and limits of multilateral coordination from the points of view of the United Kingdom (Richard Brown) and Germany (Beate Reszat). Two other papers address more specifically the processes of exchange rate decision-making and coordination in Germany (Jochen Michaelis) and the EMS (Peter Bofinger). The final two articles take up the Japanese dimension, focussing at important current and long-term issues of fiscal (Yukio Noguchi) and monetary (Kazumasa Iwata) policy. The volume is of interest to economists, political scientists, and all active observers of European, Japanese, and international economic policy.

1994, 176 p., paperback, 48,- DM, 355,50 öS, 48,- sFr, ISBN 3-7890-3419-3
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visible when countries with flexible exchange rates are analysed and that these costs are much higher than Barro's estimates.

Statistical Results

Generally, it has to be kept in mind that most countries did not adhere to a "clean" exchange rate policy over longer periods. Floating was often mixed with exchange-rate targeting and central bank intervention and fixed exchange rates were often characterized by revaluations. Therefore, it is difficult to separately perform rigorous tests of the proposed relationship for fixed and floating exchange rates. Still, given the evidence of the relationship between growth and the real exchange rate, it is hard to dispute the fact that the exchange rate regime matters. Although none of the statistical results was significant, they exhibited the expected sign. For those countries whose currencies were rigidly tied by fixed exchange rates in the 1960s there is a positive relationship between inflation and growth. In countries with floating currencies this relationship is negative. Therefore, a test of the relationship between growth and inflation is likely to understate the costs of inflation whenever some of the countries analysed have – at least temporarily – pegged their currencies.

More reliable information could be obtained if the simple regression of growth on inflation were replaced by a test of a complete growth model which also incorporated the exchange-rate regime. However, such a test would run into the same difficulty as that described above – namely that since the early 1970s very few countries adhered to truly fixed exchange rates or a clean float. Thus, the most solid empirical evidence in favour of the hypothesis that most estimates of the cost of inflation are downward biased may well be the results concerning the relationship between growth and the real exchange rate. If the Balassa-Samuelson hypothesis holds, higher growth translates (*ceteris paribus*) into higher inflation in fixed exchange-rate systems.

Endogenous and Exogenous Inflation

Still, it may be argued that it is not appropriate to define two separate kinds of inflation: "endogenous" and "exogenous" inflation. After all, if inflation has negative effects on growth, these effects should become visible in an empirical study – no matter what kind of inflation exists. However, it should be noted that the endogenous inflation described above is only just another way of bringing about changes in relative prices. If the exchange rate is fixed and the price of

tradeables is determined in world markets, a change in the relative price of tradeables and non-tradeables (= change of the real exchange rate) can only be brought about by changes in the prices of non-tradeables. In this case, the overall price level moves in the same direction as the price for non-tradeables. Suppose, for instance, that in country A, productivity is constant in the non-tradeables sector but is rising in the tradeables sector. In the rest of the world, on the other hand, productivity in both sectors is constant. If exchange rates are fixed, the price of tradeables is determined in world markets. Therefore, the rising productivity of labour will increase the nominal wage rate in the tradeables sector. Given an integrated national labour market, the wage rate has to be equal in both sectors. Therefore, wages will rise in the non-tradeables sector as well. With constant productivity this leads to higher prices for non-tradeables. Higher prices of non-tradeables lead to a higher price level and – if productivity differences persist – a higher inflation rate.¹⁵ However, this higher inflation rate has an allocative function. Rising wages in the tradeables sector are like a constant pull, attracting labour from the non-tradeables sector. Therefore, wages and prices in the non-tradeables sector have to rise in order to keep labour in the non-tradeables sector. Such "inflation" has little in common with inflation which is caused by monetary policy and which distorts relative prices and the allocation of capital.

Does this mean, that inflation is not "always and everywhere a monetary phenomenon"? Not necessarily. As long as Friedman's dictum is applied to entire currency areas, it still holds. Under the Bretton Woods system, the average inflation rate in the participating countries was determined by monetary policy in the United States. Therefore, average inflation in the participating countries was a monetary phenomenon. However, the relative inflation rates of those countries which pegged their currencies to the US-dollar were determined by real factors. So, when measuring the negative effects of inflation, only independently floating currency areas should be compared. Countries which peg their currencies should be treated as one unified currency area. As long as this is not taken into account, estimates of the costs of inflation are bound to be downward biased.

¹⁵ It is sometimes stated that both inflation and growth are endogenous in the presence of supply shocks (cf. Stanley Fischer, *op. cit.*, ch. 6; and Clive Briault, *op. cit.*, pp. 40-41). However, this is only the case if there is a series of (either positive or negative) shocks and if monetary policy is accommodating.