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Does It Pay To Synchronize Structural Reforms Across Markets And Countries? Insights From The Global Economic Model

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Abstract

Structural reforms in labor and product markets are likely to have significant long-run benefits in terms of output and welfare. In the short-run, due to rigidities and adjustment costs, the impact of reforms of various sectors of the economy differs, with some having substantial costs in terms of real wages and consumption. Transition dynamics are affected by the monetary policy framework and by the interactions of the economy with the rest of the world. Simulations with a calibrated large scale new-Keynesian open economy model show that labor and services market reform have substantial transition costs when monetary policy cannot react sufficiently, be it because of monetary union or a pegged exchange rate. Concurrent traded goods market reform would mitigate, but fall well short of compensating these effects, whereas synchronization of reform across countries would eliminate transition costs. While the magnitude of the response to reforms depends on model parameters and the size of the economy, a rich specification of adjustment dynamics helps inform political economy choices and provides a stylized guide for forecasting near-term effects.

Keywords: Economic Policy, Econometric Models, Competition, Markups, Monetary Policy JEL Classification numbers: C53; E52; F47

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I. INTRODUCTION

Europe has been struggling to raise trend growth as a result of structural problems in its labor and product markets. Hence there is broad consensus that structural reforms are the remedy to brighten long-term growth prospects (European Commission, 2005a; IMF, 2004; and OECD, 2006). While reforms seem to be gradually progressing in most EU countries, a consensus has not yet emerged on how to sequence or synchronize reforms, especially in monetary union. Comprehensive reforms are being implemented mainly on national timetables and often only after a prolonged slump in activity has set of warning bells. This sequential approach has raised the specter of rotating slumps in the euro area (Blanchard, 2006) and led to calls for the ECB to pay attention to growth in its objective function.

In this paper, the issue of labor and product market reforms in individual countries in the euro area is investigated with the IMF's Global Economy Model (GEM). The model is used to quantify the steady state effects of labor and product market reforms on key macroeconomic variables, investigate international spillovers, and explore transition dynamics to inform political economy questions and derive monetary policy implications. GEM is well suited to do this (Bayoumi, 2004). It belongs to the class of large scale new open economy models with structural equations rooted in microeconomic theory. The model incorporates monopolistic competition in product and labor markets (specified through markups), frictions in the adjustment to shocks, and a fully specified monetary policy reaction function. Its multi-country dimension allows for a complete exploration of international linkages.

The findings that product and labor market reforms have sizeable steady state effects on output, probably well above from 10 percentage points, are consistent with earlier studies of reform in the EU using GEM (Bayoumi, Laxton, and Pesenti, 2004). The size of the effect depends in a nonlinear manner on the degree of pre-reform rigidity in the various markets. More flexible countries, which already have a relatively high level of per capita GDP, obviously have less room to reap benefits from reform, though possible gains are still substantial (e.g., Denmark, Hunt, 2004, and Finland, Luna, Lutz, and Stavrev, 2005). Steady state spillovers of reforms on output are modest because supply and demand in the reforming country rise broadly proportionally. Spillover effects on welfare are somewhat stronger because of terms of trade effects. Similar results were obtained in a study of combined fiscal adjustment and productivity-enhancing reforms for Japan (Batini, N'Daye, and Rebucci, 2005).

The focus of this study, setting it apart from previous applications, is on the transition dynamics and the potential gains from synchronizing structural reforms across markets and across countries within a monetary union, the euro area. Conceptually, Blanchard and Giavazzi (2003) argue in favor of starting reforms with widespread product market

deregulation as this would raise real wages and lower resistance to labor market reforms. Indeed, diminishing regulations and barriers to competition in product markets would force firms to reduce the markup they charge to customers and allow consumers to benefit from lower prices. This could diminish resistance to reducing labor market regulations (e.g., employment protection) and reforming institutions that prevent competitive forces from playing fully (e.g., centralized bargaining). The model simulations suggest a more nuanced conclusion when a distinction is made between traded and nontraded goods and the implications of monetary union fully taken into account. While all reforms are welfareenhancing, traded goods market reforms alone have immediate positive effects on output, wages, and welfare, while labor market reforms alone lead to output gains and a decline in real wages. Services sector reforms alone boost real wages but are likely to have a temporary negative effect on consumption and output. Synchronization of reforms among euro area economies modifies this result as it brings into play monetary policy. To the extent that reforms boost potential output significantly for the entire euro area, monetary policy could be eased, thereby eliminating transition costs. Similarly, for a large economy, transition costs may be smaller as the effect of its reforms has a larger weight in the ECB's reaction function.

The remainder of the paper is structured as follows: Section II provides a brief description of the basic structure of GEM with particular attention to the markups in labor and product markets. Section III discusses the set up of fiscal and monetary policy in the model. Section IV reports on the long-term effects and spillovers and section V on the short-term costs and synchronization of reform across markets and countries. Section VI provides a reality check and Section VII concludes.

II. MODEL STRUCTURE: WHAT SETS GEM APART?

The IMF's GEM belongs to the class of new open economy macro models which merge microeconomic foundations with sticky prices, nominal rigidities, trade, and international financial markets. Since it is based on optimizing consumers and producers, GEM has a comparative advantage to analyze the impact of structural changes relative to more traditional large-scale macroeconomic models with reduced-form equations. With all underlying behavioral parameters explicitly specified, it can track changes in underlying behavior that result from structural reforms, making it less subject to the Lucas critique (Lucas, 1976). For example, when labor union bargaining power is reduced, output increases and the real exchange rate depreciates as more output needs to be sold to the rest of the world. The effect on output will depend on the elasticity of the response of hours worked to the change in the wage as well as on the degree of substitutability between domestic and foreign produced goods. For a detailed description of the conceptual structure of GEM see Bayoumi, 2004.

The behavioral parameters used in the model were taken from the relevant literature, some of which are invariant across countries, while others were modified using country-specific

information.¹ For the simulations presented in this paper, the model is set up as a world consisting of the 2005 EU25, divided into four blocks: a country undertaking reforms (France and Belgium, respectively, representing a large and small euro area economy); the euro area excluding this reforming country (EA)²; the non-euro area old EU members (Denmark, Sweden, United Kingdom, RE); and the 2005 new member states (NMS).³ Differences across blocks and countries were kept to the minimum necessary, particularly between Belgium and France, which are geographically and culturally very close. Hence, all key elasticities of substitution, the discount factor, and habit persistence have been set at the same value for all blocks (see Appendix I for details).

The simulation results are sensitive to alternative values of key parameters, though without altering the qualitative conclusions. The less labor supply reacts to changes in the wage, the lower the impact of reforms, predictably more so for labor market reforms than for product market reforms. A lower share of liquidity-constrained consumption raises the beneficial impact of labor market reforms as more of the rewards to work, and thus consumption can be intertemporally allocated. As a result, the response of hours worked rises. Finally, if trade elasticities are lower (domestic and foreign traded goods are poorer substitutes), the impact of reform diminishes substantially and spillover effects are smaller. By confining the model to the EU25, countries appear less open than they are in reality and spillover effects are limited to those that benefit EU members. The effect of this restriction is marginal, however, compared to the complexity of increasing the number of blocks in the model.⁴

Markups are an essential feature of GEM, reflecting imperfect competition in product and labor markets. Each product is made by one monopolistic firm, setting a markup over costs. A very large number of firms offer diverse products and services that are imperfect substitutes. The elasticity of substitution of demand between products determines the firm's market power, which sets prices subject to the risk of losing market shares so as to maximize profits:

¹ See Bayoumi, Laxtion, and Pesenti (2004) for calibration details. This paper follows their approach.

² For model purposes the euro area excludes Slovenia which joined after 2005.

³ The new member states block is here defined as: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, and Slovenia.

⁴ Bayoumi, Laxton, and Pesenti (2004) estimate spillovers from the euro area to the rest of the world, which provide a benchmark for the degree of underestimation of spillover effects due to the reduced-openness assumption. They estimate joint labor and product market reforms in the euro area to yield 12.4 percentage points of output with a spillover effect on the rest of the world of 0.8 percentage point of output.

*Price*_t = markup_t * marginal cost_t or $p_t = \theta / (\theta - 1) * mc_t^{5}$

where θ is the elasticity of substitution. The setup in the labor market is analogous. Each worker offers a specific kind of labor services that is an imperfect substitute for services offered by other workers. The lower the degree of substitutability, because of skill differences, anti-competitive regulation or other factors, the higher the markup, and the lower employment in terms of hours.

Empirical estimates show significant markups in product and labor markets for most countries. Traditionally, estimates of markups were made separately for product and labor markets respectively (Oliveira, Martins, Scarpetta, and Pilat, 1996; and Jean and Nicoletti, 2002). However, there is theoretical justification (Blanchard and Giavazzi, 2003) and empirical evidence of a positive relation between goods market rents and wage premia over market clearing wages.⁶ Recent joint estimates of product market markups and bargaining power by labor indicate much higher product market markups than traditional estimates, which omitted the part of the firm's rent captured by workers and not reflected in profits. Hence, the model was calibrated with product markups from such joint estimates (Table 1). Estimates of wage bargaining power from Dumont, Rayp, and Willemé (2005) and Crépon, Desplatz, and Mairesse (2002) were transformed into wage markups, ensuring a consistent approach.⁷

	Labor	Traded	Non traded
Belgium	1.29	1.19	1.39
France	1.35	1.21	1.41
Euro area, excluding Belgium	1.35	1.21	1.40
and France (EA)			
Denmark, Sweden, United	1.13	1.14	1.24
Kingdom (RE)			
New member states (NMS)	1.23	1.29	1.45

Table 1. Assumed Markups in Labor and Product Markets

⁵ This simple formula ignores adjustment costs. An elasticity of substitution of 5 translates into a markup of 1.25 (25 percent). The markup goes to 0 only if all products are perfect substitutes.

⁶ Jean and Nicoletti (2002); Saint-Paul (2004); Crépon, Desplatz, and Mairesse (2002); Dobbelaere (2005); Konings, Van Cayseele, and Warzynski (2001).

⁷ The wage markup is defined as the ratio of the wage under bargaining and the wage under perfect competition. This ratio can be computed as 1+bargaining power*(1/labor share-1), with bargaining power between 0 and 1, defined as in Crépon, Desplatz, and Mairesse (2002).

As estimates of markups are not available for all countries in the EU and all markets, the following additional assumptions were made. The "euro area" (EA) was approximated by Germany and Italy (and France or Belgium, respectively), while the RE block was calibrated with estimates for the United Kingdom. For product market markups in the NMS, their relative position on the OECD measure of the degree of product market restrictedness was used to guide their calibration (OECD, 2005).⁸ While most euro area member states are in a middle position on this criterion, the United Kingdom is the most liberal country (with Denmark and Sweden also in the top four), and the NMS are considered among the least competitive. Services markups were defined relative to goods markups on the basis of direct rather than joint estimates as union power is difficult to measure in the service sector. In general, services markets are more regulated and less contestable, implying higher markups than in goods markets. Lacking empirical estimates on the NMS, it was assumed that wage markups lie in the middle between the euro area and the RE block.

Adjustment costs for nominal and real variables enable GEM to mimic the typical humpshape reaction of macroeconomic variables to shocks observed in reality. There are adjustment costs to the capital stock and the level of imports and there is habit persistence in consumption and hours worked. Realistic dynamics require a fairly strong habit persistence, while a high intertemporal elasticity of substitution ensures reasonable fluctuations in real interest rates. Sticky prices are modeled through adjustment costs for wages and prices of domestic goods and imports. The adjustment costs have been calibrated to fit evidence from estimated vector autoregressions, but overall GEM responses tend to be somewhat faster.

III. HOW DO FISCAL AND MONETARY POLICIES FIT IN?

In GEM, monetary policy authorities are forward-looking and assumed to target inflation. Following Orphanides (2003),⁹ the following interest rate rule is implemented in the model (which is quarterly):

$$(1+i_{t})^{4} = (1-\alpha_{1})(1+i_{t}^{neutral})^{4} + \alpha_{1}(1+i_{t-1})^{4} + \alpha_{2}(1+\pi_{t+3}-\pi^{target})$$

where *i* is the nominal interest rate, $i^{neutral}$ the natural interest rate, and π inflation. For the euro area, the ECB sets monetary policy on the basis of area-wide indicators and has an inflation target of 2 percent. Hence, nominal interest rates in France and Belgium are determined by the ECB. Each country's inflation and output gap enter the ECB rule with the weight of its respective GDP in the euro area. With the euro as its currency, fluctuations in

⁸ More precisely, the OECD measure covers trade and investment restriction, regulatory barriers, discriminatory procedures, or ownership barriers; licensing and permits, administrative, sector-specific, and legal burdens, antitrust exemptions; and state influence measured by the size and scope of the public enterprise sector, direct controls over business, and price controls or restrictions on establishment. See Conway and others (2005).

⁹ See also WEO April 2005, Annex 3.3 to Chapter III.

individual member country's nominal effective exchange rate are limited. Consequently, changes in relative prices between traded and nontraded goods, or the real effective exchange rate, take the form of inflation differentials and result in important cross-country variations in the real interest rate after shocks. This also apply to countries with hard pegs to the euro, except that their circumstances do not enter at all in the ECB's reaction function. Hence, the conclusions of the paper regarding synchronization of reforms across countries are also valid for these countries.

Fiscal policy is modeled through a fiscal rule, which ensures debt sustainability in the long run. The tax rate on capital is fixed at 10 percent. Tax rates on labor adjust endogenously to keep public debt close to a target level. Hence, fiscal policy is essentially passive, with the only effect stemming from changes in tax-induced distortions in the labor-leisure choice. For the purpose of the simulations in this paper, this target level of public debt is kept constant and set at the latest historical observation. The speed of adjustment is very slow, set at 25 years, to avoid introducing short-term noise in adjustment dynamics. However, if structural reforms improve the tax base, the tax rate on labor is allowed to decline with positive feedback effects on the labor market. This long-term orientation of fiscal policy seems broadly consistent with the current reality facing both Belgium and France and most members of the EU.

IV. LONG-TERM GAINS AND SPILLOVERS ACROSS MARKETS AND COUNTRIES

The definition of the four blocks provides a natural design for the simulation exercise. The group of Denmark, Sweden, and the United Kingdom (RE) have on average more flexible labor and product markets than other parts of the EU. Hence, quantifying the effect of reforms which increase competition in these markets to the average level of this block is a meaningful benchmark. However, this does not imply that each of the three RE countries has an optimal level of competition nor that their average markup is a perfect benchmark. Similarly, zero markups should not be seen as ideal. Some markup may be justifiable as an incentive for innovation and as the result of efficiency-wage type contracts.

In the model simulations, reforms are implemented gradually and under certainty. Markups in labor and traded product markets are reduced to the level of the RE block over a period of five years, while in the nontraded sector (services), deregulation is assumed to progress slower, taking ten years. In the model, agents have perfect foresight, thus eliminating any uncertainty about the nature and path of these reforms.

The simulated overall gains from more competition in labor and product markets are substantial in terms of GDP, employment, and consumption (Table 2 and Figure 1). Once the adjustment to reform in all markets is complete, real GDP would be about 16 percent above the baseline in France and about 11 percent in Belgium. The difference between these two outcomes is due to the different starting point, with France somewhat further away from the

benchmark, particularly in the labor market. The capital stock would rise very substantially and hours worked would also rise, but by less. The increase in consumption is smaller than the gain in GDP, because resources need to be diverted to investment to maintain a higher capital stock.

	Real	Consum-	Hours	Capital
	GDP	ption	Worked	Stock
France				
Labor market	7.1	6.6	7.3	6.5
Nontraded services	6.0	4.7	5.6	9.0
Traded goods and services	2.6	1.4	1.6	5.9
All markets simultaneously	16.4	13.1	14.9	22.7
Belgium				
Labor market	4.7	4.2	4.9	4.1
Nontraded services	4.3	3.5	3.9	7.0
Traded goods and services	1.4	0.6	0.9	3.5
All markets simultaneously	10.7	8.3	10.3	15.8

Table 2. Long-Run Effects of Reducing Markups in Labor and Products Markets^{1/} (Deviations from baseline in percent)

1/ Markups were reduced by 22 percentage points in labor markets, 17 percentage points in the nontraded sector, and 7 percentage points in the traded sector.

Increasing competition in each market separately yields significant, though varying, gains in GDP and employment (Figure 2). Comparing the effects of reforms across markets is not straightforward. The impact depends on the magnitude of the reform (i.e., the distance from the benchmark) as well as the elasticity of output and employment to changes in relative prices. Further, the relationship between the elasticity of substitution across different products and labor inputs and respective markups is convex. Hence, reforms in the traded sector, where markups are small and not very different across blocks, do not yield large gains.

Complementarities between labor market reform and goods and services market reforms are important. When implemented in isolation, labor market reform raises output and consumption by broadly the same amount, but hours worked go up more than proportionally and the capital stock less than proportionally. Moreover, real wages remain permanently below baseline because goods and services prices do not decline in proportion with wages, as firms increase rents and limit the expansion of output (Figure 3). On the other hand, product market reforms raise the capital stock sharply, triggering higher real wages as labor becomes

relatively scarce. Consequently, output rises by more than hours worked. This result supports the Blanchard-Giavazzi (2003) argument that one may wish to implement product market reforms, which boost real wages, ahead of labor market reforms, which depress them. In addition, the total impact of the reforms is slightly larger than the sum of separate reforms, by about 0.5 percent for GDP. This is consistent with findings in the literature that the impact of reforms in one area is larger if other sectors of the economy are more efficient.

In the long run, international spillover effects are small, though not negligible and more important for welfare than output.¹⁰ The feedback effects on the rest of the euro area of an individual country's reforms are marginal and depend on the size of the reforming economy (Figure 4). Reforms in the traded goods sector end up having no spillovers at all. The effects of reforms in the labor market and the nontraded goods and services sector on output abroad are very small. Similarly, the spillovers from joint reforms in the euro area are small in terms of output (e.g., 0.9 percent in the case of France out of a total of 17.5 percent, and 0.7 percent in the case of Belgium out of 11.5 percent, Table 3 and Figures 5a and 5b). The limited size of spillovers in the long run stems from the fact that the reforms drive up supply and income in the reforming country proportionally, ultimately leading to a similar demand response. However, reforms on its own and attempts to sell more output abroad. Hence, joint reform leads to higher consumption and lower hours worked and thus more welfare than stand-alone reforms.

¹⁰ The size of these spillovers depends on the elasticity of substitution between imports and domestic production, but within a reasonable range for this parameter the conclusions are not significantly different.

	Deal CDD	Consum-	Hours	Capital
	Real ODP	ption	Worked	Stock
France ^{1/}				
Labor market	7.5	7.4	7.5	7.3
Nontraded services	6.1	4.9	5.6	9.3
Traded goods and services	3.1	2.2	1.8	6.8
All markets	17.5	15.0	15.4	25.0
Of which: spillover from Euro area	0.9	1.7	0.5	2.0
Belgium ^{2/}				
Labor market	5.0	5.0	5.1	4.8
Nontraded services	4.3	3.5	3.9	7.0
Traded goods and services	1.7	1.3	1.0	4.2
All markets	11.5	10.1	10.3	16.9
Of which: spillover from Euro area	0.7	1.4	0.4	1.4

Table 3. Synchronized Euro Area-Wide Structural Reform – Long-Run Impact (Deviations from baseline in percent)

1/ Markups were reduced in France by 22 percentage pints in labor markets, 17 percentage points in nontraded sectors, and 7 percentage points in traded sectors. The markup reductions in the euro area were 22, 16, and 7 percentage points, respectively.

2/ Markups were reduced in Belgium by 16 percentage pints in labor markets, 15 percentage points in nontraded sectors, and 5 percentage points in traded sectors.

V. SHORT-TERM COSTS AND SYNCHRONIZATION OF REFORM ACROSS MARKETS AND COUNTRIES

The dynamic adjustment paths of real variables differs significantly between reforms. In response to labor market reforms, employment rises and investment takes off, gradually pushing output above baseline (Figure 6). Wages stay below baseline as union bargaining power is reduced, leading to a fall in inflation and pushing up the real interest rate. The combined effect of these developments keeps consumption below baseline for about 1½ to 2 years and overall domestic demand lags supply. To bring in foreign demand, the real exchange rate depreciates, and the current account moves above the baseline. As the adjustment proceeds, domestic income rises sufficiently to trigger a positive consumption response, reversing these developments. The simulations suggest that it takes about 4 to 5 years to complete the transition.

Reforms in the traded goods and services sector immediately lift all real variables, driven by an investment boom which is larger than in the case of labor market reforms since the relative price of capital to labor does not rise (Figure 7) and the real interest rate falls. Increasing competition in the traded goods sectors makes domestic firms internationally more competitive as well. Since they are partly price-taker, they can afford to pay somewhat higher wages, which quickly leads to an expansion of demand, a real appreciation, and a current account temporarily below baseline.¹¹

Conversely, reforms in the nontraded sector have an initial negative effect on output, consumption, and employment, even though investment responds positively, helped by the relative decline in the price of capital goods (Figure 9). The reforms lead to the largest fall of inflation, mainly because initial markups are larger than in other markets and there is limited flexibility to shift resources between traded and nontraded sectors. Real wages rise but the real interest rate effect dominates to dampen domestic demand and the real exchange rate depreciates while the current account moves above baseline. In the set-up chosen here, i.e., gradual, certain reforms over ten years, the adverse transitory impact on output will peak after about 5 quarters and that on consumption after about 2 years.

Given the differences between the impact of reforms in traded goods and services markets and those in the other markets, synchronization of reforms across markets in a given country reduces transition costs. It is possible that a judicious combination of reforms can eliminate the transitory costs in terms of output though this depends on the magnitude of the reform, the degree of openness of the economy, and the ease with which resource can be reallocated across sectors. In particular, with traded goods and services markets already more flexible in most European countries, there is not much scope to exploit further reform in these markets. As a result, model simulations suggest that France can achieve this outcome but Belgium cannot (Figure 9). In any case, in neither country is there enough room to offset the adverse transitory effects on consumption.

Inflation plays a key role in short-term aggregate dynamics, underscoring the potential role of monetary policy and synchronization of reforms across countries. When markups are reduced only in the reforming country, area-wide nominal interest rates fall very little, as monetary policy reacts only to euro area-wide indicators. In the case of France, there is a small effect, though never more than about 0.2 percentage points, while the effect in the case of Belgium is unnoticeable. When prices fall (compared to baseline) monetary conditions in the reforming country tighten, exerting additional deflationary pressure. The depreciation of the real effective exchange rate, needed to balance supply and demand, must come about through temporary lower inflation, further depressing prices, and raising the real interest rate. In the

¹¹ Alternatively, more competition in the traded sector lowers traded goods prices vis-à-vis nontraded services prices and therefore represents a real appreciation of the home currency.

presence of nominal rigidities, insufficient monetary accommodation slows the response of investment and consumption.

Coordination of the timing of structural reforms in the euro area results in faster adjustment and eliminates transition costs. When markups are reduced in the entire euro area, nominal interest rates fall sufficiently to avoid transitory declines in output and, importantly for the political economy of reform, also in consumption. In the first few years, rather than rising above baseline, the real interest rates falls below it (Figure 10). This makes a large difference to demand: with stand-alone reforms, consumption in France would be 3 percent *below* baseline by the end of the first year and investment 4 percent above. With reforms synchronized across the euro area, consumption would be 1 percent *above* baseline and investment almost 9 percent. Similar conclusions hold for reforms in labor and nontraded services markets separately (Figure 11 and 12).

VI. TAKING THE MODEL TO THE REAL WORLD

GEM as specified in this paper does not contain explicit interactions between markups in product and labor markets. Research suggest that the impact of reforms in one market depend on the degree of flexibility of other markets and may show up through an increase in TFP growth (Estevão, 2005). Such interactions would tend to amplify the results of the model which are driven only by increases in factor supply in response to increased efficiency of labor and capital use. Conversely, rigidities in one market may prevent economies from reaping the benefits from reforms in an other market. The most obvious example would be when product market reforms reduce firms' markups but labor unions are unwilling to lower their demands on the remaining markup, thus causing the rate of return of investment to fall in the affected industries, which would dampen the investment response.

Uncertainty is not considered explicitly in the model. It is unlikely that agents will fully believe or understand the implications of the reforms and act to deliver certainty-equivalent results. Thus, the initial response to reforms will be more muted than suggested by the simulations. Monetary authorities will react in a similar manner and are likely to have a conservative bias, preferring to wait to see some results on the supply side before reacting. This is likely to delay the benefits from synchronized reforms.

The availability of good estimates of markups and the ability to map real world reforms into changes in these markups is key for the GEM approach to be convincing in assessing the impact of structural reforms and inform policy choices. On the former, more evidence is becoming available, especially for labor markets and traded goods sectors, but for services sectors progress is more difficult and, overall, country coverage is incomplete. On the latter, the simplicity of modeling markups in GEM makes the analysis tractable, but comes at the expense of having to be agnostic about specific reasons for imperfect competition. GEM has

no built-in mechanisms to help with mapping from reforms to markups, but this can be done outside the model, as illustrated by the following examples.

GEM calibrated for Belgium was used to simulate the macroeconomic impact of network industry reform (Van der Linden, 2006). The reduction in the price-cost markup in the sectors of energy and auxiliary transportation and communication was computed exogenously based on an analysis of "the economic rent" or operating surplus of the industries before and after reforms. It was estimated that it would lead to a decline in the overall markup in the traded goods and services sector by about 6 percent and the nontraded services sector by 3 percent (e.g., the markup ratios in traded and non traded sectors would fall from 1.19 to 1.179 and from 1.39 to 1.377, respectively). In steady state, these reforms would raise GDP in Belgium by about 1.1 percent and consumption and hours worked by a similar amount.

GEM calibrated for France was used to estimate the impact of a set of product market reforms that would reduce France's markup in the nontraded services sector to within 10 percent of the markup of the control group of Denmark, Sweden, and the UK, using the OECD's product market regulation indicators. The reforms were selected on the basis of the size of their impact and consisted of relinquishing control over enterprises in 9 out of 18 sectors of the economy in which the state still controls enterprises, reducing the size of public ownership of commercial enterprises as measured by the value of assets which can be privatized, liberalizing shop opening hours, and requiring regulators to assess alternatives to regulation before adopting regulations. In the long run, these reforms would boost GDP by somewhat more than 4 percent, though there would be transition costs when implemented in isolation (Table 4).

Year	1	5	10	Steady state
GDP	-0.80	2.96	4.13	4.26

Table 4. France: Output effect of lowering nontraded services market markupto within 10 percent of the benchmark (cumulative, in percent)

Source: GEM simulations of standalone reforms

VII. CONCLUDING REMARKS

Simulations with the IMF's Global Economic Model calibrated for the EU suggest that it pays to synchronize structural reforms across markets and across countries for members of the euro area (and for countries with hard pegs to the euro). Making traded goods markets more competitive has immediate positive effects on output and real wages and can help mitigate the negative impact of labor market reform on real wages in both the short and the long run and the transitory negative effects on consumption and output of reforms in the nontraded services sectors. However, because traded goods markets are already flexible there

is not enough scope for using reforms in these markets to fully compensate for the adverse transitory effects of services sector reforms.

Synchronization of reforms across countries plays a crucial role since it brings into play monetary policy. By simply pursuing its objective of price stability, the monetary authority will be able to react more forcefully to synchronized reforms simply because they will exert a much stronger downward pressure on prices than standalone reforms in any given member country. The simulations indicate that this reaction would be sufficient to eliminate transition costs. Conversely, a member of the euro area has less incentive to reform on its own since it would face tighter monetary conditions for a while.

Quantifying the long-run and transition effects of structural reforms remains a challenge but the rich parameterization of underlying behavior and adjustment dynamics in GEM facilitates experimentation with different specifications. In the specification chosen here, long-run gains in reforming countries are on the order of 15 percent of output, a reasonable estimate when levels of GDP per capita are compared with the benchmark. The adjustment path of all standalone reforms is characterized by a strong positive investment response, but labor and nontraded services market reforms have a negative impact on consumption and in some cases on output. In the former case, this is mainly due to a fall in real wages, while in the latter case it results from higher real interest rates. The model predicts the negative effects on consumption to last about 6 quarters and that on output losses, when they occur, 2 to 3 quarters. Typically, the current account of the reforming country improves in the transition, remaining above its pre-reform level for several years. The negative effects on consumption and output disappear with synchronization of reforms across countries and the effects on the current account are smaller.



Figure 1. Long-Term Impact of Standalone Structural Reforms: France and Belgium (Deviation from control, quarters)







Figure 3. Long-Term Effect of Structural Reform On Real Wages: France and Belgium (Deviation from control, quarters)



Figure 4. Long-Term International Spillovers of Reforms in France (Deviation from control, quarters)











Figure 6. Labor Market Reforms In France and Belgium: Transition Dynamics















Figure 10. Synchronized Reforms Across Countries: Transition Dynamics









APPENDIX I. CALIBRATION AND STRUCTURE OF THE MODEL

Behavioral parameters were taken from the relevant literature, some of which are invariant across countries, while others were modified using country-specific information (Appendix I Table 1).

	Belgium	France	Euro	RE ²	NMS ³
	_		Area		
Parameters					
Elasticities of substitution					
Intertemporal consumption elasticity	3.00	3.00	3.00	3.00	3.00
Labor supply elasticity (Frisch)	0.33	0.33	0.33	0.33	0.33
Capital-Labor substitution	0.80	0.80	0.80	0.80	0.80
Tradables and nontradables	0.50	0.50	0.50	0.50	0.50
Domestic tradables and imports	2.50	2.50	2.50	2.50	2.50
Home bias					
Consumption goods 1/	0.18	0.37	0.61/0.71	0.63/0.75	0.51/0.22
Capital goods 1/	0.25	0.44	0.61/0.79	0.65/0.85	0.49/0.22
Liquidity-constrained consumers (share)	0.35	0.35	0.45	0.25	0.55
Discount rate (1.03 ^{-0.25})	0.993	0.993	0.993	0.993	0.993
Habit persistence					
Consumption	0.91	0.91	0.91	0.91	0.91
Labor supply	0.80	0.80	0.80	0.80	0.80
Country size (population share) 1/	2.3	13.9	65.4/53.8	16.1	16.2

Appendix rapic r. Science Campi anon rapiditi	Appendi	x Table 1.	Selected	Calibration	Parameter
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1/ The first number reflects calibration for Belgium, the second for France.

2/ RE=Denmark, Sweden, United Kingdom

3/ NMS=New member states (in 2005)

The elasticity of labor supply with respect to wages determines the magnitude of the response of hours worked to labor market reforms. Estimates of this elasticity vary considerably across the literature depending on the methodology followed and the sample considered. This elasticity is typically found to be low for those in permanent full-time jobs and relatively high for other types of jobs. A recent metaregression suggest a parameter of about 0.33 (Evers, De Mooij, and Van Vuuren, 2005).¹² Estimates of this parameter appear to

 $^{^{12}}$ This metaregression (using 239 elasticities from 32 empirical studies) predicts the elasticity for men to be 0.1 or 0.2 depending on model specification and for women 0.5. Here, the average is taken assuming equal numbers of men and women at the margin.

be quite similar across countries. A recent study for Belgium sets the value of this parameter to be 0.3, though only 0.12 for men only (Konings, 2005).

Home bias parameters are related to the size of the economy, its openness to trade, and the elasticity of substitution between imported and domestically-produced goods in the CES production and consumption functions. GEM computes the summary parameters on the basis of assumed elasticities and actual data on trade. These parameters can be interpreted intuitively as follows: for example, in the case of Belgium, the bias for domestically-produced goods over imported traded consumption goods is 0.18. This implies that Belgian consumers demand about 18 percent more goods produced at home compared to a situation of indifference (zero bias) between home and foreign-produced traded goods. Zero bias is defined as the case in which the share of home-produced traded goods is the same as the relative size of the economy in the world.

While household preferences are similar across all households, part of consumption is subject to liquidity constraints. Estimates of the share of liquidity-constrained consumers—which is not exactly the same as liquidity-constrained consumption, the concept used in GEM—vary a great deal and do not seem to be robust in the literature (Fernandez-Corugedo and Price, 2002). Campbell and Mankiw (1991) estimated this fraction at between 40 and 50 percent for the United States, while Weber (2000) could not reject the hypothesis that there were no "rule-of-thumb" or liquidity-constrained consumers. Iacoviello (2004) estimates the amount of consumption subject to liquidity constraints to be between 20 and 25 percent for the United States, a figure close to what is used in other simulations.¹³

Consequently, the share of liquidity-constrained consumers for the financially most advanced countries (Denmark, Sweden, and the United Kingdom) was set at 25 percent. For the euro area, estimates for individual countries ranged between 20 and 60 percent (Roeger and in 't Veld, 1997). It was assumed that Belgium and France do somewhat better than average as they have relatively deep financial markets, with a share of 35 percent of consumers liquidity constrained, and the rest of the euro area somewhat worse with a share of 45 percent. For new member states, the share was set at 55 percent, in line with estimates by Coricelli, Mucci, and Revoltella (2005).

The figures below indicate the trade relations and relative sizes of the blocks of the model used for simulations for France and Belgium, respectively.

¹³ Roeger and in 't Veld (1997) impose 30 percent for all countries in the world for simulations with QUEST.



Trade (in percent of GDP) covers intra-EU flows only. Therefore, the four blocks appear less open than they are in reality, and the spillover effects are limited to those that benefit EU members.¹⁴ Overall trade covers goods and services, while the geographic orientation and sector composition are based on trade in goods only.¹⁵ It is assumed that bilateral services trade flows are proportional to trade in goods. For France, this assumption seems relatively innocuous, but for highly services-oriented Belgium, it may introduce a small bias as geographical distributions of services and goods trade may not fully match. In addition, in order not to overestimate the openness of the Belgian economy, transit trade (estimated at 55 percent of total) was excluded.¹⁶

The size of the public sector helps determine the share of nontraded goods in GDP and the role of competitive markets. The public sector is larger in France than in the other country blocks, absorbing about 26.2 percent of GDP, compared to 21.5 percent elsewhere.¹⁷ The difference stems from public consumption, more specifically from a higher public sector wage bill (13.9 percent of GDP in France, compared to 11 percent or slightly less in the other three blocks. Public investment in France (2.8 percent of GDP) is only marginally higher than elsewhere. In contrast, the size of Belgium's public sector is smaller than the EU average, absorbing about 19.6 percent of GDP, compared to 22.8 percent. Though the wage bill (12.2 percent) is slightly higher than in the other three blocks, total public consumption is marginally lower. Public investment (1.6 percent of GDP) is noticeably smaller.

¹⁴ Bayoumi, Laxton, and Pesenti (2004) estimate spillovers from the euro area to the rest of the world, which <u>http://www-int.imf.org/gen/redbook/2documen/22tables/222stand/2221font.htm</u>provide a benchmark for the degree of underestimation of spillover effects due to the reduced-openness assumption. They estimate joint labor and product market reforms in the euro area to yield 12.4 percentage points of output with a spillover effect on the rest of the world of 0.8 percentage point of output.

¹⁵ Trade flows are based on the UN COMTRADE statistics. For the sake of simplicity, the commodities sector was excluded from this version of GEM.

¹⁶ This estimate is approximate. It was guided by the observation that according to input-output tables, about 45 percent of final domestic demand consists of imports (Avonds, 2005, Table 47).

¹⁷ The resource allocation to the public sector is based on national accounts data (WEO database, 2004). It does not include interest payments and transfers.

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