IS MONETARY POLICY IN THE EUROZONE LESS EFFECTIVE THAN IN THE US?

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Abstract

There is a wide consensus that the existence of structural rigidities in the Eurozone reduces the effectiveness of the ECB's monetary policies. In order to test this "ECB-handicap" hypothesis, we perform a meta-analysis of the effects of monetary policies in the US and the Eurozone countries. This consists in collecting the estimated transmission coefficients obtained from published econometric studies. Meta-analysis then allows us to control for a number of factors that can affect these estimated coefficients. We conclude that there is no evidence for the hypothesis that the ECB is handicapped in using monetary policies for the purpose of stabilizing output compared to the US.

JEL Code: E50, E52, E58.

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1. Introduction: the issues

A consensus seems to have emerged that because of the existence of labour market rigidities, monetary policies in the Eurozone are less effective in influencing output than is the case in the US. The argument is quite often phrased as follows: "rigidities in the labour markets tend to limit the pace at which an economy can grow without fueling inflationary pressures" (ECB(2004), p21). Thus when the ECB lowers the interest rate to stimulate the Eurozone economy, this will quickly be transmitted into higher prices with only limited effects on output. Since the US economy is less rigid, the Federal Reserve can more easily stimulate the economy without introducing inflationary pressures.

An influential paper substantiating this view is Angeloni, et al.(2003). These authors came to the conclusion that a one percentage point increase in the short-term interest rate tends to have a substantially stronger output effect in the US than in the Eurozone. In addition, they identified this difference to be due to a significantly higher consumption effect of monetary policy changes in the US as compared to the Eurozone. As an example, we show the effects of monetary policy on output, consumption and investment in the US and the Eurozone as obtained by Angeloni(2003). It can be seen that the output effects of monetary policy changes are more than twice as strong in the US than in the Eurozone, and that most of this difference comes from much larger consumption effects in the US than in the Eurozone.

Table 1: Effect of a one percentage point increase in the short-term interest rate on a number of macroeconomic variables in the US and in the Eurozone

	US			Eurozone		
	1 year	2-years	3-years	1 year	2-years	3-years
CPI	-0.07	-0.41	-1.01	-0.09	-0.21	-0.31
GDP	-0.35	-1.28	-1.37	-0.22	-0.38	-0.31
Consumption	-0.37	-1.35	-1.44	-0.12	-0.23	-0.19
Investment*	-0.31	-1.79	-3.16	-0.34	-1.04	-1.22

Source: Angeloni, et al. (2003)

This evidence has strengthened the perception that while an activist monetary policy such as the one followed by the Federal Reserve during the last decade may be sensible for the US, it is not appropriate for the Eurozone where as a result of rigidities, such an activist monetary policy would barely affect output, while it would mainly lead to more inflation. This view of the relative ineffectiveness of monetary policy in the Eurozone has now become the conventional one and is often formulated in the popular financial press (see e.g. The Economist, (2005), p. 20)).

There is a large literature on the relation between price and wage rigidities and the optimal design of monetary policies. This literature has led to a number of propositions that can be summarized as follows. First, in a world of perfectly flexible wages and prices monetary policy has no effect on output (Woodford(2003)). In such a world, there is also no need for using monetary policy to stabilize output. Second, in a world characterized by price and wage rigidities monetary policy can be quite potent in influencing output at least in the short run (see e.g. Taylor(1980), Fischer(1977), Clarida, et al.(1999)). In fact it is only because prices and wages are rigid that monetary policy can affect output in the short-run. In this sense the view that monetary policies in the Eurozone are ineffective because of the existence of rigidities is surprising. Without rigidities, monetary policy cannot affect output. This leads to a third proposition. The effectiveness of monetary policy depends on the nature of these rigidities. The consensus today is that *nominal* wage rigidities *increase* the output effects of monetary policy shocks. In contrast, *real* wage rigidities *reduce* the effectiveness of monetary policies in affecting output (see Gylfason and Lyndbeck(1994), Tabellini(2001), Soskice and Iversen(2000)). It follows that it is important to specify the nature of the structural rigidities to understand how these affect the transmission of monetary policies. Some rigidities increase the effectiveness of monetary policies in affecting output, others reduce this effectiveness. Thus, the issue of how rigidities affect the effectiveness of monetary policies is an empirical one. In the next sections we turn to this empirical issue.

There is also the issue of the *desirability* of stabilizing output using monetary policies. This issue only arises in a world of price and wage rigidities. There is, however, no consensus among economists whether or not the existence of wage and price rigidities makes active stabilization policies desirable. According to neo-Keynesian thought such policies are desirable (Clarida, et al.(1999)). In the neo-classical view the

existence of rigidities does not justify active monetary policies aiming at stabilizing output (Goodfriend and King(2001)).

The issues of optimal response of monetary policy are outside the scope of this paper. Instead we will focus on the empirical question of the effectiveness of monetary policies in affecting output. More precisely, we will study the issue whether the effectiveness of monetary policies in the US and the Eurozone differs. Since the nature of the labour market rigidities is quite different between the US and the Eurozone, it is natural to ask the question of whether these differences translate into differences in the transmission of monetary shocks into output and prices.

2. A meta-analysis of the effects of monetary policy in the US and the Eurozone

The econometric analysis of the effect of monetary policies has changed considerably during the 1990s mainly as a result of the advance of econometric techniques, and in particular as a result of the increasing use of VAR and SVAR techniques. This has led to a proliferation of econometric evaluations of the effectiveness of monetary policies in many countries.

In order to test the hypothesis that the effectiveness of monetary policies in changing output is systematically lower in the Eurozone as compared to the US we will use a "meta-analysis". This technique is frequently used in medical sciences and has sporadically been used in economics (see e.g. Rose(2004), Knell and Stix(2003), Nijkamp and Poot(2004))[1]. The objective of this analysis is first to statistically analyse the estimated effects of monetary policy shocks on output and prices, and second to identify the factors that can explain the differences in these estimated effects.

The way will proceed is to first collect data on the parameters that measure the effect of monetary policy on output and prices and that have been estimated in econometric studies. We will distinguish between the short-term effects and the long-term effects on output and price levels. The parameters collected from these studies will then be used as the dependent variable in an econometric analysis that aims at explaining the variation in these parameters.

[1] See Stanley(2001) for a critical analysis of the use of meta-analysis in economics.

2.1 The data

The source of the data we use are the empirical studies on the effects of monetary policies. We restricted the empirical studies to those published after 1990. The main reason is that during the 1990s the new econometric technology using VARs came into use in studies evaluating monetary policies. Since this has become the new state-of-the-art econometric technology we decided to restrict the analysis to a period in which this technology was introduced.

We used a search of Econlit and also searched in well-known discussion paper series (NBER, CEPR, CESifo) and the discussion paper series of central banks. We obtained 83 studies that report numbers on the effect of monetary policy. There are of course many more papers that analyse the transmission of monetary policies, but many of these papers provide no or incomplete quantitative evidence of the effects of monetary policy, or report results that cannot be made comparable to other results.

We were interested in four different parameters measuring the effect of monetary policy. These are

- The short-term effect on output
- The long-term effect on output
- The short-term effect on the price level
- The long-term effect on the price level

We decided that the effects after one year measure the short-run, while the effects obtained after five years measure the long run. We would have liked to use a longer time span. However, very few studies report effects exceeding five years. In some studies the longest time span is even shorter than five years.

The way the empirical results are reported is far from harmonized. The VAR and SVAR studies report impulse response functions that measure the impact of a monetary policy shock (typically a short-term unanticipated interest rate increase) on output and prices. We harmonized these numbers so that each number measures the

effect of a 1% increase of the interest rate on output and the price level at the respective horizons[2].

There are very few studies that use the money stock as the policy variable. Almost no VAR or SVAR studies use the money stock. As a result, we restrict the analysis to those studies that use the interest rate as the policy variable.

There are also a number of studies using structural econometric models. These studies typically report the effect of a monetary policy shock on output (prices) as the difference between the simulated output (price) level obtained with and without the policy shock[3]. We used these numbers and applied the same harmonization so that these parameters measure the effect of a shock in the interest rate (money stock) of 1%.

Many of the 83 studies selected report results for more than one country. As a result we obtained 278 parameters measuring the short-term and long term output effects of monetary policy shocks. For the effects of monetary policy on the price level we only obtain 185 parameters because a number of studies focus only on the output effects of monetary policy.

2.2 Some descriptive statistics

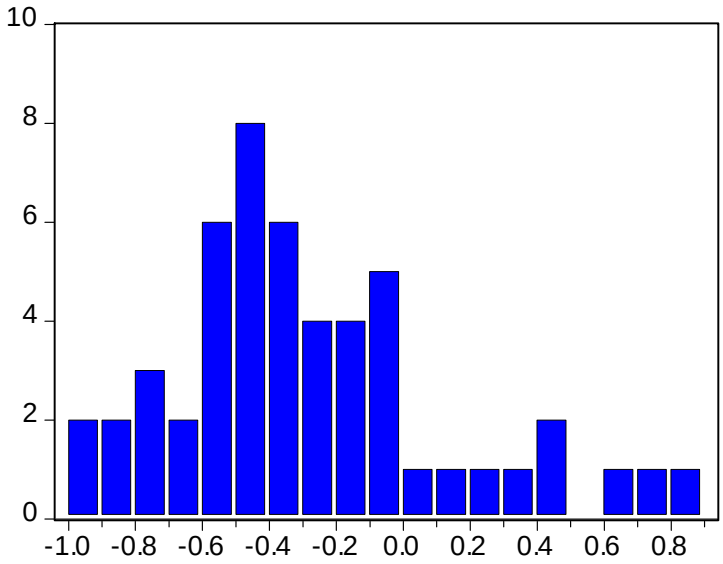
Before engaging in the econometric analysis it is useful to present some descriptive statistics of the different parameters measuring the effects of monetary policies. We do this in the form of histograms. We first concentrate on the estimated output effects in the US and in the Eurozone countries. In figures 1 and 2 we show the histogram of the short-term and long-term effects of an interest rate increase of 1% in the US and in the Eurozone countries obtained from our sample of econometric studies. We eliminated some outliers, i.e. in the case of the short-term effects all the coefficients lower than –1 and higher than +1, and in the case of the long-term effects all the coefficients lower than –1. However, for the sake of completeness we present the full sample in appendix.

[2] Many VAR and SVAR studies only report the graphs of the impulse response functions. We therefore enlarged these graphs considerably allowing us to measure the coefficients of the impulse response functions with great precision.

[3] Thus the parameter estimates obtained from econometric models do not distinguish between anticipated and unanticipated interest rate shocks. Typically VAR-based estimates relate to unanticipated interest rate shocks.

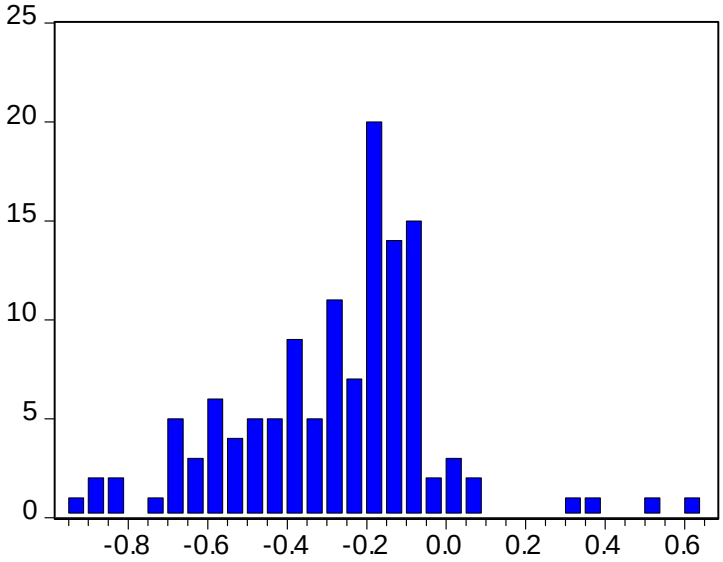
Figure 1: Frequency distribution of the estimated short-term output effect of a 1% increase in the short-term interest rate in the US and in the Eurozone countries

US



Series: OUTPSTUS1	
Sample 12 278	
Observations 51	
Mean	-0.284187
Median	-0.380550
Maximum	0.846154
Minimum	-0.992908
Std. Dev.	0.426118
Skewness	0.891282
Kurtosis	3.542041
Jarque-Bera	7.376606
Probability	0.025014

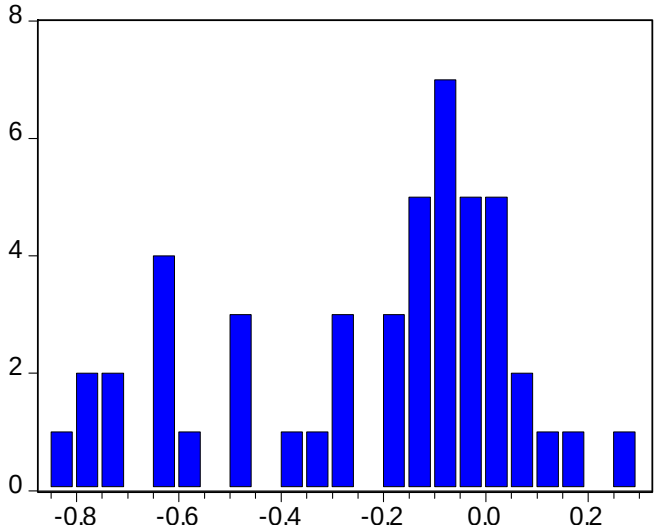
Eurozone



Series: OUTPSTEURO1	
Sample 1 274	
Observations 126	
Mean	-0.283083
Median	-0.250000
Maximum	0.610000
Minimum	-0.911111
Std. Dev.	0.258444
Skewness	0.119816
Kurtosis	4.295974
Jarque-Bera	9.119098
Probability	0.010467

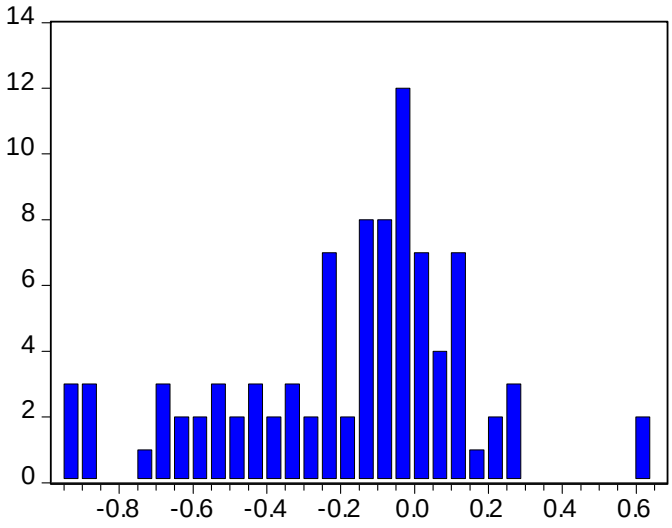
Figure 2: Frequency distribution of the estimated long-term output effect of a 1% increase in the short-term interest rate in the US and in the Eurozone countries

US



Series: OUTPUTLTUS1	
Sample 12 278	
Observations 48	
Mean	-0.232297
Median	-0.143272
Maximum	0.282484
Minimum	-0.831400
Std. Dev.	0.284948
Skewness	-0.627096
Kurtosis	2.279996
Jarque-Bera	4.182809
Probability	0.123514

Eurozone



Series: OUTPUTLTEURO1	
Sample 1 256	
Observations 92	
Mean	-0.187347
Median	-0.110000
Maximum	0.625000
Minimum	-0.950000
Std. Dev.	0.328404
Skewness	-0.484228
Kurtosis	3.116385
Jarque-Bera	3.647230
Probability	0.161441

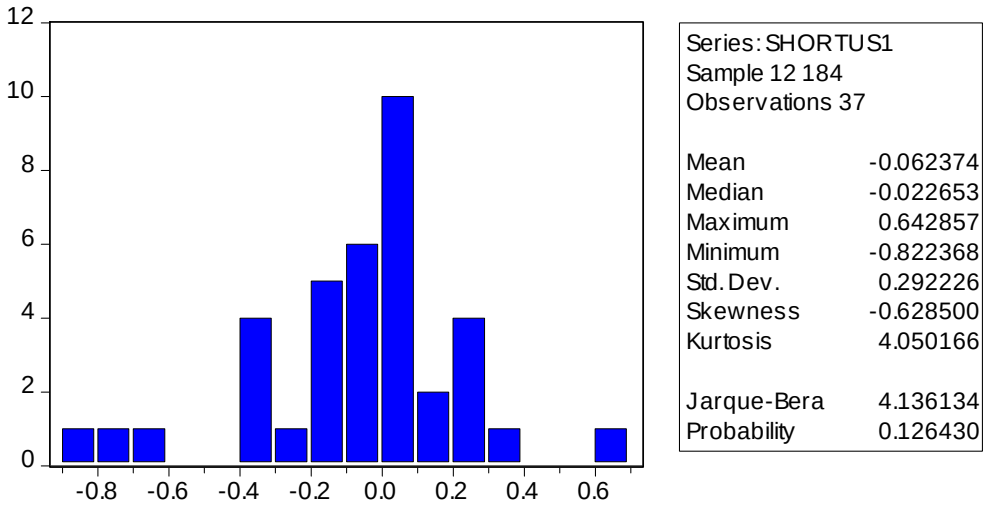
We focus first on the short-term output effects in figure 1 (effect after one year). The most striking result is that the mean coefficient obtained in the US and in the Eurozone econometric studies is almost the same. After one year a 1 % (unanticipated) increase in the short-term interest rate leads to a decline in output of 0.28% in both the US and the Eurozone. We also observe, however, that there is a large variance of the estimated coefficients. One of the purposes of the meta-analysis will be to identify the factors that explain this large variance.

The long-term output effects shown in figure 2 lead to the same conclusions. There does not seem to be much of a difference in the estimated long-term output effects in the US and the Eurozone countries. In addition, the variance in these estimated coefficients is rather high. Note also that on average the short-term output effect is stronger than the long-term effect. However, in the case of the US the difference between the short- and the long run effects is small.

We perform a similar descriptive analysis of the price effects of monetary policies shocks. We show these in figures 3 and 4

Figure 3: Frequency distribution of the estimated short-term price effect of a 1% increase in the short-term interest rate in the US and in the Eurozone countries

US



Eurozone

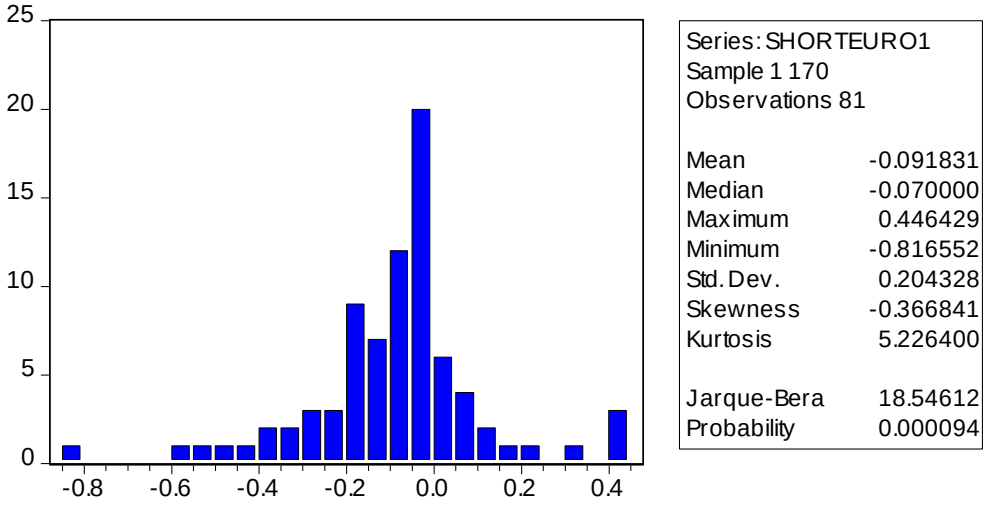
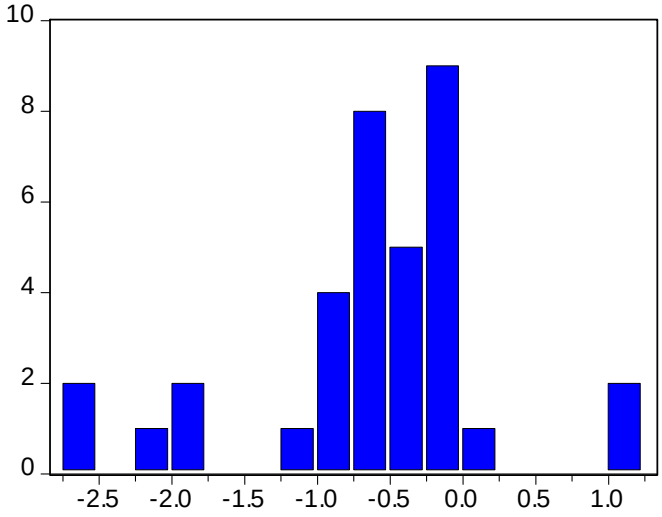


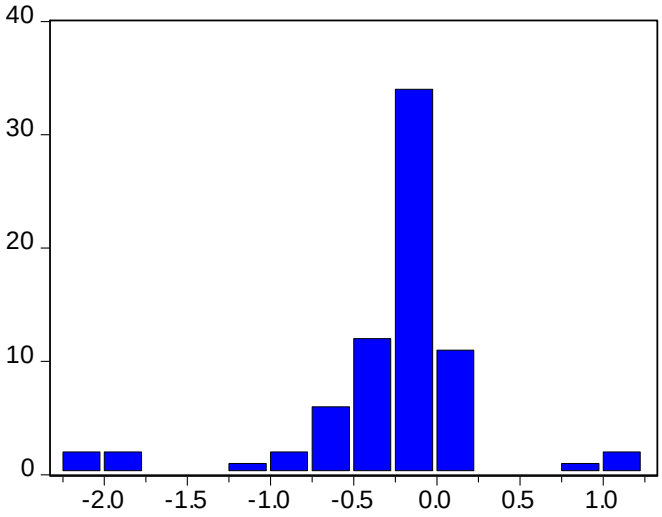
Figure 4: Frequency distribution of the estimated long-term price effect of a 1% increase in the short-term interest rate in the US and in the Eurozone countries

US



Series: LONGUS1	
Sample 12 184	
Observations 35	
Mean	-0.589501
Median	-0.522101
Maximum	1.093333
Minimum	-2.552220
Std. Dev.	0.823684
Skewness	-0.699741
Kurtosis	3.789338
Jarque-Bera	3.764840
Probability	0.152221

Eurozone



Series: LONGEURO1	
Sample 1 170	
Observations 73	
Mean	-0.252795
Median	-0.160000
Maximum	1.010000
Minimum	-2.250000
Std. Dev.	0.546669
Skewness	-1.449747
Kurtosis	7.663393
Jarque-Bera	91.71935
Probability	0.000000

From figure 3 we observe that the mean coefficient measuring the short-term effect of an increase of the short-term interest rate is close to zero in both the US and the Eurozone. The coefficient measuring the long-run effect is relatively large. Thus the econometric studies confirm that there is price stickiness. In the short run monetary policy shocks do not affect prices. These effects appear only in the long run. Note again that the variance around the mean coefficients is very high

From these descriptive statistics one should not draw the conclusion that there is no difference in the transmission of monetary policy shocks between the US and the Eurozone. There are many factors that can influence these estimated coefficients. For example, it could be that the US studies have used different econometric methods than the Eurozone countries, or have been obtained for other sample periods. These different factors have to be identified and controlled for. Only then can we test whether the transmission of monetary shocks in the Eurozone and the US are different. This will be the objective of meta-analysis.

2.3 Econometric analysis: output effects

In this section we specify an econometric equation explaining the different parameters described in the previous section. The purpose is to control for a number of variables that can affect the size of the estimated coefficients and that are unrelated to the hypothesis that we want to test, i.e. that these coefficients are different between the US and the Eurozone countries.

The econometric equation is specified as follows:

$$PS_i = a + \Sigma_k \beta_k D_k + \varepsilon_i \quad (1)$$

$$PL_i = c + \Sigma_k \eta_k D_k + \omega_i \quad (2)$$

where PS_i and PL_i are the observed short-term and long term parameters measuring the effect of monetary policy.

The variables D_k are variables expressing a particular characteristic of the study from which parameter i was obtained or from the country involved. We distinguish between the following characteristics:

- The countries analysed in the study: in this case each country is represented by a separate dummy variable.
- The econometric technique used. We distinguish between five types of econometric methods. The first one uses plain VARs, i.e. the method used to impose identifying restrictions is based on imposing a recursiveness ordering (Choleski decomposition). The second one uses SVARS. This is a VAR method that relies on an economic theory to impose prior restrictions on (some)

parameters of the model. Quite often, this method imposes a restriction on the long-term effect of monetary policy (e.g. a zero restriction on the long-term output effect). The third one, FAVAR, uses dynamic factor analysis and the fourth one, MARKOV uses switching in regimes. Finally the fifth technique relies on traditional econometric modelling[4].

- The variable used to measure output. We distinguish between GDP, industrial production (PROD), and output gap (GAP). Each of these measures is represented by a separate dummy.
- The sample period during which the studies were performed. We distinguish between studies in which the sample period starts in the sixties, the seventies and the eighties. This distinction is introduced to find out whether the coefficients measuring the effectiveness of monetary policy have changed over time. We introduce three dummy variables: SIXTIES, SEVENTIES, and EIGHTIES.
- The exchange rate regime. We distinguished between two exchange rate regimes, fixed and flexible. The countries on a flexible exchange rate regime are the UK, the US, Japan and Germany. The others (EMS countries and emerging countries) were on a fixed exchange rate regime[5].

A final issue concerns the weights given to the different publications. The quality of the different studies is not the same. One would therefore like to adjust for the quality of the studies. It is, however, very difficult to do this without introducing subjective judgment. This could lead to the possibility of a selection bias, whereby the researcher gives a higher weight to those studies, which come close to his priors. We have not attempted to do this. The only quality criterion we have maintained is the length of the sample periods of the different studies[6]. Thus studies that use a longer sample period, and thus more information, receive a higher weight than studies using a shorter sample period. The way we do this is by weighting each study by the length of the sample period (expressed as a percent of the longest sample period). We will present results using both weighted and unweighted data.

[4] There is, of course, scope for further distinctions in the econometric techniques.
[5] One could introduce finer distinctions between different exchange rate regimes. For example, one could use the IMF-classification of exchange rate regimes. This classification has been criticised, however. See Calvo and Reinhart(2000).
[6] Another possible quality criterion could be the significance of the estimated coefficients. The trouble with this is that many studies do not report confidence levels of the estimated coefficients.

We show the results for the short-term output effects in table 1[7]. We have structured the model in such a way that we have one dummy variable for each country. For the other variables (econometric method, output measure, and sample period) we eliminate one of them, i.e. we eliminate VAR, GDP, and SIXTIES. As a result the country coefficients represent the effects of monetary policy in each country in studies using VAR as an econometric method, GDP as a measure of output, with a sample period starting in the sixties. In this way we eliminate differences between countries that have to do with the use of different econometric methods, output measures and sample periods. The coefficients of the remaining variables then measure how different econometric methods, output measures and sample periods affect these country coefficients on average.

We observe that the country coefficients are very similar. We performed a Wald test to test for equality of the coefficient of the US and the Eurozone countries. We show the results in table 2. We find that we cannot reject the hypothesis that these coefficients are equal.

There are a few additional observations one can make from table 1. First, the way output is measured does not seem to affect the size of the coefficients. Second, the use of different econometric methods matters. Studies using structural VARs produce short-term output coefficients that on average are significantly smaller (in absolute value) than the coefficients obtained with VARs. The same is true for studies using econometric models. The opposite holds for studies using VARs that combine dynamic factor analysis. Third, there is some evidence (in the weighted regressions) that the coefficients are smaller (in absolute) value in the studies with sample periods starting in the 1980s.

[7] The variable FLOAT was dropped. We did not find any significant difference between countries with floating and fixed exchange rates.

Table 1: Regression results of equation (1): short-term output coefficients

	Unweighted regression		weighted regression	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
AUSTRIA	-0.38	-2.83	-0.24	-2.93
BELGIUM	-0.31	-2.09	-0.22	-2.46
DENMARK	-0.16	-0.76	-0.15	-1.21
EUROZONE	-0.22	-0.84	-0.22	-1.34
FINLAND	-0.38	-2.64	-0.25	-2.92
FRANCE	-0.32	-2.94	-0.22	-3.42
GERMANY	-0.34	-1.72	-0.30	-2.24
IRELAND	-0.19	-1.02	-0.18	-1.61
ITALY	-0.22	-2.07	-0.16	-2.48
NETHERLANDS	-0.29	-2.13	-0.20	-2.39
PORTUGAL	-0.28	-1.70	-0.18	-1.84
SPAIN	-0.25	-2.03	-0.18	-2.50
SWEDEN	-0.43	-1.95	-0.31	-2.29
GREECE	-0.23	-0.93	-0.24	-1.61
LUXEMBOURG	-0.26	-0.75	-0.19	-0.91
UK	-0.28	-1.38	-0.27	-1.97
US	-0.31	-1.77	-0.25	-2.12
JAPAN	-0.06	-0.27	-0.16	-1.08
AUSTRALIA	-0.31	-0.81	-0.32	-1.35
CANADA	-0.28	-0.99	-0.31	-1.75
EMERGING	0.03	0.25	-0.09	-1.16
IND	-0.04	-0.62	-0.03	-0.67
GAP	0.14	1.16	0.06	0.86
SVAR	0.17	1.88	0.11	2.02
ECON	0.16	2.85	0.07	2.16
FAVAR	-0.29	-1.96	-0.18	-2.01
MARKOV	0.02	0.09	-0.06	-0.55
SEVENTIES	-0.02	-0.19	0.03	0.52
EIGTHIES	-0.08	-1.10	0.07	1.38
MONEY	0.16	1.54	0.13	2.14
FLOAT	0.01	0.05	0.05	0.46
R-squared	0.18		0.15	
S.E. of regression	0.33		0.20	
Sum squared resid	23.3		8.3	
Log likelihood	-61.8		57.1	

Table 2: Wald Test: equality of the US and Eurozone coefficients

Equation (1) weighted regression			
F-statistic	0.255	Probability	0.99
Chi-square	3.320	Probability	0.99

The results of estimating equation (2) for the long-term output coefficients are shown in table 3. A first striking observation is that the long-term output coefficients in the different countries are generally not zero. In many cases they are statistically different

from zero. This is surprising as the generally accepted theory predicts that in the long run the output effects of monetary policy shocks should be zero. This result, however, strongly depends on the econometric method that is used. The country coefficients in table 3 assume the use of VARs. An analysis of the coefficients of SVAR, ECON, FAVAR, and MARKOV reveals that in the studies that use structural VARs and econometric models the long term output coefficients are much lower (in absolute value) and are close to zero. The use of dynamic factor analysis however again leads to an increase in the long-term output coefficients. The fact that the use of structural VARs and econometric models produces results that are in accordance with the theory should not be surprising. These methods typically impose the long-term condition that the output effect is zero.

A comparison of the Eurozone coefficients and the US coefficients reveals that they are of the same order of magnitude. A formal Wald test of equality of the Eurozone and US coefficients was performed. The results are shown in table 4. We find that when we apply the test on all these coefficients we should reject the hypothesis that these are equal. It turns out, however, that if we remove the outlier (Greece in the weighted regression) we cannot reject the hypothesis that the US and Eurozone long-term output coefficients are equal.

From the preceding analysis we can conclude that there is no evidence that the transmission of monetary shocks into output is any different in the Eurozone from the transmission in the US. Both the short-term and the long-term output coefficients in the Eurozone countries and in the US appear to be of the same order of magnitude if we control for differences in econometric methodology, differences in the measurement of output and differences in the sample periods. Formal tests of significance corroborate this conclusion.

Finally it is worth mentioning here that as in the case of the short-term coefficients the size of the long-term output coefficient appears to have declined in the studies using more recent sample periods (after 1980).

Table 3 : Regression results of equation (2): long-term output coefficients

	Unweighted regression		weighted regression	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
AUSTRIA	-0.36	-3.03	-0.24	-3.18
BELGIUM	-0.17	-1.42	-0.15	-1.90
DENMARK	-0.13	-0.83	-0.14	-1.35
FINLAND	-0.14	-1.13	-0.15	-1.88
FRANCE	-0.23	-2.37	-0.16	-2.64
GERMANY	-0.18	-1.17	-0.22	-2.04
IRELAND	-0.17	-1.16	-0.18	-1.95
ITALY	-0.09	-0.96	-0.11	-1.75
NETHERLANDS	-0.29	-2.38	-0.21	-2.65
PORTUGAL	-0.30	-2.19	-0.22	-2.53
SPAIN	-0.20	-1.73	-0.18	-2.44
GREECE	-0.47	-2.18	-0.40	-2.92
LUXEMBOURG	-0.25	-0.84	-0.21	-1.13
EUROZONE	-0.20	-0.93	-0.21	-1.53
SWEDEN	-0.14	-0.76	-0.17	-1.43
UK	-0.10	-0.63	-0.15	-1.40
US	-0.14	-1.02	-0.22	-2.38
JAPAN	0.09	0.48	-0.08	-0.70
AUSTRALIA	-0.24	-0.75	-0.28	-1.34
CANADA	-0.21	-0.80	-0.20	-1.20
EMERGING	-0.15	-1.35	-0.14	-1.88
IND	-0.10	-1.54	-0.06	-1.36
GAP	0.17	1.81	0.10	1.77
SVAR	0.24	3.23	0.14	2.92
ECON	0.16	2.76	0.08	2.26
FAVAR	-0.37	-3.35	-0.14	-2.06
MARKOV	0.12	0.85	0.08	0.85
SEVENTIES	-0.05	-0.74	0.01	0.30
EIGTHIES	0.10	1.41	0.13	2.85
FLOAT	-0.09	-0.77	0.01	0.13
MONEY	-0.16	-1.73	-0.07	-1.21
R-squared	0.26		0.25	
S.E. of regression	0.28		0.18	
Sum squared resid	16.08		6.27	
Log likelihood	-23.27		78.19	

Table 4: Wald Test: equality of the US and Eurozone coefficients

Equation (2) weighted regression			
F-statistic	0.590	Probability	0.85
Chi-square	7.679	Probability	0.86
Equation (2) weighted regression, outlier Greece excluded			
F-statistic	0.395	Probability	0.96
Chi-square	4.743	Probability	0.96

2.4 Econometric analysis: price effects

The hypothesis, as usually formulated, that monetary policies in the Eurozone are ineffective in influencing output has a corollary as far as the transmission into prices is concerned. It implies that a monetary expansion in the Eurozone will be transmitted more quickly and more completely into price increases (see ECB(2004), p. 21). In this section we test this hypothesis. In order to do so, we analyse the short-term and long-term price effects of monetary policies in the US and the Eurozone. We will proceed in the same way as in the previous section. We estimate the econometric model consisting of equations (1) and (2), where PS_i and PL_i now represent the estimated short-term and long-term price effects of monetary policy shocks. A note of warning is necessary here. Because not all the empirical studies of the effect of monetary policies report results of the effects on the price level, we have fewer data points in the sample (185). As a result, the statistical quality of the econometric results is weaker than in the previous section.

We first concentrate on the short-term price effects (equation (1)). We show the results of estimating equation (1) in table 5 both for the weighted and unweighted data. We find that most of the country coefficients are close to zero. None is statistically different from zero. This contrasts with the short-term output coefficients which were found to be statistically different from zero for most countries. These results are in line with a well-known empirical regularity, i.e. that prices are stickier than output. In the short-run (i.e. after one year) prices do not react to monetary policy shocks. This is the case both in the Eurozone countries as in the US.

We also show the results of a formal test of equality of the Eurozone and the US coefficients (see table 6) and we conclude that one cannot reject the hypothesis that these coefficients are equal.

Table 5: Regression results of equation (1): short-term price coefficients

	Unweighted regression		weighted regression	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
AUSTRIA	-0.15	-1.28	-0.05	-0.79
BELGIUM	-0.11	-0.94	-0.04	-0.62
DENMARK	0.002	0.01	0.01	0.04
EUROZONE	0.03	0.16	0.03	0.24
FINLAND	-0.06	-0.47	-0.06	-0.80
FRANCE	0.003	0.04	-0.003	-0.07
GERMANY	0.02	0.19	0.004	0.07
GREECE	-0.06	-0.34	-0.04	-0.39
IRELAND	-0.09	-0.66	-0.03	-0.41
ITALY	-0.03	-0.33	-0.02	-0.35
JAPAN	0.30	2.67	0.15	2.29
LUXEMBOURG	-0.02	-0.08	0.02	0.17
NETHERLANDS	-0.20	-1.64	-0.07	-0.99
PORTUGAL	-0.13	-0.90	-0.04	-0.56
SPAIN	-0.05	-0.41	-0.01	-0.17
SWEDEN	-0.03	-0.17	0.03	0.41
UK	-0.02	-0.20	0.002	0.05
US	-0.06	-1.25	-0.03	-1.21
AUSTRALIA	-0.08	-0.32	-0.04	-0.26
CANADA	-0.27	-1.55	-0.19	-1.95
EMERGING	0.08	1.00	0.020	0.40
SVAR	0.01	0.23	-0.003	-0.11
ECON	-0.02	-0.31	-0.04	-1.02
FAVAR	0.001	0.01	0.01	0.12
SEVENTIES	0.02	0.28	-0.003	-0.08
EIGHTIES	-0.07	-1.11	-0.02	-0.42
MONEY	0.50	2.53	0.42	3.68
R-squared	0.18		0.17	
S.E. of regression	0.24		0.14	
Sum squared resid	8.59		2.81	
Log likelihood	10.18		99.64	

.Table 6: Wald Test: equality of the US and Eurozone coefficients

Equation (1) weighted regression			
F-statistic	0.218	Probability	0.99
Chi-square	2.837	Probability	0.99

The next step in the analysis consists in performing the same analysis for the long-term price coefficients. The results are shown in tables 7 and 8. We now find country coefficients that are statistically different from zero in almost all cases. Thus in the long run (after 5 years or more) monetary policy shocks have significant effects on the aggregate price levels in almost all countries. We also note that the statistical quality

of the regression is higher when we use weighted data (higher R^2 and more significant coefficients). In addition, the country coefficients are more similar in the weighted regressions.

Table 8 shows the result of a formal test of equality of the Eurozone countries' and the US coefficients. We cannot reject the hypothesis that these coefficients are equal. We conclude from this and the results concerning the short-term price effects that there is no evidence that monetary policy shocks lead to a quicker and stronger transmission into prices in the Eurozone than in the US. The hypothesis that Eurozone monetary policy is less effective than US monetary policy because of a quicker and stronger transmission of Eurozone monetary policies into prices has no empirical backing.

Table 7: Regression results of equation (2): long-term price coefficients

	Unweighted regression		weighted regression	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
AUSTRIA	-0.34	-2.13	-0.24	-2.87
BELGIUM	-0.36	-2.29	-0.25	-2.99
DENMARK	-0.22	-0.98	-0.22	-1.80
EUROZONE	-0.26	-0.86	-0.23	-1.46
FINLAND	-0.30	-1.83	-0.22	-2.47
FRANCE	-0.29	-2.33	-0.22	-3.28
GERMANY	-0.29	-2.47	-0.24	-3.81
GREECE	-0.45	-2.05	-0.32	-2.76
IRELAND	-0.27	-1.62	-0.22	-2.49
ITALY	-0.18	-1.63	-0.19	-3.22
JAPAN	-0.06	-0.46	-0.16	-2.24
LUXEMBOURG	-0.37	-1.22	-0.22	-1.39
NETHERLANDS	-0.34	-2.34	-0.25	-3.15
PORTUGAL	-0.33	-1.92	-0.25	-2.79
SPAIN	-0.47	-3.40	-0.33	-4.45
SWEDEN	-0.40	-2.08	-0.28	-2.73
UK	-0.35	-2.84	-0.26	-3.89
US	-0.41	-6.53	-0.27	-8.24
AUSTRALIA	-1.03	-3.40	-0.56	-3.42
CANADA	-1.13	-4.39	-0.79	-5.70
EMERGING	-0.14	-1.36	-0.16	-2.79
SVAR	0.11	1.41	0.06	1.47
ECON	0.16	1.96	0.03	0.72
FAVAR	-0.07	-0.67	-0.02	-0.36
SEVENTIES	0.08	0.80	0.09	1.71
EIGHTIES	0.12	1.44	0.16	3.55
MONEY	1.10	4.59	0.81	6.29
R-squared	0.35		0.43	
S.E. of regression	0.28		0.15	
Sum squared resid	9.41		2.68	
Log likelihood	-8.40		79.21	

Table 8: Wald Test: equality of the US and Eurozone coefficients

Equation (2) weighted regression			
F-statistic	0.435	Probability	0.95
Chi-square	5.657	Probability	0.96

3. Conclusion

The view that the ECB is handicapped by the existence of structural rigidities has now become widely accepted. In this view the ECB cannot use monetary policies to stabilize output in the same way as the US Federal Reserve can. The argument is that the labour market rigidities in the Eurozone countries have the effect of transmitting a monetary expansion quickly into higher prices with little effect on output.

We argued that the effects of labour market rigidities on the transmission process of monetary policies depends on the nature of these rigidities. Some of these rigidities can in fact enhance the short-term output effects of monetary policies. Ultimately the issue of whether the ECB is less capable of influencing output than the Federal Reserve is an empirical one.

We studied this empirical issue by performing a meta-analysis of the effects of monetary policies in the US and the Eurozone countries. This consists in collecting the estimated transmission coefficients obtained from published econometric studies. Meta-analysis then allows us to control for a number of factors that can affect these estimated coefficients, i.e. the econometric methods employed, the sample periods used in these econometric studies, and other characteristics. By controlling for these factors we are able to test the ECB-handicap hypothesis. This hypothesis can then be formulated in two steps. First, if correct one should find that the short-term output effects of monetary policy in the Eurozone countries are systematically lower than in the US. Second, monetary policy shocks are transmitted faster and stronger into prices in the Eurozone countries than in the US. Our empirical analysis allows us to reject these two hypotheses. There does not seem to be evidence for the hypothesis that the ECB is handicapped by the existence of structural rigidities in using monetary policies for the purpose of stabilizing output compared to the US.

These results do not imply that the ECB should be more activist than it has been so far. There are other reasons one could invoke (e.g. maintaining credibility) not to favour such activist monetary policies. The popular argument, however, that because of the existence of rigidities, the ECB is less powerful than the Fed in stabilizing output is unfounded. Therefore, the lower degree of activism of the ECB compared to the Fed cannot be justified on the grounds that the ECB cannot affect output because of the existence of rigidities.

References

Angeloni, I., Kashyap, A., Mojon, B., Terlizzese, D. , (2003), The Output Composition Puzzle: A Difference in the Monetary Transmission Mechanism in the Euro Area en the US, European Central Bank, Working Paper, no. 268, September.

Christiano, L., Eichenbaum, M., Evans, C., (1998), Monetary Policy Shocks: What have we learned? NBER Working Paper no. 6400.

Clarida, R., Gali, J., Gertler, M., (1999), The Science of Monetary Policy, *Journal of Economic Literature*, December.

European Central Bank, (2004) The Monetary Policy of the ECB, Frankfurt.

Fischer, S., (1977), Long-Term Contracts, rational expectations and optimal money supply rules, Journal of Political Economy, 85: 191-206.

Greene, W. (1997), Econometric Analysis, 3th Ed., 1075 pp.

Goodfriend, M., and King, R., (2001), The Case for Price Stability, in Herrero, Gaspar, Hoogduin, Morgan, and Winkler, (eds.), Why Price Stability? Proceedings of the First ECB Central Banking Conference, Frankfurt.

Gylfason, T. and Lyndbeck, A., (1994), The interaction of monetary policy and wages, Public Choice, 79: 33-46.

Knell, M., and Stix, H., (2003), How Robust are Money Demand Estimations? A Meta-Analytic Approach, Discussion Paper no. 81, Austrian National Bank.

Lipsey, M., and Wilson, D. (2001), Practical Meta-Analysis, Sage Publications, London.

Nijkamp, P., and Poot, J., (2004), Meta-Analysis of the effect of fiscal policies on long-run growth, *European Journal of Political Economy*, Vol. 20, 91-124.

Rose, A. , (2004) The Effect of Common Currencies on International Trade: A Meta-Analysis, in von Furstenberg, Monetary Unions and Hard Pegs: Effects on Trade, Financial Development and Stability, Oxford University Press.

Sims, C., (1992), Interpreting the Macroeconomic Time Series : The Effects of Monetary Policy, *European Economic Review*.

Soskice, D., and Iversen, T. (2000), The non-neutrality of monetary policy with large price or wage setters, Quarterly Journal of Economics, 14, 110-124

Stanley, T. (2001), Wheat from Chaff: Meta-Analysis as Quantitative Literature Review, *Journal of Economic Perspectives*, 15(3).

Tabellini, G. (2001), Comment on "The Case for Price Stability" by Marvin Goodfriend and Robert King, in Herrero, Gaspar, Hoogduin, Morgan, and

Winkler, (eds.), Why Price Stability? Proceedings of the First ECB Central Banking Conference, Frankfurt.

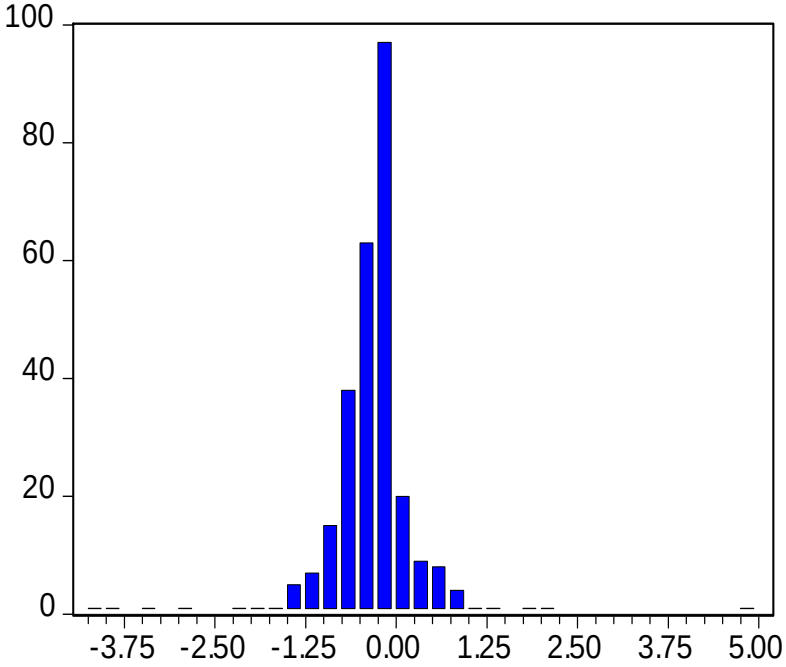
Taylor, J., (1980), Aggregate Dynamics and Staggered Contracts, *Journal of Political Economy*, 88: 1-22.

The Economist, (2005), The Great Thrift Shift. A Survey of the World Economy, September 24, London.

Woodford, M., (2003), Interest and Prices: Foundations of a Theory of Monetary Policy, Princeton University Press.

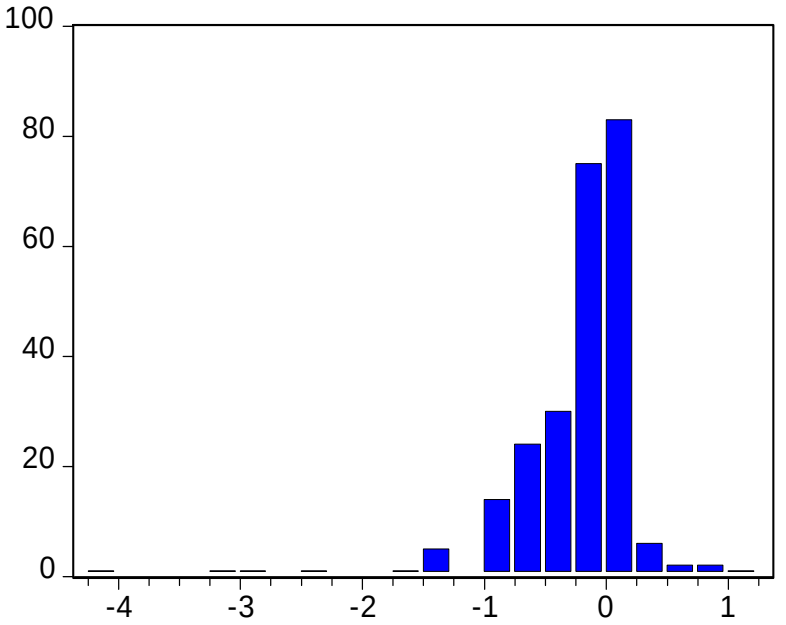
Appendix: Descriptive statistics, full sample

Short-term output coefficients (OUTPUTST), full sample



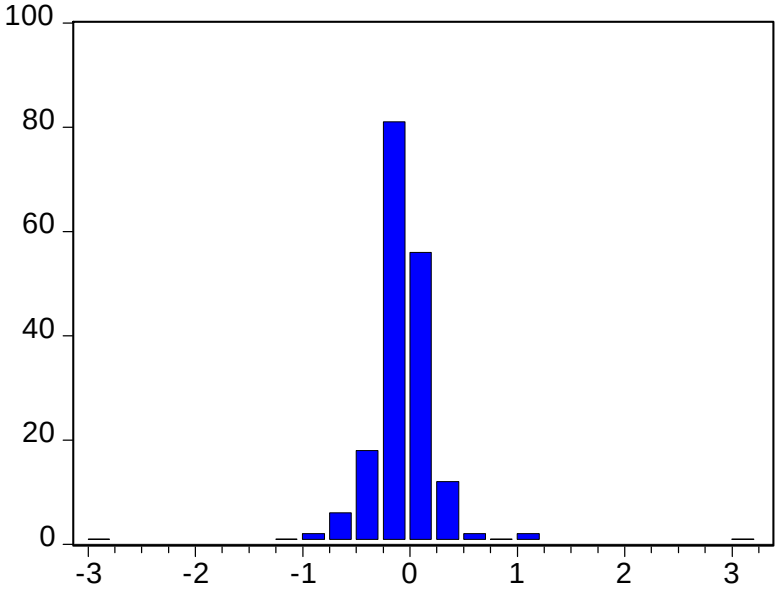
Series: OUTPUTST	
Sample 1 278	
Observations 278	
Mean	-0.297346
Median	-0.250000
Maximum	4.853800
Minimum	-4.100000
Std. Dev.	0.694908
Skewness	0.184213
Kurtosis	20.23044
Jarque-Bera	3440.527
Probability	0.000000

Long-term output coefficients (OUTPUTLT), full sample



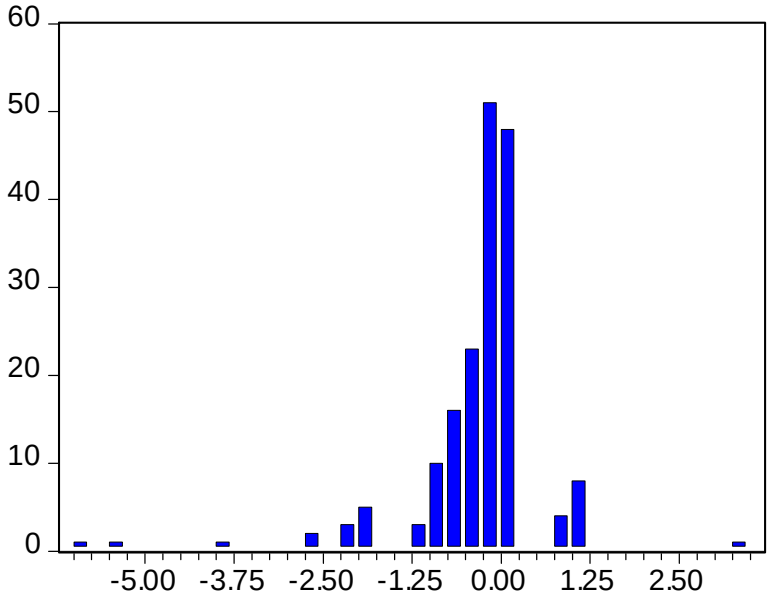
Series: OUTPUTLT	
Sample 1 278	
Observations 247	
Mean	-0.237818
Median	-0.070000
Maximum	1.106700
Minimum	-4.200000
Std. Dev.	0.531429
Skewness	-3.242688
Kurtosis	20.70667
Jarque-Bera	3659.574
Probability	0.000000

Short-term price coefficients (SHORT), full sample



Series: SHORT	
Sample 1 185	
Observations 183	
Mean	-0.043338
Median	-0.040000
Maximum	3.232500
Minimum	-2.800000
Std. Dev.	0.425706
Skewness	1.145268
Kurtosis	30.58872
Jarque-Bera	5843.677
Probability	0.000000

Long-term price coefficients (LONG), full sample



Series: LONG	
Sample 1 185	
Observations 177	
Mean	-0.300804
Median	-0.110000
Maximum	3.279000
Minimum	-6.000000
Std. Dev.	0.932080
Skewness	-2.530144
Kurtosis	17.08711
Jarque-Bera	1652.393
Probability	0.000000

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