

Globalization, Inflation and Monetary Policy

Following up on Glatzer, Gnan and Valderrama (2006), we investigate two further channels through which globalization may have dampened inflation in the euro area: first, changed incentives for policymakers; second, global demand and supply conditions. Our empirical evidence shows that the domestic output gap seems to have lost its influence on inflation in the euro area; however, we cannot confirm that euro area inflation is instead significantly influenced by the global output gap. Therefore and because of daunting measurement problems, we caution against attaching undue weight to global output gap developments in central banks' reaction functions. The flattening of the euro area Phillips curve – together with weakened monetary policy control over inflation due to increasing global long-term interest links and heightened uncertainty for policymakers due to globalization – calls for the stabilization of inflation expectations as a primary goal for monetary policy. Central banks should not rely on the inflation-dampening effects of globalization to last indefinitely: Supply bottlenecks in energy and raw materials, a shift in emerging economies' savings-investment balance, as well as protectionist pressure may put an end to these effects.

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1 Introduction

Global inflation followed a distinct downward trend during the 1980s and 1990s. In recent years, inflation rates remained at low levels, despite massive increases in the prices of energy and raw materials. There is a general perception that globalization has facilitated this favorable inflation record and that inflation is increasingly influenced by global, rather than national, determinants.

Glatzer, Gnan and Valderrama (2006) identified six broad channels through which globalization² may have influenced inflation and explored in some detail microeconomic determinants such as import prices and competitiveness effects on inflation in Austria. The present study is a follow-up and elaborates on two macroeconomic channels through which globalization may have dampened in-

flation. First, the notion that central banks worldwide did a better job in reducing inflation and keeping it low is developed in various directions. Second, the idea that global, rather than domestic, developments of aggregate demand and capacity constraints influence inflation in the short term is discussed and tested empirically for the euro area.

The remainder of this article is structured as follows: Section 2 provides an overview of the current state of the economic literature on how globalization may have altered monetary authorities' objective function. Section 3 discusses how globalization can influence the sensitivity of inflation to output fluctuations. Section 4 investigates empirically whether inflation in the euro area has increasingly become influenced by global, rather than domestic, output gap

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² As in Glatzer, Gnan and Valderrama (2006), we define (economic) globalization as the growing economic interdependence of countries worldwide, brought about by an increasing volume and variety of cross-border transactions in goods and services as well as by the higher mobility of factors of production, including a more rapid and widespread international diffusion of technology.

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developments. Section 5 draws conclusions.

2 Globalization Has Strengthened Monetary Authorities' Commitment to Price Stability and Anchored Inflation Expectations

The notion is widely shared that the global decline in inflation is, at least to some extent, the result of monetary policies credibly geared toward price stability. Indeed, several studies document empirically that central banks responded more aggressively to inflation in the 1980s and 1990s than in the two previous decades (Taylor, 1999; Clarida et al., 2000). But what is the source of such stronger commitment?³

2.1 Globalization Changes Economic Structures, Reducing Central Banks' Incentives to Boost Output beyond Potential

Globalization may have changed monetary policymakers' objective function and may thus have contributed to lower inflation through various channels.

A *first* reasoning starts from the proposition that monetary policymakers have an incentive to create "surprise inflation" (i.e. an increase in the inflation rate not anticipated by economic agents) to generate a temporary increase in real output and employment. The possibility to do so crucially hinges on price and wage rigidities, which entail that prices and wages do not immediately react to

unexpected monetary expansion. As globalization increases competition and makes prices and wages more flexible, the real effects of monetary policy become smaller and shorter-lived. In other words, it takes a bigger acceleration in inflation to achieve the same temporary increase in real output; the short-run Phillips curve becomes flatter.⁴ As a corollary, it also takes bigger interest rate hikes to curb inflation once it has risen.⁵ For both reasons, the incentive to use monetary policy as a tool (albeit short-lived) to boost output beyond the economy's potential diminishes, and monetary policy concentrates on the policy variable that it ultimately determines, i.e. the general price level (Rogoff, 2003). In line with this reasoning, Chen et al. (2004) estimate that the squeeze on markups caused by increased competition arising from globalization lowered central banks' preferred rate of inflation in EU countries by more between 1988 and 2000 than the direct inflation-dampening effect of lower import prices did.

Second, it has been argued that higher openness increases the cost of unexpected inflation. In Romer (1993), this is so because a more open economy suffers more from the negative terms-of-trade effect of a real exchange rate depreciation associated with unexpected monetary expansion. In Lane (1997), the reduced incentive to create surprise inflation in more open economies is due to a lower share of monopolistically produced nontradable goods in con-

³ For a policy-oriented analysis of how globalization may have influenced monetary policy, see also BIS, 2006.

⁴ Galati and Melick (2005) provide a survey of recent empirical studies which confirm a recent flattening of the short-run Phillips curve in many countries. See also Stock and Watson (2005).

⁵ Vega and Winkelried (2005) show theoretically and empirically that as domestic expenditure in tradable goods increases relative to nontradable goods, the conventional interest rate channel of monetary policy on inflation weakens.

sumption,⁶ which reduces the welfare gain from stimulating production in nontradable goods. Empirical estimates by both authors confirm that more open economies indeed experience lower inflation rates. This result is robust to the inclusion of various additional explanatory variables, such as central bank independence. Gruben and McLeod (2004) find that the negative openness-inflation correlation strengthened across all country groups during the 1990s.⁷ Razin and Loungani (2005a, b) argue that capital account liberalization allows consumers to smooth fluctuations in consumption, reducing the dependence of domestic demand on the domestic output gap. At the same time, trade openness fosters specialization in production, which increases distortions associated with fluctuations in inflation rates. Thus, policymakers seeking to maximize welfare should put more weight on inflation stabilization and respond less to output gap fluctuations in more open economies.

Third, it has been argued that more flexibility in labor markets and in nominal wages may lower the optimal inflation rate, since the costs of possible temporary deflation⁸ is reduced (Borio and Filardo, 2006).

Finally, as Wagner (2002) argued, businesses and foreign investors may regard inflation as a signal of bad economic policy and political and eco-

nomical instability. As globalization increases competition among countries to attract companies and foreign investment, it may also be expected to strengthen policymakers' incentive to safeguard price stability.

2.2 Changed Incentives for Legislators and Global Benchmarking Foster Central Bank Independence

The above arguments have described ways in which globalization may have strengthened policymakers' quest for price stability. These mechanisms could in principle have contributed to lower inflation outcomes without any changes to central bank laws. However, over the past two decades central bank laws were globally modified to grant central banks higher independence, and central banks were mandated to safeguard price stability as their primary goal. Thus, the question has been raised (Rogoff, 2003) whether the worldwide decline in inflation was primarily driven by changes in economic structures (which were in turn supported by globalization) or by better monetary policy institutions. Indeed, the two explanations may be related. Much the same as globalization may have strengthened monetary authorities' quest for price stability for the reasons described above, it may – together with other factors, such as the

⁶ Monopolistic production of nontradables entails a level of output in these products which is socially too low. Therefore, stimulating non-traded output through unanticipated monetary expansion creates welfare gains.

⁷ Contrary to claims by Terra (1998), the effect is not confined to highly indebted countries. This is also found by Gupta (2003).

⁸ Downward rigidity of nominal wages and prices are often quoted as a rationale for central banks to aim for low but positive inflation rates rather than price level stability. This is one of the reasons why e.g. the Eurosystem has defined price stability as an annual increase of the euro area HICP of below but close to 2%. If globalization contributes to reducing nominal downward wage and price rigidities, this reduces the required "safety margin" from zero inflation. Research in the context of the Eurosystem's Inflation Persistence Network has found that goods prices in the euro area are quite flexible downward; however, services prices as well as wages continue to be an important source of nominal rigidities (for a policy-oriented summary see Crespo Cuaresma and Gnan, 2005; Gnan, 2005).

experience of the inflation of the 1970s and 1980s and new theoretical insights – also have contributed to persuading legislators to change central bank legislation toward independence and price stability.

Second, the wave of new central bank legislation may also have reflected a tendency toward global “benchmarking” for stability-oriented monetary institutions. Globalization in that sense also implies an easier and faster spillover of “monetary policy technologies” in much the same way as technological spillovers in other areas have been facilitated. But global institutions such as the International Monetary Fund (IMF) also actively encouraged such policy and institutional benchmarking processes. In the EU, the Maastricht Treaty has also supported institutional and legal benchmarking: Its convergence provisions require EU governments to grant the national central banks legal independence prior to a country’s participation in Stage Three of EMU.

2.3 Increased “Threat of Devaluation” Supports Monetary Discipline

Globalization also importantly includes the liberalization of the international flow of capital. Thus, in a globalized economy, inflationary monetary policies risk more severe and immediate consequences than among rather closed economies with nationally segmented financial markets (Tytell and Wei, 2004); an unanticipated monetary expansion will likely be accompanied by exchange rate devaluations. In a small open economy, such a development will exacerbate inflationary consequences, while positive growth and employment effects will be dampened through higher imported intermedi-

ate goods prices and nominal wages rising in tandem with the increased inflation rate (Rogoff, 2003; Romer, 1993). In the case of fixed exchange rate regimes, the incentive for monetary discipline may be complemented by the threat of speculative attacks and market-forced devaluations.

2.4 Better Informed Monetary Policy and Strategic Frameworks to Maintain Price Stability, or Simply “Good Luck” and “Opportunistic Behavior”?

It has been argued that monetary policy was better informed over the past two decades by new theoretical insights, by a wider range of and more reliable data, by more advanced analytical and empirical tools, and, last but not least, by central bankers’ learning from past mistakes, in particular from the “Great Inflation” of the 1970s and 1980s (Gnan and Wittelsberger, 1999, 2003; BIS, 2006; Galati and Melick, 2005). An alternative view is that the good inflation performance of the past two decades is largely, if not entirely, due to “good luck.” According to this line of argument, fewer adverse shocks have hit the economy, thus making it easier now to maintain price stability. Part of this good luck may be attributed to favorable shocks linked to globalization. However, most empirical studies conducted on this question find that good luck played only a small part in explaining the decline in inflation (Stock and Watson, 2005; Ahmed et al., 2004; Galati and Melick, 2006).

Finally, according to the “opportunistic approach to disinflation” (Orphanides and Wilcox, 2002; Aksoy et al., 2003), central banks may also have used the tailwind of

price-dampening supply side shocks associated with globalization to permanently lock in lower inflation rates which would otherwise have been costly to achieve.

2.5 Globalization May Have Dampened Inflation Expectations

Globalization may also have dampened inflation expectations, in turn reducing actual inflation. Several arguments for this have been put forward: *First*, if economic actors understand that central banks are more committed to the primary objective of maintaining price stability (which may in turn be related to globalization), their expectations about future inflation fall. *Second*, the lower actual inflation – even if it had partly been due to “good luck” or “opportunistic behavior” – may have bolstered central banks’ credibility, thus amplifying the inflation dampening effect of the original positive supply shock. *Third*, economic agents perceiving that globalization puts downward pressure on prices and wages may lower their inflation expectations regardless of the other factors just mentioned. Put differently, they would expect future positive supply shocks from globalization. The notion that inflation expectations have become better anchored is in line with evidence quoted above on a flattening of the short-run Phillips curve.

3 Globalization May Have Weakened the Link between Domestic Demand and Inflation

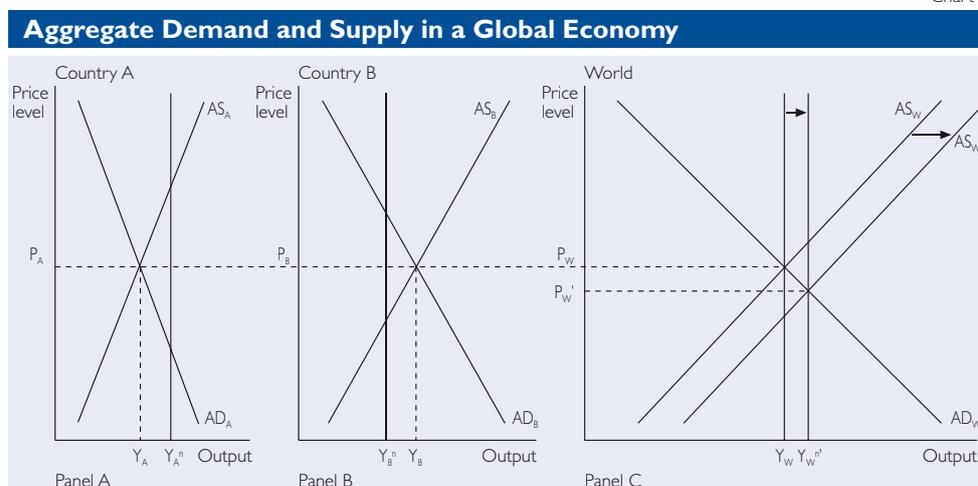
3.1 A Stylized Model of Global Aggregate Demand and Supply

In a closed⁹ economy, the price level or inflation are influenced in the short run by the balance between domestic aggregate demand and the economy’s production potential, i.e. the output gap. If short-run equilibrium output is above the economy’s long-run equilibrium, the price level or the inflation rate increase; in the event of slack, the price level or inflation falls.

Opening up an economy to foreign trade and foreign capital flows allows the trade balance to be in surplus or in deficit. Net imports of goods and services can make up for a lack of domestic supply and net exports can make up for a lack of domestic demand. Inflation in open economies will be less influenced by domestic supply and demand conditions. Instead, foreign supply and demand conditions as well as international inflation and exchange rate developments should play an increasingly important role for an individual country’s inflation rate. In a (hypothetically) fully globalized world with frictionless international movement of goods, services, capital and labor, inflation would in the short term be influenced to a large extent by the global balance of demand and supply. Globalization could thus be expected to have diminished the influence of domestic economic conditions on in-

⁹ For the sake of simplicity, we do not address exchange rates in this stylized description of supply and demand effects. Clearly, in reality, the choice of exchange rate regime and (nominal and real) exchange rate developments can influence demand and supply schedules. For a further discussion, see Borio and Filardo (2006) and BIS (2006).

Chart 1



Source: OeNB.

Note: AS stands for aggregate supply, AD for aggregate demand, Y^n for natural rate of output.

flation, while increasing the importance of global developments.

The shift from domestic to global influences of the aggregate price level can be illustrated within a strongly simplified framework of aggregate demand and aggregate supply in two countries.¹⁰ In the example sketched in chart 1, country A is currently in a recession, i.e. it operates below its potential Y_A^n , while country B experiences a boom, i.e. its production is above its potential Y_B^n . If both economies were closed, country A would experience falling prices (or more realistically, in a dynamic setting, falling inflation rates), while in country B the price level would increase (inflation) until both economies have, each for itself, reached their individual levels of potential output again.

Panel C of chart 1 illustrates the effect of globalization. As companies now can freely trade goods and services as well as factors of production, the production possibilities of the two

economies are now added up into a single global production schedule. Similarly, as consumers, firms and the government can purchase goods, both at home and abroad, aggregate demand of the two economies is represented by the new global aggregate demand schedule.

Note further that the global aggregate supply schedule is not obtained by simply adding up the individual supply schedules of the two closed economies. As argued in Glatzer, Gnan and Valderrama (2006), globalization is likely to boost productivity (through comparative advantage, economies of scale, competition, innovation, etc.). Thus, world potential output will be more than the sum of individual countries' output: This is graphically indicated by global potential output, Y_W^n in panel C being more than the sum, Y_W^n , of the individual countries' potential output levels. As a consequence, the global aggregate supply curve AS_W shifts to the right

¹⁰ For details, see standard macroeconomics textbooks, e.g. Blanchard (2005).

and the price level (or, more realistically, inflation) will fall. Let us now use chart 1 to consider three aspects of global demand and supply, and their effects on global prices and on inflation.

3.2 Does Globalization Cause Stronger Compensatory Effects among Worldwide Business Cycles?

First, in the short run, at a business cycle frequency, the effects of globalization on inflation and its variability are influenced by whether individual countries' business cycles are synchronized or not (Gamber and Hung, 2001). In chart 1 this translates into the two AD curves moving to the right and to the left in tandem or independently of each other or even in opposite directions. If they move in tandem, this would imply that booms and recessions of individual countries add up at the global level, as do (dis)inflationary phases. If business cycles were independent of each other or even moved in opposite directions, scarce and excess capacities across countries would compensate each other over the business cycle, thus smoothing global cyclical ups and downs in production and inflation. This very special case is assumed for illustrative purposes in chart 1. While country A is in recession, country B experiences a boom, and the two countries' excess and slack capacities compensate each other. Whether this "compensatory" effect operates in practice depends on how synchronized global business cycles are. Chart 2 suggests quite parallel business cycle movements between the euro area and the world. Economet-

ric studies yield a more ambiguous picture. A number of empirical studies (Stock and Watson, 2003; Helbling and Bayoumi, 2003) find strong evidence for an important role of common global factors driving business cycles among advanced countries but far less so in developing countries. It is also unclear whether business cycle synchronicity has more increased or decreased over time. Considering that globalization has more recently been characterized by the inclusion of emerging economies in the international division of labor, compensatory capacity effects among countries might indeed play some role.¹¹

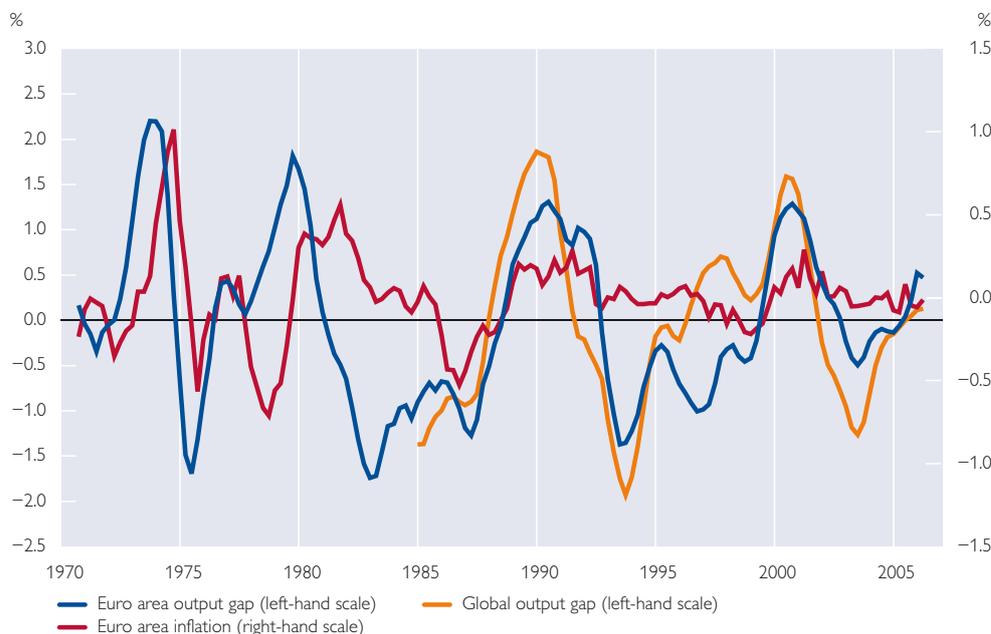
3.3 Productivity and Price Shocks Due to Globalization Alter Aggregate Supply Conditions

A second consideration linked to global demand and supply relates to the effects of globalization on aggregate supply schedules. It was mentioned above that globalization leads to gains in world potential output. The resulting shift to the right in the AS_w schedule might over the medium to long run, other things being equal, dampen the price level and inflation. However, some aspects of globalization can also shift aggregate supply upwards and dampen world potential output, e.g. increases in oil and raw material prices that are due to the strong and lasting increase in global demand for these resources (Arpa et al., 2006). The fact that major forecasting institutions have consistently underpredicted inflation in the euro area since the start of EMU while repeatedly overpredicting output growth (Korteweg and Masuch, 2005) is consistent with a series of

¹¹ For a policy-oriented survey, see Kose (2004).

Chart 2

Euro Area: Inflation, Domestic and Foreign Output Gaps



Source: ECB, Borio and Filardo (2006).

supply-side shocks – including oil and energy price rises – hitting the euro area.

3.4 Globalization Triggers a Shift in the Savings-Investment Balance

A third aspect of global demand and supply addresses longer-lasting structural shifts in aggregate demand schedules. Part of the inflation-dampening effect of globalization over the past years arose from the strong expansion of productive capacity in emerging countries such as China and India (a rightward shift in their potential output and AS schedules), which was not accompanied by a proportional increase in aggregate demand (their AD schedule did not move to the same extent). Besides resulting in high rates of domestic investment, the very high savings ratios in these countries were also reflected in sizeable trade surpluses. As emerging countries make progress with their economic catching-up process, shown

inter alia by increasing personal disposable income levels, their propensity to consume might increase (their AD curve would with a delay, follow increased aggregate supply). Exchange rate appreciations might accompany and accelerate this adjustment process. Once aggregate demand catches up with aggregate supply, emerging countries' influence on the global balance of demand and supply would change, and the price- and inflation-dampening effect would fade out.

3.5 Globalization Increases Monetary Policymakers' Uncertainties

The structural shifts in individual countries' and world global aggregate supply and demand conditions which may be triggered by globalization are likely to increase the degree of uncertainty that monetary policymakers face. The higher uncertainty results from difficulties in interpreting indicators such as the output gap and the

natural rate of interest¹². Identifying inflationary pressures emanating from domestic and global demand and supply conditions, including import and raw material prices becomes more difficult. The monetary transmission mechanism is likely to change (Wagner, 2002; BIS, 2006). Spillovers from foreign economic developments and economic policies are likely to increase.

4 Is Inflation in the Euro Area Increasingly Influenced by Global Business Cycle Developments?

In this section we explore whether inflation in the euro area has recently been increasingly influenced by global rather than domestic business cycle developments. To test such an effect, empirically, we rely on a reduced-form model that relates inflation to a measure of excess demand and a measure of supply shocks from abroad. In this kind of “Phillips curve,” it is usually found that parameters are unstable due to the Lucas critique.¹³ But parameters are also expected to be unstable because of the progressive evolution of globalization. Thus, the hypothesis we test is that the relation-

ship between domestic excess demand and inflation has weakened over time due to the process of globalization. In a second step, we test whether including a measure of external excess demand has explanatory power beyond that of the domestic output gap, and whether this result changes over time.

As chart 3 shows, output gap measures of the euro area and those of the global economy¹⁴ tend to move together for long periods. Thus, estimating an equation with both measures of excess demand simultaneously will probably suffer from multicollinearity. On the other hand, simply replacing the domestic output gap with the foreign output gap in the estimated equation would yield no or little additional information, since both variables are highly synchronized.¹⁵ Thus, as an additional explanatory variable, we include a measure of foreign output gap to the extent that it deviates from the domestic output gap.¹⁶

To test our hypothesis that the relationship has weakened over time, we allow the coefficients of the domestic and foreign output gaps to vary over time.¹⁷

¹² For a discussion of the possible effects of globalization on the natural rate of interest, see Crespo Cuaresma et al. (2005) and BIS (2006).

¹³ See for example Turner (1997).

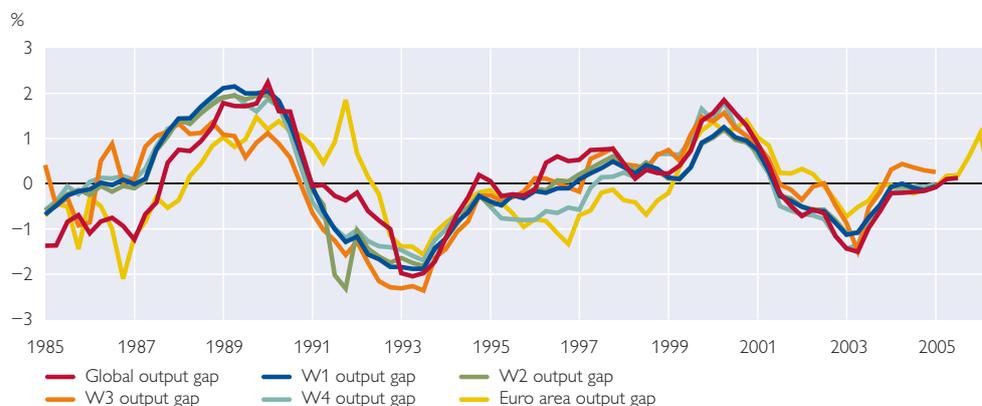
¹⁴ The euro area output gap is taken from the Area-Wide Model Database. The global output gap is a trade-weighted global output gap from the euro perspective as in Borio and Filardo (2006, p. 9). Estimations done with other measures of the global output gap as calculated by Borio and Filardo yield very similar results, confirming the robustness of our results. Global output gap data were kindly provided by Borio and Filardo.

¹⁵ Although both variables tend to be highly synchronized, replacing the euro area output gap with the global output gap yields implausible results, showing that domestic excess demand is more relevant than foreign excess demand. Estimations are available on request.

¹⁶ This variable is determined by calculating the difference between the domestic and foreign output gaps. The variable is set at zero when the difference is within a range of $\pm 1\%$.

¹⁷ In principle, we could also allow the coefficients for lagged inflation and relative import prices to vary over time, but since they are not our main interest, we assume them to be fixed. Estimates allowing for time-varying coefficients for lagged inflation and relative import prices yielded qualitatively similar results.

Chart 3

Measures of Global Output Gaps and Euro Area Output Gap


Source: OeNB, Borio and Filardo (2006).

Note: W1 to W4 are alternative measures of the global output gap as proposed and estimated in Borio and Filardo (2006).

The model used for the empirical estimation is:

$$\begin{aligned} infc = & \beta_1 * infc_{t-1} + \beta_2 * infc_{t-2} + \beta_3 * rimpinf + \\ & \beta_4 * rimpinf_{t-1} + \beta_5 * rimpinf_{t-2} + sv1 * ygd_{t-1} + \\ & sv2 * dygdygw_t \end{aligned}$$

where inflation is relative inflation above its trend ($infc$), with trend inflation being approximated by the Hodrick-Prescott filter. Relative import prices ($rimpinf$) are changes in import prices above changes in domestic inflation.¹⁸ All variables are first differences of the normalized variables. $sv1$ is the time-varying coefficient of the domestic output gap (ygd), while $sv2$ is the time-varying coefficient of the deviation above a threshold of the global from the domestic output gap ($dygdygw$).

In a first step, the model is estimated excluding the deviation of the global from the domestic output gap as a time-varying explanatory variable.

The estimation results shown in chart 4 confirm that the relationship

between inflation and domestic measures of excess demand in the euro area has indeed changed over time. While the domestic output gap contributed to explaining inflation significantly up to the early 1990s, its explanatory power declined markedly and was insignificant in the latter part of the period under review. This result is consistent with a number of studies which have found that inflation and output growth dynamics have changed globally over time (Canova et al., 2006).

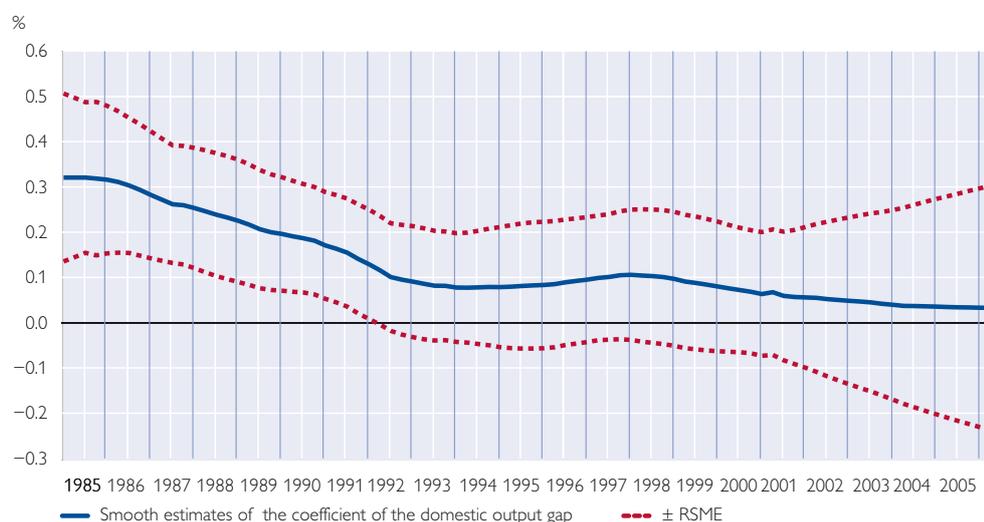
In a second step, we include also the deviation of the global from the domestic output gap as a time-varying explanatory variable.

This second estimation result, which is shown in chart 5, confirms that the effect of the domestic output gap on inflation in the euro area weakened markedly over time. By contrast, the influence of the deviation of the global from the domestic output gap increased slightly. Although the confidence bands suggest that both variables are not significant,

¹⁸ The estimations were also done using oil prices and relative oil prices as alternative measures of supply shocks. However, these variables turned out to be insignificant.

Chart 4

The Declining Importance of the Domestic Output Gap in Explaining Euro Area Inflation



Source: OeNB, authors' calculations.

Note: RSME stands for root mean square error.

the result is interesting. As chart 3 showed, domestic and foreign output gaps have tended to be more synchronized over time, which implies that the deviation of the global from the domestic output gap tends to be smaller (and less volatile) toward the end of our sample, while its effect on inflation tends to be greater.¹⁹

All in all, by 2005, both the domestic output gap as well as the deviation of the global from the domestic output gap have a quantitatively similar, small and insignificant effect on domestic inflation. These findings suggest that other factors, such as a changed monetary policy regime, changes in the formation of inflation expectations or other omitted variables, e.g. labor productivity developments, may play an increasing role in explaining the development of inflation in the euro area. Canova et al.

(2006) find that for the euro area “changes in the transmission and the volatility of monetary policy shocks and in the volatility of supply shocks matter” in explaining the changing dynamics of inflation and output growth.

How do these results compare to the few other empirical studies which directly relate inflation to a global output gap or foreign capacity constraints? Tootell (1998) investigates the effect of foreign capacity on U.S. inflation, but defines foreign capacity as the output gap of the six main trading partners (Canada, Germany, France, Italy, Japan and the U.K.). He finds that foreign capacity does not contribute to explaining the fall in inflation up to 1998 and concludes that domestic capacity is still more important, which is in part similar to our results. But he does not investi-

¹⁹ Estimations in which relative import prices are also modeled as gradually changing parameters also show that the importance of these variables diminishes over time and thus does not compensate for the falling explanatory power of the domestic output gap. Estimation results are available from the authors on request.

Chart 5a

Declining Influence of the Domestic Output Gap on Euro Area Inflation

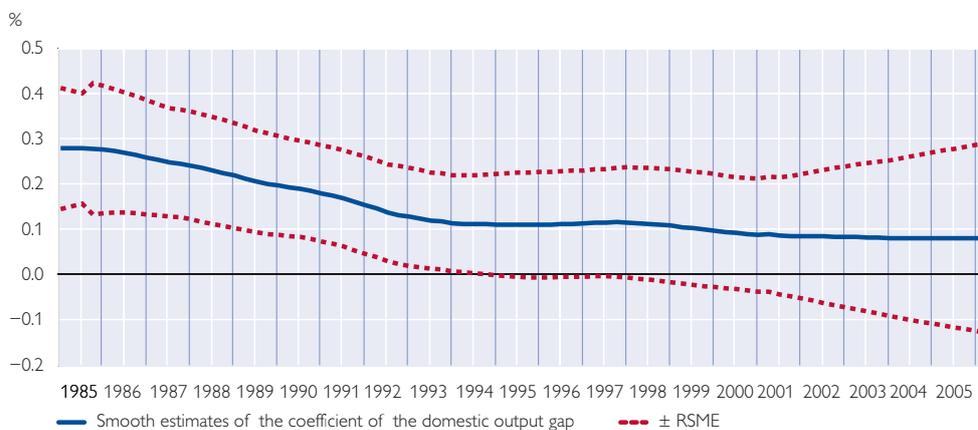
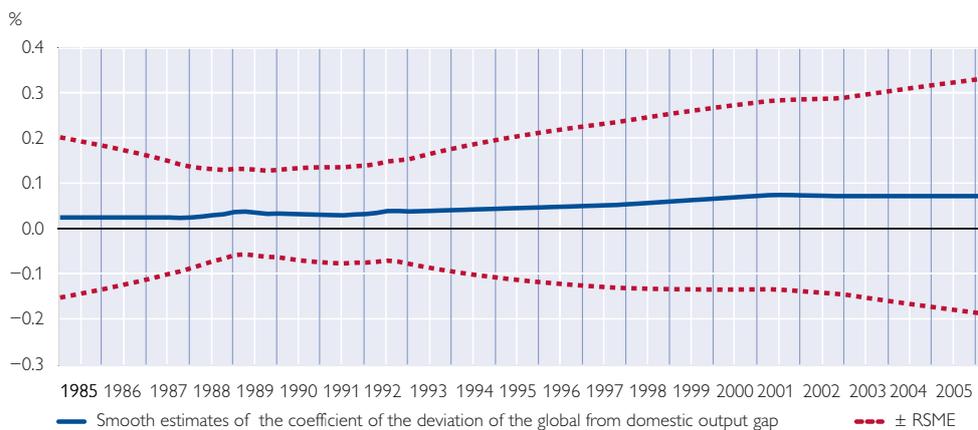


Chart 5b

Slightly Increasing Influence of the Deviation of Global from Domestic Output Gap on Euro Area Inflation



Source: OeNB.

Note: RSME stands for root mean square error.

gate whether this relationship has changed over time and misses the important recent period of accelerating globalization. Additionally, the study uses a narrow definition of main trading partners and thus does not take into account the increases in capacity utilization implied by the opening of large emerging markets such as China and India. Gamber and Hung (2001) come to quite a different conclusion, showing that including foreign capac-

ity utilization in a Phillips curve equation helps explain inflation in the U.S.A. significantly better than a specification without foreign capacity utilization. The difference between their results and those of Tootell (1998) could be due to the fact that they cover 35 U.S. trading partners, which includes many large emerging countries (i.e. China and India).

Our results can probably be compared most directly with those of

Borio and Filardo (2006).²⁰ These authors investigate the sensitivity of inflation to the domestic output gap and to different measures of foreign economic slack, after controlling for increases in input costs. Their results for a large cross-section of countries show that measures of global economic slack add considerable explanatory power to traditional benchmark inflation rate equations or in some cases that the measures of global economic slack are more highly positively correlated with domestic inflation than the domestic output gap. Qualitatively, the two studies point in the same direction in the sense that the relationship between inflation and domestic output has weakened over time. But they yield different results on the role of global capacity constraints. This reflects, on the one hand, different econometric estimation techniques. On the other hand, our estimation takes the deviation between global and domestic output gap as an explanatory variable whereas Borio and Filardo (2006) use the foreign output gap as such.

Another related paper on this subject, Mumtaz and Surico (2006), uses quite a different methodology. These authors use a dynamic factor model with time-varying coefficients and stochastic volatility to identify national and international common features on inflation in a panel of 164 series for the most industrialized economies in the world. Their results show that while a common international factor tracks the level of national inflation rates reasonably well, country specificities are more important in explaining the volatility

of actual inflation. A noteworthy result is that they find the international component of national inflation rates to have become increasingly important in the last decade, while the impact of country-specific conditions on inflation has tended to disappear in the recent past.

5 Summary and Conclusions

This study investigated two groups of channels through which globalization may have influenced inflation over recent years.

First, globalization is likely to have strengthened monetary authorities' commitment to price stability. Globalization and its consequences, such as more flexible prices and wages, a flatter short-run Phillips curve and higher net costs from unanticipated inflation in more open economies, have prompted legislators to grant central banks independence and to mandate the central banks to maintain price stability as their primary goal. Independently of and beyond the effects of stronger central bank independence, the same globalization effects can also be expected to have lowered the time-consistent inflation rate ultimately achievable under a discretionary monetary policy regime. Increased price and wage flexibility has reduced the optimal safety margin towards zero inflation. The globalization of capital flows and the associated stronger "threat of devaluation" have added to the quest for monetary policy credibility and price stability. Central banks may also have used favorable shocks (including the price-dampening effects of globalization) to "lock in" lower inflation rates

²⁰ First, our global output gap data (including the range of countries included) were kindly provided by Borio and Filardo. Second, like our study, Borio and Filardo (2006) also analyze whether the coefficients have changed over time.

than would otherwise have been easily achievable. The continued good inflation performance despite a recent series of adverse cost shocks (in particular soaring energy and raw material prices) strengthens explanations which trace lower inflation to fundamental changes in the formation of prices and inflation expectations rather than to mere “good luck.”

Second, globalization has been argued to have weakened the link between the domestic output gap and inflation, with the global output gap playing an increasing role for individual countries’ inflation developments. Since the euro area and global business cycles are broadly synchronized, “compensatory” effects among capacity constraints in the euro area and the rest of the world can be expected to be rather limited. An empirical estimation performed in this study on the one hand confirms that unlike in the 1980s, the domestic output gap no longer plays a significant role in explaining inflation in the euro area more recently. This finding coincides e.g. with Borio and Filardo (2006), who found significantly declining sensitivity of inflation to domestic measures of slack. On the other hand, we cannot confirm these authors’ result that the global output gap has replaced the domestic output gap in driving euro area inflation. We find that while the importance of the deviation of the global output gap from the domestic output gap increased slightly over the past 20 years, it has remained insignificant.

The difference between our results and those of other studies reflects various differences in variables and estimation methods used: Our study’s focus was on finding time-varying parameters, and instead of the global output gap as such, its de-

viation from the euro area’s output gap was used as an explanatory variable. The results are similar, though, in the sense that also in Borio and Filardo (2006) the global output gap plays a much smaller role in explaining domestic inflation for the euro area as a whole than for individual countries. Naturally, for the Eurosystem’s monetary policy, only aggregate euro area economic developments can ultimately be decisive. The increasing role of the global output gap for domestic inflation in many individual euro area countries may indeed also reflect increasing integration among euro area countries.

On a more structural note, the integration of global goods and (partly) factor markets has – through various channels – boosted global potential output beyond the sum of former production capabilities. As long as world demand does not rise at the same pace, this output boost should dampen world inflation. As emerging economies’ catching-up progresses, these countries’ savings investment balance might shift toward more consumption, reducing these economies’ global inflation-dampening influence. Furthermore, as recent experience has demonstrated, increased world production can create bottlenecks in raw materials and energy, and can thus also be associated with negative cost shocks, putting upward pressure on prices.

Which conclusions can we draw from the above findings?

- The empirically widely found reduced link between domestic measures of economic slack and inflation implies that cyclical fluctuations should contribute less than before to deviations of inflation from the central bank’s definition of price stability. As a cor-

ollary, however, monetary policy becomes less effective in influencing inflation through the traditional demand channel, and it becomes harder to bring inflation back to target once it deviates. The transmission of monetary policy to domestic inflation can be further loosened by increasing interlinkages among world long-term interest rates (Borio and Filardo, 2006; BIS, 2006).²¹ Stabilizing inflation expectations in the first place becomes more important in this changed economic environment.

- It is uncontroversial to state that globalization increases the need for central banks and other policymakers to monitor international developments closely. However, this should in our view be understood in a rather general sense. Particularly for a large currency area such as the euro area, it does not imply that the central bank should include some measure of global slack in its reaction function. To date, global slack conditions have a very modest and – in our estimates insignificant – explanatory power for inflation in the (aggregate) euro area. Furthermore, for practical policy purposes, it is very difficult to estimate the global output gap. In particular, measuring potential growth and output in rapidly developing emerging economies, which are experiencing signifi-

cant structural changes, is a daunting task (Borio and Filardo, 2006;²² Henry, 2006). Gearing monetary policy decisions on domestic output gap developments has been shown to be potentially seriously misleading due to difficulties in assessing output gap developments in real time (Orphanides, 2002). Focusing on global output gap developments would further exacerbate this problem.

- Globalization is on balance likely to have increased the uncertainty (determinants of the business cycle and inflation process, data uncertainty, uncertainty on monetary policy transmission) that monetary policymakers face. The changing economic environment alters conventional policy guideposts in a way that complicates policy deliberations. This calls for policy strategies based on a broad set of indicators – domestic and global – which are comparatively more robust to a changing economic environment.
- It is far from clear for how long globalization may continue to dampen global inflation developments. Changing consumption behavior in emerging economies might affect these countries' influence on the balance between global aggregate demand and supply, and thus on inflation in advanced economies in the medium run. Protectionism might put an

²¹ Related to this, the question has been raised to what extent domestic “natural rates of interest” continue to be of relevance or whether they should not increasingly be replaced by a “global natural rate of interest” to the extent that one considers such a concept a rough guidepost for monetary policy (Crespo Cuaresma et al., 2005).

²² Borio and Filardo (2006) argue, for instance, that the level of potential output in China may be a rather soft constraint, since labor supply is highly elastic and capital levels are still below those consistent with steady-state growth. At the same time, short-term labor supply bottlenecks could arise, since it takes time to move the workforce from rural areas to centers of production. Thus, they argue that the acceleration or deceleration of growth rates may be a more robust measure of short-run capacity constraints than the output gap.

end to the process of globalization and even partly reverse it. Constituencies that feel disadvantaged by globalization may increase pressure on central banks to pursue inflationary monetary policies.

– Thus, monetary policy in the euro area and other advanced currency areas cannot rely on the beneficial inflation dampening of globalization to last indefinitely.

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