

Is Asia different?

New Evidence on the Globalization – Inflation Nexus

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This version: March, 2009

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Abstract:

This paper brings new evidence on the link between globalization and inflation. Looking at the evidence for the 1980 – 2006 period, it is shown that inflation dynamics linked to the globalization process are different in Asian developing countries, compared to developed OECD countries.

Key-words: Globalization; inflation; developed countries; developing countries

JEL Classification: C13, C23, E31, E58, F15, F41

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1. Introduction

The role of globalization as a check on inflation has recently attracted the attention among academics (see e.g., Ball 2006, Rogoff 2006, Kohn 2006). It is true that inflation in both the developed and the emerging economies has witnessed a sharp deceleration since the 1980s, and that it remains subdued, despite temporary spikes in the prices of liquid fuels and / or raw materials. The parallelism between this recent wave of globalization and the reduction in inflation has led to a perception that the determinants of the slowdown in inflation were not only the domestic ones but could be part of the fruits of globalization. If one takes into account the liberalization and deregulation of markets (Razin and Loungani, 2005a, b), the international competition leading to faster growth of productivity, an increased labour supply and the resulting check on wage pressures (Borio and Filardo, 2006), sound fiscal policies (IMF, 2006) and the improved governance of monetary authorities (Crowe and Meade, 2007), it depicts factors that may have led to the fall of inflation across countries.

However, some evidence reveal that inflation has also declined in countries where institutions have not yet been liberalized, in countries where central banks are less independent and where the quality of governance has not shown any significant positive change¹.

Hence, to assess the impact of globalization on inflation, one can gain by comparing different sets of regions and countries. As it can be argued that globalization can reduce inflation in developed (high cost) countries, thanks to cheap imports from developing (low cost) countries, it may be the case that, in the low cost countries, the unification of markets has triggered raising prices of tradable goods. Given the size and role of Asian countries in international trade, comparing the inflationary impact of globalization in these and in

¹ Notably, inflation in Africa, Latin America and in transition economies, where reforms have not gone at the same pace as in other parts of the world, declined from high double and even triple digits to single digits (see Rogoff, 2003, and Daunfeldt and de Luna, 2008).

developed countries is thus an important piece of evidence to be added to the debate on the benefits of globalization.

The aim of this paper is twofold. First, we observe if inflation dynamics are affected by globalization in otherwise different countries (Asian developing countries and OECD countries). Second, how different are the impacts, if any? This makes it distinct from the earlier studies undertaken on the issue. To the best of our knowledge, so far the research has mostly taken into consideration the developed countries². However, given the role of emerging economies and particularly of Asia in international trade over the last decades, it implies that a part of the evidence may still be missing³. Therefore, this study relies on the annual data of a mix of 37 Asian and developed countries⁴. We estimate the model for the whole sample and for the two different sub-samples. As liberalization and openness of trade started in the 1980s, our sample period expands over 1980 to 2006.

Accordingly with the literature on the topic, we estimate a standard Phillips curve, and compare the results for the whole sample with the ones obtained on the two sub samples. The results confirm a negative impact of trade openness on inflation. However, we exhibit strong differences for the impact of globalization on inflation between the Asian part of our sample, compared with the OECD countries.

The paper is structured as follows. Section 2 discusses some of the channels through which globalization can impact inflation. Section 3 describes the data and the methodology. Consequently section 4 presents the results, while section 5 concludes.

2. Globalization Channels

Though globalization is not a new phenomenon, both the scope and the rate of change of the globalization process seem to have increased over time (Taylor 2006). Global trade and the flows of FDI have witnessed significant increase since the early 1980s (IMF, 2006), and no open economy can be figured out to be unaffected by the process. However, the manifold

² See, e.g., Allard (2007), Ball (2006), Milani (2008), Rogoff (2006).

³ Emerging Asian countries exports account for more than one-third of world trade flows.

⁴ It includes 21 industrialized countries of the world and 16 developing countries particularly from Asia and Middle-east.

impacts of globalization can be different from one country to the other, depending on the structure of the economy, and thus of the relative strength of (notably) the following channels.

First, globalization has a direct impact on inflation through import prices. With the integration of economies of different nature (say, the low cost and the high cost economies), the flow of low cost imports dampens the inflation in the high cost countries – countries having a high cost of production due to high wages and prices. This ‘trade integration’ channel is probably the basic channel through which globalization influences inflation, and the decline in the past two decades’ inflation is also usually referred to be the result of this effect. Moreover, even if, as observed by Rogoff (2006), this channel may impact the relative price and not the absolute price level, it is reinforced as globalization also puts a check on the central banks’ ability to ‘grease the wheels’ of the economy through expansionary policies (Rogoff, 2003).⁵

As a second channel, one has to notice that labour markets also play a vital role in the transmission of the impact of globalization to inflation. Due to the integration of labour markets, the huge influx of labour from the low-cost countries has resulted into an ease in the wage pressures in the high cost countries, which consequently drags the cost of production down and dampens inflation (IMF, 2006).

The third channel works through the enhanced competition process: where the markets are integrated, stronger competition leads to technological progress and extends the scope of the economies of scale. Thus the profit margins are squeezed and this may put a downward pressure on inflation (IMF, 2006; OECD, 2006). Stronger competition due to globalization affects the balance between the global supply and demand of goods and services and may help contain inflation, at least as long as the emerging economies produce more than their domestic demand. This channel is completed through the capital markets integration, which results into a greater availability of credit, thus affecting the aggregate demand (Glatzer et al. 2006).

A fourth channel has not yet been discussed in the context of globalization. It is the export-price channel. Globalization merges markets across the globe and may help provide cheaper

⁵ Note that this channel can be reinforced by an expectations-led one: globalization may dampen expectations if and when agents believe that it results into a decline in inflation. This is all the more true that agents trust the monetary authorities to be more proactive to target and to control inflation in such a context.

goods to high cost countries. However, at the same time, it gives extra incentives to exporters in the low cost countries, where either the goods are produced at low cost because of a cheap labour force or due to the low purchasing power of the inhabitants. In a scenario where globalization reinforces the sensitivity of domestic prices to international demand and supply, high prices in the high cost countries with high per capita incomes induce some rent seeking by low cost producers. This raises the prices of those goods in the low cost countries and pushes the domestic inflation up.

This last channel in particular pleads for different strengths of the globalization impact in different types of countries, but the other channels too. In a nutshell, then, the question appears to be: One world, one inflation, with different pockets of different sizes? The following sections provide evidence supporting a positive answer to this question.

3. Data and methodology

We estimate a standard Phillips curve with the data from IMF, CHELEM and OECD data bases, for the period 1980 to 2006. The data covers 37 countries including 21 industrialized countries and 16 developing countries from Asia. We estimate the Phillips curve equation for (1) the pool of 37 countries, (2) the 21 developed countries and (3) the 16 Asian developing countries.

We use annual data for all the countries, for inflation rate based on consumer price index (CPI), real GDP, import prices and export prices. However, we also use some computed variables including output gap and trade openness. We detrend the log of real GDP using the Hodrick & Prescott filter method to estimate output gap, whereas trade openness is computed as per IMF defined methodology, where trade as a percentage of GDP is considered as a measure of trade openness.

$$\text{Trade Openness (TO)} = \frac{\text{Exports + imports}}{\text{GDP}} \times 100 \quad \rightarrow \quad (1)$$

We initialize our estimation with a baseline model:

$$\pi_{it} = \alpha_i + \beta_0 \pi_{it-1} + \beta_1 y_{it} + \varepsilon_{it} \quad \rightarrow \quad (2)$$

Phillips curve, as in equation 1, relates the current consumer price index (CPI) inflation π to its own lag and to the output gap (y). Our baseline equation reflects the impact of output gap on inflation, and also that of the inflation persistence. However, in a later stage we augment the baseline equation by introducing other explanatory variables including import prices, export prices, trade openness, in presence of some instrumental variables as well (see equation 3).

$$\pi_{it} = \alpha_i + \beta_0 \pi_{it-1} + \beta_1 y_{it} - \beta_2 TO_{it} + \beta_3 Ip_{it} + \beta_4 Ep_{it} + \varepsilon_{it} \quad \rightarrow \quad (3)$$

Where:

π : Consumer Price Inflation

y : Output gap

TO : Trade Openness

Ip : Import Prices

Ep : Export Prices

Initially, we estimate the Phillips curve equation by OLS method. However, the presence of fixed effects and the inclusion of the lagged independent variable as an explanatory variable, result in inconsistent OLS estimates. We thus introduce instrumental variables. Some estimates were also run using Arellano and Bond's (1991) GMM, notably in sub-samples estimates, where the number of countries can be superior to the sample period.

4. Empirical evidence

Results – Part 1:

It is usually admitted that in the long run inflation is determined by the central banks (monetary authorities); however in the wake of new dynamics in the global economy particularly in shape of the trade integration and rising openness, the monetary policy and its affectivity might not go unquestioned. The consequences of increasing trade and globalization for the monetary policy are yet to be quantified, though there could be theoretical

deliberations. Besides many other issues in estimating the impact of globalization on inflation, the foremost is the exact variable of globalization, which to our knowledge doesn't exist so far. Nevertheless, various proxies have been under use in different studies to capture the maximum possible information regarding globalization and to measure its impacts thereof.

As stated earlier, we use the measure of trade openness and import/export prices for this purpose; however, our findings suggest that while there remained shortcomings of data, especially on import prices for some of the developing countries in our sample; trade openness can be considered a better proxy for globalization at present. The following section describes the results.

Inflation Sensitivity to Output Gap Changes:

Increasing international trade shifts the determinants of demand for local goods from the local to the international market forces, thus limiting the ability of making the pricing decisions by the local producers. This in turn makes domestic inflation less sensitive to the domestic changes in the business cycle. That is why, despite Rogoff's (2006) claim of a steep Philips curve, many hold for its flattening (IMF 2006; Ball 2006).

Though our results also support to a greater extent the flattening of the Phillips curve, we don't dwell on this point further, as this question does not fall under the scope of this particular study. Nevertheless, it is worth mentioning that we found inflation sensitive to the output gap changes, however the impact remains small and in some cases insignificant. The change elasticity in inflation due to output gap was found even stronger in case of the developing countries. This result is comprehensible if interpreted from the perspective of relatively unstable output and inflation in the developing countries. Weak institutions, less credible central banks and vulnerable economic conditions in the developing countries instigate the investment decisions of the firms more sensitive to the inflation expectations and output trends. However, this still doesn't answer the question of the impact of globalization on the domestic inflation, which may pass through the import and export prices and through increasing openness.

Import Prices and Inflation:

Import price effect is one of the most important and direct source for globalisation to impact the domestic inflation. The integration of economies promotes competition and results into a

flow of low cost imports to the high cost countries, which thereby dampens inflation in the high cost countries. Although the decline in inflation during the past two decades is also usually referred to be the result of this effect, this may also be due to several other reasons including prudent monetary policies by the central banks and the explicit or implicit inflation targeting strategies of the monetary authorities particularly in the developed countries (IMF 2006).

Relative prices have both direct and indirect effects on the absolute prices and in turn on general price level. Whereas, some suggest that relative prices have no impact on inflation, we strongly contradict. Ball (2006) strongly emphasises that “there is no ‘natural’ or ‘obvious’ connection between inflation and relative prices”. Irrespective of the debate about whether it being a fiscal or a monetary phenomenon, inflation is not only a rise in the prices of some particular commodity or commodities, but that of a set of goods, where the resultant combine effect of change in the prices of these (basket) goods is translated into inflation over that particular period. This combined effect no doubt takes into account the impact of the change in the import prices. In this regards the oil prices shock of 1970s and the one of the recent past could be examples of the relative prices affecting the domestic inflation through not only their second round but through direct effects. In this way the relative price theory cannot even be pointed out as mere an ‘accounting fallacy’. The relative prices do have a natural and obvious impact on inflation, even if in the long run it is the monetary factors that determine the course of inflation, in the short and medium term relative prices play important role in domestic inflation dynamics.

Due to data limitations, we could only look for the effect of import price inflation in the developed countries. Though we could not establish any significant connection in this regard, the results are inclined towards a negative relationship of the import price inflation with the domestic inflation over the period concerned.

Openness and Inflation:

Since 1990s the international trade has witnessed a significant rise, whereas there could be many explanations to this rise, globalization is often regarded as one of the main impetus behind this rise. While, no doubt, it is not a perfect definition of globalization, openness is sometime regarded as a proxy to the increasing international trade in the pretext of

globalization (IMF2006, Ball 2006). We thus use trade openness measure to estimate the effects if any on inflation.

The overall results support the conventional thinking of globalization having a negative impact on inflation. We find the negative and statistically significant relationship between inflation and trade openness for the overall sample. However, the impact is much stronger in the developed countries, which is not unexpected in the perspective of imports from low cost countries.

Export Prices and Inflation:

As stated earlier, we attempt to build a hypothesis, on the basis that as the growing international trade fosters competition, it instigates the exporters from the low cost countries to penetrate the markets of high cost countries. This, no doubt, raises the profit margins of the exporting firms, on the cost of high prices of the same commodities domestically, which in attempt to match the prices in the international markets crowds out the local buyers with relatively smaller purchasing powers in most of the cases. At the same time it may result in increasing the overall inflation *ceteris paribus*.

Our results confirm that the export price inflation played a role in the dynamics of inflation over time. Although the coefficient for the export price inflation is not very high in all the three case scenarios (the overall pool; the developed countries and the developing countries), the relationship remains negative and statistically significant. This negative relationship can be explained in a way that in the wake of growing trade among and within low and high cost countries, as an established fact prices will go down. These are actually the relative prices that may fall, that of the export and the import prices, or at the least, inflation in export and/or import prices may decelerate. However, the rising trade on the back reduced or abolished trade barriers will raise the demand of certain commodities, and the domestic supply now meeting both the external and the internal demand will while on one hand give a push to the domestic output growth will also instigate inflation in the exporting country. For the developing countries, this could be a blessing in disguise only if it concerns the value added or the manufactured exports. In case, where it is mainly the exports of necessities or the food items with less probability of a substantial rise in capacity, will raise the domestic inflation without even reflecting it in the real output growth.

Results – Part 2:

As stated earlier, we estimate the Phillips curve for one overall pool and the two sub-samples. This section sheds light on the results obtained from the estimations thereof.

Pool Estimation⁶

We estimate three different scenarios for the overall pool, both through pooled least square and also by using instrumental variables (see table 1). Our results confirm the conventional thinking of large inflation persistence and also that inflation is positive correlated with the cyclical variations in output. We find highly significant coefficients for the lagged inflation and for the output gap as well. This depicts on one hand that inflation remained mainly influenced by its own base as well as the domestic economic condition played also an important role in the variation in general price level on the other.

However, in the second scenario where we include the variable of trade openness, we find a negative and statistically significant relationship between the trade openness and inflation. This result is interesting in its essence as it reveals the fact that increasing international trade instigates specialization and the optimal utilization of resources and facilitates the economies in their investment concentration decisions basing them on the comparative advantage. Nonetheless, it also establishes that the reduction in the trade barriers also results into a reduction of inflation sensitivity to the domestic economic conditions. We find, though significant results for the output gap coefficient even when regressed in presence of trade openness, we find that the magnitude of the coefficient remains on decline with the introduction of the proxies of globalization.

This is also evident from the third scenario where we include export prices on the right hand side of the equation. As that of the trade openness, we find negative and statistically significant relationship between export price inflation and the overall inflation. This can be

⁶ As a robustness check we also estimate different explanatory variables for the sake of confirming the stability of our estimates. In this regard we used the (i) Freedom House Index (FHI) as a proxy to estimate the impact of political conditions of a country on inflation; (ii) Structural dummy for 1990s probable break due to the rise of global trade; (iii) financial openness measure to estimate the impact of financial globalization; (iii) central bank autonomy index for analyzing the impact of institutional improvement on inflation; and also a dummy for the creditors and debtors on the basis of current account balance. Our estimates suggest that for countries already or becoming free according to FHI globalization placed a check on inflation; however the results are not statistically significant. Financial openness and the structural dummy has shown also a negative relationship with inflation which is statistically significant; whereas current account dummy reveals that countries that accumulates surpluses observed a rise in inflation vice versa (for detail see table XXX in appendix).

justified in the perspective of the flexible exchange rate regimes, mostly existing in our sample. As for a depreciating exchange rate economy, it is likely that a change in export prices may leave the domestic prices to change in opposite direction.

Developed Countries

Our analysis for the developed economies confirms the existing literature. We find a negative relationship between trade openness and inflation which is also statistically significant. By the same token we also find large inflation persistence and the correlation of inflation to the domestic output gap. The results reveal that, being the bigger sub-sample of our pool; the results for the developed countries have largely influenced the overall results of the pool in the former section.

We obtain negative and significant coefficients for all the globalization proxies in relation to inflation. Trade openness has shown a strong negative relationship (significant at 5 percent) with the inflation. The results confirm our hypothesis, that trade openness in the presence of low and high cost countries, may lead to shift the advantage of low prices to the high cost countries and this is visible in the results, as we find a negative and statistically significant coefficient for import prices in relation to inflation. This result is also in line with the earlier observations of the various studies held in this context. It is worth mentioning here that inflation sensitivity to the output variations decline with the inclusion of trade openness in the equation.

Developing Countries

We estimate the same scenarios for the developing countries. This forms an important part of this study, as to our knowledge this aspect of globalization effects has not yet been explored. Our results establish notably large inflation persistence. In all the panel regressions we find a high and highly significant coefficient of the lagged inflation, while the impact of output variations from its potential has also shown visible and statistically significant impact on inflation.

Like in the earlier estimations we also find a negative relationship between trade openness and inflation for the developing countries, which affirms the conventional thinking. This result is interesting in its essence as it reveals that globalization has played a positive role in reducing the inflation also in the low cost countries; however, it should also be kept in

preview that this could also be on one hand due to the fine tuning of the financial the monetary institutions, and due to the over-increasing trade, on the other hand, from some of the emerging market economies included in the sample particularly China.

5. Conclusion

Precise quantification of the impacts of globalization on the economies, irrespective of their structure, will remain a question yet to be answered, where the reasons on one hand are the limitation of data for most of the developing countries, while on the other hand the exact measure of globalization is also not possible so far. However, studies have used different measures as proxies for globalization and have drawn some inferences as well on the basis of those estimates. This study also encompasses various measures of globalization to estimate the impact of globalization on inflation but unlike the previous studies it is not only to measure the impact in developed countries but also in the developing countries.

The debate of relative price impact stands well acknowledged in this study as our hypothesis that for the developing countries globalization may have an impact on domestic inflation in the developing countries establishes. This while reveals several other fact including the general consensus that globalization leads the firms to sacrifice their profit margins in the wake of growing competition in the global market , also confirms that the relative prices of the commodities in the measure-basket of inflation have an impact on the overall price level. We find that through the export prices, globalization has a negative impact on domestic inflation for both the developed and the developing countries' clusters in our sample; however the impact is stronger in the developing countries. This evidence suggests that in a competition among various economies with different economic structures and conditions the masses would be paying for the margins of exporter firms.

Our estimates imply that globalization effect the domestic inflation negatively despite strong inflation persistence and also reveal the fact that with the growing international trade the inflation sensitivity to output gap is on decline. Thus in this way globalization does not only have an incentive for the inflation targeting central banks of mostly the developed countries but also for the multi-objective pursuing central banks of developing countries.

Table 1: Estimation for the Pool of 37 Developed and Developing Countries

	Dependant Variable											
	(π) CPI Inflation						Δ CPI Inflation					
	Pooled Least Squares			IV			Pooled Least Squares			IV		
Lagged Inflation	0.87*** (17.8)	0.61*** (6.8)	0.74*** (10.7)	0.65*** (7.5)	0.64*** (5.4)	0.66*** (5.7)	-0.38*** (-4.3)	-0.39*** (-4.3)	-0.26*** (-3.8)	-0.34*** (-4.2)	-0.35*** (-4.2)	-0.26*** (-3.6)
Output Gap	0.12* (1.7)	0.14** (2.2)	0.07 (1.2)	0.55*** (3.29)	0.18** (2.37)	0.17** (2.14)	0.14** (2.16)	0.14** (2.14)	0.07 (1.19)	0.51*** (3.7)	0.51*** (3.7)	0.38** (2.5)
Trade Openness		-0.03* (-1.55)	0.02 (1.00)		-0.06* (-1.60)			-0.03 (-1.52)	0.02 (1.00)		-0.02 (-1.13)	-0.02 (-0.23)
Export Prices			-0.04* (-1.54)			-0.52* (-1.92)			-0.04 (-1.54)			0.02 (0.14)
R-squared	0.78	0.81	0.85	0.82	0.84	0.84	0.23	0.23	0.15	0.1	0.1	0.08
Durbin-Watson stat	1.99	1.74	2.1	1.99	1.92	2.0	1.74	1.74	2.12	2.03	2.02	2.16
Cross-sections	37	37	36	36	36	36	36	36	36	36	36	36
Total pool	932	899	776	870	721	718	906	873	776	870	840	738

White diagonal standard errors & covariance (d.f. corrected)

T Statistics in paranthesis

*** Significant at 1 %; ** significant at 5%; * significant at 10%.

Table 2: Estimation for the Developed Countries

Dependent Variable: CPI Inflation				Dependent Variable: 1st Difference of CPI Inflation												
Methodology :	Pooled Least Squares				IV				Pooled Least Squares				IV			
Lagged Inflation	0.8*** (22.7)	0.8*** (23.0)	0.8*** (21.3)	0.8*** (21.2)	0.8*** (26.1)	0.8*** (20.0)	0.7*** (18.2)	0.7*** (21.2)	-0.11*** (-5.8)	-0.12*** (-5.9)	-0.13*** (-5.9)	-0.13*** (-5.9)	-0.13*** (-6.5)	-0.13*** (-7.0)	-0.23*** (-6.6)	-0.25*** (-7.4)
Output Gap	0.2*** (5.1)	0.2*** (5.1)	0.2*** (4.3)	0.2*** (4.3)	0.3*** (4.4)	0.2** (2.3)	0.2** (3.3)	0.2** (3.0)	0.19*** (4.13)	0.19*** (4.21)	0.18** (3.6)	0.18** (3.6)	0.16** (2.5)	0.17** (2.7)	0.23** (3.1)	0.21** (2.7)
Trade Openness		-0.01 (-0.3)	0.03* (2.0)	0.03* (2.0)						0.03 (1.5)	0.06** (2.5)	0.06** (2.5)		0.03* (1.9)	0.10* (1.8)	0.04 (0.4)
Export Prices			-0.02 (1.4)	-1.7 (0.6)												
Import Prices				1.7 (0.6)												
R-squared	0.88	0.88	0.88	0.88	0.87	0.84	0.85	0.86	0.2	0.2	0.23	0.23	0.21	0.22	0.28	0.36
Durbin-Watson stat	1.96	1.97	2.04	2.04	2.03	1.98	2.04	2.05	1.97	1.98	2.05	2.05	2.04	2.05	2.04	2.01
Cross-sections	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Total pool	506	481	457	457	487	463	437	453	506	481	457	457	486	463	442	439

White diagonal standard errors & covariance (d.f. corrected)

T Stats in paranthesis

Table 3: Estimation for the Developing Countries

Dependant Variable												
(π) CPI Inflation							Δ CPI Inflation					
Pooled Least Squares				IV			Pooled Least Squares			IV		
Lagged Inflation	0.86	0.55	0.72	0.63	0.51	0.74	0.44	0.45	0.28	0.37	0.38	0.27
	(13.9)	(5.0)	(6.8)	(4.8)	(2.6)	(4.5)	(4.1)	(4.1)	(2.7)	(2.9)	(3.0)	(-2.3)
Output Gap	0.09	0.09	0.03	0.59	0.37	0.17	0.09	0.09	0.03	0.59	0.58	0.45
	(1.05)	(1.27)	(0.28)	(2.79)	(2.92)	(1.26)	(1.24)	(1.27)	(0.28)	(2.79)	(2.92)	(1.72)
Trade Openness		0.02	0.02		-0.06			0.02	0.02		0.03	0.02
		(1.22)	(0.97)		(-2.0)			(1.2)	(1.0)		(0.91)	(0.07)
Export Prices			-0.05			-0.11			0.05			0.02
			(-1.1)			(-1.58)			(1.13)			(0.03)
R-squared	0.75	0.79	0.84	0.8	0.8	0.8	0.25	0.25	0.14	0.07	0.08	0.03
Durbin-Watson stat	1.99	1.66	2.04	1.97	1.7	2.0	1.67	1.66	2.09	1.97	1.96	2.12
Cross-sections	16	16	16	16	16	16	16	16	16	16	16	16
Total pool	400	392	319	384	364	389	400	392	319	384	377	304

White diagonal standard errors & covariance (d.f. corrected)

T Stats in paranthesis

1/ Annual CPI Inflation with one lag.

2/ Difference between the lag of actual and the potential GDP.

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