

*This chapter finds that product and labor market reforms raise output and employment in the medium term, but complementary macroeconomic policies are needed to maximize their short-term payoff given the current economic slack in most advanced economies. Product market reforms deliver gains in the short term, while the impact of labor market reforms varies across types of reforms and depends on overall economic conditions. Reductions in labor tax wedges and increases in public spending on active labor market policies have larger effects during periods of slack, in part because they usually entail some degree of fiscal stimulus. In contrast, reforms to employment protection arrangements and unemployment benefit systems have positive effects in good times, but can become contractionary in periods of slack. These results suggest the need for carefully prioritizing and sequencing reforms.*

Worries have deepened over the persistent sluggishness of growth in advanced economies since the 2008–09 global financial crisis. The growth rate of potential output—defined as the level of output consistent with stable inflation—has declined in major advanced economies, and it is likely to remain below precrisis levels through the medium term (see Chapter 3 in the April 2015 *World Economic Outlook*). Although the global financial crisis was a factor in this slowdown, not least through its effect on investment, the decline in potential growth started in the early 2000s, which suggests that deeper structural factors have been at play (Figure 3.1).

As a result, the continued weakness of growth and shrinking macroeconomic policy space, especially in several euro area countries and in Japan, have led policymakers to emphasize structural reforms. The hope is that such reforms will lift potential output over

the medium term while also strengthening aggregate demand in the near term by raising consumer and business confidence.

High on the agenda are several reforms designed to strengthen the functioning of product and labor markets (IMF 2015; OECD 2015). Although the specifics vary widely for individual countries, these reforms broadly involve the following:

- Deregulating retail trade, professional services, and certain segments of network industries (air, rail, and road transportation; electricity and gas distribution; telecommunications and postal services), primarily by reducing barriers to entry
- Increasing the ability of and incentives for the non-employed to find jobs, by boosting resources for and efficiency of active labor market policies, reducing the level or duration of unemployment benefits where these are particularly high, or both
- Lowering the costs of and simplifying the procedures for hiring and dismissing regular (that is, permanent) workers and harmonizing employment protection legislation for both regular and temporary workers
- Improving collective-bargaining frameworks in instances in which they have struggled to deliver high and stable employment
- Cutting the labor tax wedge—that is, the difference between the labor cost to the employer and the worker's net take-home pay
- Implementing targeted policies to boost participation of underrepresented groups in the labor market, including youth, women, and older workers

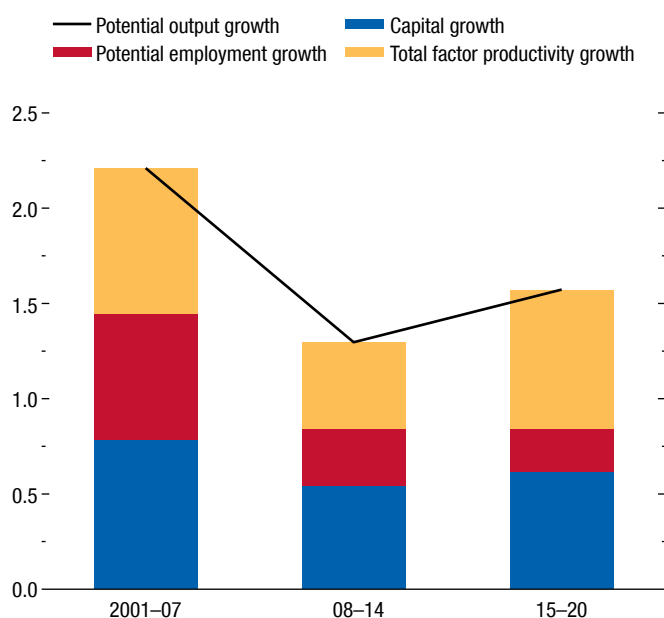
The reforms on this menu, though highly diverse, all aim either at reducing policy distortions or at improving the way existing institutions address imperfections in markets. For example, governments can improve the way they provide income insurance to workers by more effectively combining unemployment benefits, employment protection legislation, and active labor market policies.

The long-term gains that labor and product market reforms generate for advanced economies and the channels through which they operate (increased productivity,

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**Figure 3.1. Evolution of Potential Output Growth and Its Components in Advanced Economies**  
(Percent)

Potential growth has declined in major advanced economies, and it is likely to remain below precrisis levels through the medium term.



Source: IMF staff estimates.

Note: This figure draws on Figure 3.11 in the April 2015 *World Economic Outlook*.

lower unemployment, higher labor force participation) are fairly well documented (see, for example, Bouis and Duval 2011 and the studies cited therein). Much less is known, however, about the short- to medium-term effects of such reforms on aggregate output, employment, and inflation. On one hand, credible structural reforms may strengthen confidence and enhance expectations and thereby boost aggregate demand (Draghi 2015). On the other, they may further weaken demand through wage and price deflation, which can increase real interest rates in countries where monetary policy is already constrained (Eggertsson, Ferrero, and Raffo 2014; Krugman 2014). Both scenarios presume that reforms have a fairly quick and sizable impact on supply (potential output). A broader concern is that even the most effective reforms might have merely a small short-term supply benefit because of the length of time the economy needs to converge to a (higher) long-term output level (Rodrik 2015).

This chapter employs new data and modeling techniques to assess whether product and labor

market reforms can improve the economic outlook in advanced economies. Specifically, the chapter

- Summarizes the evolution of a wide range of product market regulations and labor market structures across advanced economies over the past four decades and assesses the scope for further reform
- Examines the channels through which reforms affect economic activity under strong versus weak economic conditions, drawing on a new model that differentiates between specific regulations (for example, the costs of layoff procedures and barriers to entry), unlike other model-based studies
- Applies novel empirical strategies to a new database of reforms to create a fresh quantitative assessment of their short- to medium-term macroeconomic effects, including their sensitivity to the state of the business cycle and the stance of macroeconomic policies
- Considers how—in light of the findings—reforms might be sequenced and supported by other policies to maximize their potential quantitative economic benefits in the near and medium term

These are the chapter's main findings:

- A number of advanced economies still have significant room for further deregulation in retail trade and professional services and in a few network industries. Labor market institutions are more varied across countries and are also more stable over time than are product market regulations. In some cases this stability reflects the success of several different institutional models in delivering good labor market outcomes, but in many others it highlights obstacles to reforming poorly functioning institutions and the scope for further efforts.
- The product and labor market reforms considered in this chapter can make important contributions to potential output and employment levels in many advanced economies over the medium term (Table 3.1). They therefore warrant further effort, particularly in most euro area countries and in Japan. Their contributions are likely to be modest in the short term, however, because it takes time for the benefits to materialize, particularly where economic conditions remain weak.
- Product market reforms also have some expansionary effect in the short term. This effect does not depend markedly on overall economic conditions, but the impact on investment tends to be weaker for credit-constrained firms.

**Table 3.1. Effect of Product and Labor Market Reforms on Macroeconomic Outcomes**

The effects of structural reforms depend on the type of reform, overall economic conditions, and the horizon considered.

Area of Reforms	Normal Economic Conditions		Weak Economic Conditions		Strong Economic Conditions	
	Short Term	Medium Term	Short Term	Medium Term	Short Term	Medium Term
Product Market	+	++		+	+	++
Employment Protection Legislation			–	– –	+	++
Unemployment Benefits	+	++	–		+	++
Labor Tax Wedge	++	++	++	++		
Active Labor Market Policies	++	++	++	++		

Source: IMF staff estimates.

Note: The macroeconomic outcomes are output and/or employment; + (–) indicates positive (negative) effect; the number of + (–) signs denotes the strength of the effect. The effect of labor tax wedge decreases and spending increases on active labor market policies is smaller but remains positive when these measures are implemented in a budget-neutral way.

- The effects of labor market reforms depend on overall economic conditions:
  - Fiscal structural reforms in the labor market area, such as reduced labor tax wedges and increased public spending on active labor market policies, have larger effects during periods of economic slack, in part because they usually entail some degree of fiscal stimulus.
  - In contrast, reforms to employment protection arrangements and unemployment benefit systems have positive effects in good times, but can become contractionary in periods of slack because they can weaken aggregate demand.
- However, there is no compelling evidence that reform impacts in advanced economies have been weakened in the short term by interest rates that have been at or near zero since the global financial crisis. It is unclear in theory and based on past episodes whether reforms have substantial deflationary (or inflationary) effects.
- Complementary policies can offset the short-term costs of some structural reforms. These include supportive macroeconomic policies and intensified efforts to address weaknesses in bank and corporate balance sheets—for example, through stronger corporate insolvency frameworks and the development of distressed debt markets by improving market infrastructure and using asset management companies to jump-start the market in some cases (Aiyar and others 2015).

These results suggest that prioritizing and sequencing reforms can be particularly important for optimizing their impact in the current environment of persistent slack in most advanced economies. Reforms that entail fiscal stimulus will be the most valuable,

including reducing labor tax wedges and increasing public spending on active labor market policies. Such measures will also remain effective when implemented in a budget-neutral way, for example, as part of broad tax and spending reforms. Product market reforms should also be prioritized, because they boost output regardless of overall economic conditions and because they do not weigh on public finances.

Other labor market reforms could be costly in the short term under current conditions, including reductions in unemployment benefits and—especially—reform of job protection rules. One strategy could be to enact such measures with a credible proviso that they will come into force only when the recovery is more robust. Such an approach could induce firms to invest and hire prospectively, in advance of the actual implementation of the reforms. Grandfathering reforms—that is, applying new rules only to new beneficiaries (of permanent job contracts or unemployment benefits) and exempting current beneficiaries—is an alternative, possibly easier-to-implement way to achieve the same goal. Another common concern with these labor market reforms is that they may increase income inequality. Preliminary analysis does not point to significant distributional consequences of the reforms studied in this chapter, with the exception of reductions in unemployment benefits, which appear to raise inequality over the medium term. This possibility provides a case for strengthening job search support and incentives without cutting benefits, or at least for complementing benefit reforms with offsetting fiscal measures targeted at lower-income households.

There is also a case for fiscal rules that accommodate structural reforms, especially in periods of weak

economic conditions. Expansionary fiscal policy can offset the short-term costs of certain reforms (for example, to employment protection legislation) and amplify the gains from others (for example, from tax wedge reductions or increased spending on active labor market policies) (see also Chapter 2 in the October 2014 *Fiscal Monitor*). Thus, in countries that have a credible medium-term fiscal framework and available fiscal space, it could be beneficial to use fiscal policy to advance the implementation of reforms while committing to tightening later, when fiscal consolidation becomes less costly. This strategy could facilitate the adoption of reforms while amplifying their payoff over the medium term.

Given the uncertain effects of product and labor market reforms on prices, and amid persistent low inflation in many countries, strong and credible monetary policy frameworks that keep medium-term inflation expectations anchored and ease the zero-lower-bound constraint on policy rates—including quantitative easing or negative deposit rates, where relevant—can preempt the risk that reforms will lead to deflation, increase the real interest rate, and lower aggregate demand.

The policy prescriptions in this chapter represent a first-best strategy to maximize the impact of reforms in the current environment of persistent slack, but it may not always be feasible to implement them. For example, binding macroeconomic policy constraints may sometimes rule out demand support for labor market reforms even under weak macroeconomic conditions. Likewise, in some cases political economy constraints may call for pursuing difficult reforms when there is a window of opportunity—such as during periods of protracted slow growth. In such cases, reforms are pursued for their long-term benefits, but expectations regarding their short-term impact should be realistic.

Finally, despite the clear benefits, reforms in product and labor markets alone cannot counteract the persistent decline in potential growth that started in the early 2000s and was amplified by the global financial crisis. Past reforms have reduced the scope for further progress in some areas, and the empirical evidence in this chapter suggests that the impact of reforms eventually levels off. Product and labor market reforms should therefore be combined with complementary actions in other areas, including education, innovation, and tax and spending policies (April 2016 *Fiscal Monitor*, Chapter 2).

## The Economics of Product and Labor Market Reforms: A Primer

Product and labor market reforms are motivated by multiple public policy objectives. They can raise long-term output by boosting productivity, investment, and employment. They may affect income inequality by changing the distribution of jobs, market wages, and nonwage income (social benefits and taxes). Public finances and debt sustainability may also depend on reforms, including through effects on long-term output. Reforms that increase the responsiveness of wages and prices to business conditions can promote microeconomic efficiency while enhancing economic resilience by smoothing adjustment to macroeconomic shocks.

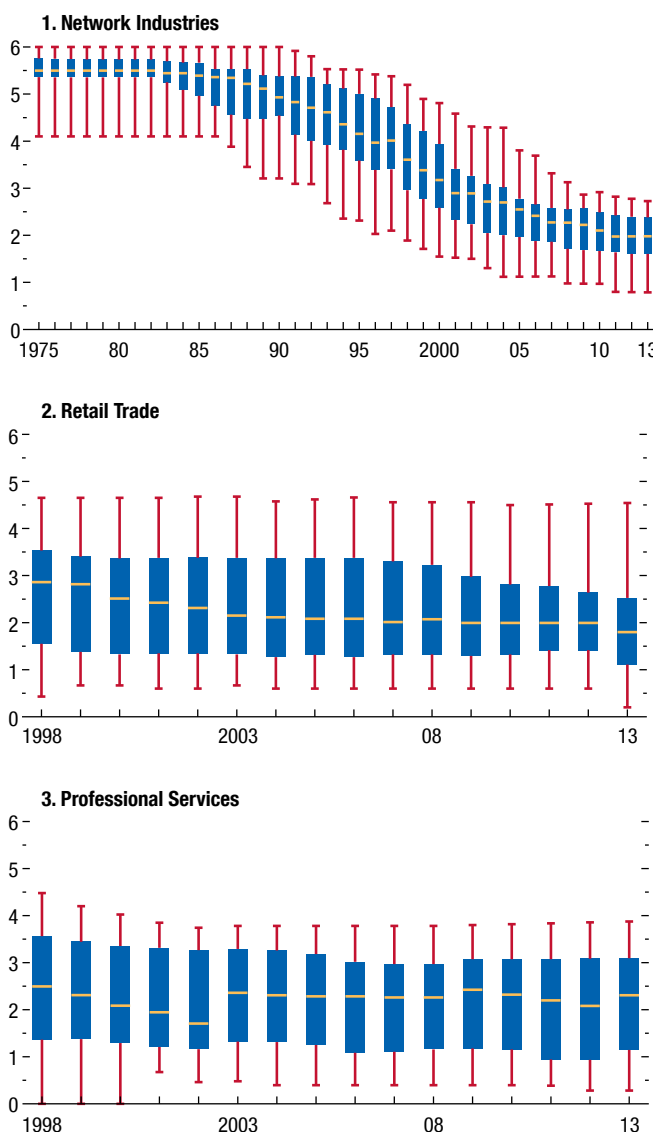
This chapter focuses on how various product and labor market reforms affect macroeconomic outcomes, particularly output and employment. Reforms can be classified according to the nature of their impact:

- *Reforms that enhance productivity*—In theory, pro-competitive product market reforms boost growth by lowering the prices that firms charge consumers, by improving the use and allocation of labor and capital across firms, and by enhancing firms' incentives to invest, absorb cutting-edge technologies, and innovate. Such reforms include, in particular, measures aimed at facilitating new firms' access to markets, lowering the administrative burden on corporations, and easing barriers to foreign direct investment and trade. Advanced economies have made major progress in all of these areas over the past two decades—for instance, in deregulating network industries (Figure 3.2). Nonetheless, there remains scope for further progress in many European countries as well as in Japan and Korea (Koske and others 2015). Although the specifics vary from country to country, there are opportunities to further strengthen competition in nontradables industries, including in some network industry segments, as well as in retail trade and professional services, where significant and rather stable barriers to entry remain in some countries (for example, Canada, France, Germany, Italy, Japan, and Spain). Reform of employment protection systems may also boost productivity by enhancing resource (re)allocation across firms and industries (Bassanini, Nunziata, and Venn 2009). Other important productivity-enhancing reforms that are beyond the scope of this chapter involve strengthening innovation policies and education systems, as well as altering tax and spending policies (see Chapter 2 in the April 2016 *Fiscal Monitor*).

- *Reforms that lower structural unemployment*—Economic theory suggests that easing barriers to entry into product markets, reducing the level or duration of unemployment benefits where particularly high, strengthening active labor market policies, and lowering labor tax wedges can all reduce unemployment over the long term by increasing the demand for labor, unemployed workers' ability and incentives to find jobs, or both (Blanchard and Giavazzi 2003; Nickell and Layard 1999; Pissarides 2000). Easing employment protection legislation enhances the relative job prospects of underrepresented groups, such as low-skilled youth and migrants, in the labor market, but it can have an unpredictable impact on *aggregate* unemployment, since it increases incentives both to hire and to dismiss workers. Reforms in this area may also have different effects depending on their design, such as whether they apply to regular or temporary jobs (for example, Blanchard and Landier 2002). Labor market regulations are much more stable over time than are product market regulations—with the exception of some widespread relaxation of employment protection for temporary workers; to a lesser extent, they also vary more across countries (Figure 3.3). The stability of labor market institutions within countries and their variability across countries partly reflect political economy factors that so far have impeded the reform of poorly functioning institutions (Box 3.1). However, they also illustrate that societal preferences vary (for example, over economic risk) and that different institutional models can be effective in accommodating those preferences (for example, Blanchard, Jaumotte, and Loungani 2014). For instance, despite some cuts in benefits since the early 1990s, Nordic countries have maintained comparatively generous unemployment insurance systems while relying extensively on active labor market policies to reduce unemployment (OECD 2006). Likewise, different collective wage-bargaining systems may deliver high and stable employment, provided they ensure that wages adequately reflect business conditions (Box 3.2). More broadly, experience suggests that both “Anglo-Saxon” and “Nordic” models can deliver high employment rates (OECD 2006; Sapir 2006).
- *Reforms that raise the participation of underrepresented groups in the labor market*—Despite some convergence, the fact that women, youth, low-skilled migrants, and older workers continue to display widely different participation rates across countries contributes to cross-country differences

**Figure 3.2. Evolution of Product Market Regulations**  
(Scale, 0–6; higher score indicates stricter regulations)

Major progress has been achieved in deregulating network industries, but there remains scope for further reform efforts, particularly in the areas of retail trade and professional services.

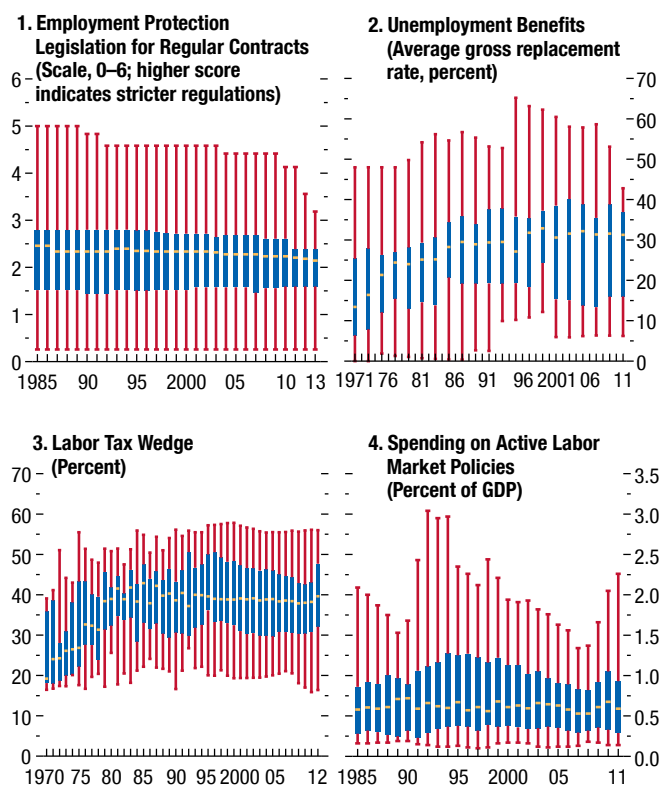


Sources: Koske and others 2015; and IMF staff calculations.

Note: The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles; and the red markers denote the maximum and the minimum. Network industries are air, rail, and road transportation; electricity and gas distribution; and telecommunications and postal services.

**Figure 3.3. Evolution of Labor Market Institutions**

Labor market regulations are generally more stable over time and also vary more across countries than product market regulations.



Sources: Organisation for Economic Co-operation and Development, Indicators of Employment Protection, Benefits and Wages, Tax Statistics, and Social Expenditure databases; and IMF staff calculations.

Note: The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles; and the red markers denote the maximum and the minimum.

in overall employment rates and suggests that there is scope for improving current policies. Options for encouraging more women to enter the labor force include reducing the (marginal) income taxation of second earners, enhancing the availability and reducing the cost of child care, and promoting policies that improve work-life balance—for instance, expanded scope and incentives for part-time work and parental leave (for example, Jaumotte 2003). Among the policies that can strengthen the labor participation of youth and low-skilled migrants are targeted active labor market policies (such as training programs), combined with demand-side policies that create job opportunities, such as lower tax wedges and youth-specific minimum wages. For older workers, it is important to reduce incentives

for early retirement, not least by lowering the implicit taxation on continued work often embedded in old-age pension systems—for example, when bonuses (penalties) for deferred (anticipated) retirement are too weak (Stock and Wise 1990)—but also by limiting the extent to which other social welfare programs can be used as pathways into early retirement (Duval 2003).

The short- to medium-term effects of these product and labor market reforms are more uncertain and are likely to vary widely depending on how they affect current aggregate demand and supply. If demand increases (declines) more than supply, overall use of domestic resources may increase (decrease), and inflation may rise (decline) as a result. This depends, in turn, on how reforms influence expectations (through their credibility and communication), wages and income distribution, the strength of the external competitiveness channel, and income and job security (actual or perceived). Transitory costs also matter. Employment protection reform may trigger immediate layoffs—especially in bad economic times—whereas hiring can take more time. Product market deregulation may lead to rapid downsizing or exit of incumbent firms but only gradual new firm entry, for example, in some network industries in which it can take time to build a network and a customer base. Finally, the short- to medium-term impact of reform can be shaped by macroeconomic policies.

## The Macroeconomic Effects of Reforms: A Model-Based Analysis

This section looks at the macroeconomic effects of reforms using a new dynamic general equilibrium model that incorporates key features of product and labor market regulation (see Annex 3.1 for details and Cacciatore and others, forthcoming-b). This model offers some key benefits: it helps shed light on the transmission channels through which reforms affect economic activity, and it addresses relevant policy issues that cannot be fully explored in the empirical analysis—such as how the zero lower bound on nominal interest rates affects the short-term impact of reforms and the immediate impact of credible announcements of future reforms.

### Model Description

The model addresses two key limitations of past studies: (1) it explicitly includes, and differentiates

among, a broad range of specific product and labor market policies, and (2) it features some real-world imperfections in product and labor markets, such as irreversible (regulatory and other) investment costs that new firms have to pay when entering the market and job-search-and-matching frictions in the labor market that make job creation a gradual and costly process.

The analysis uses the model to explore the impact of four types of product and labor market reforms: lowering anticompetitive barriers to entry in nontradables sectors, reducing administrative costs of firing procedures, cutting the levels or duration of unemployment benefits, and strengthening active labor market policies that more efficiently match prospective workers to job openings. Reforms can be carried out in three distinct macroeconomic environments:

1. *Normal times*—that is, normal business conditions
2. *Bad times with unconstrained monetary policy*—that is, assuming that the policy rate could go below zero, or equivalently, that quantitative easing could in practice fully relax the zero-lower-bound constraint
3. *Bad times with constrained monetary policy*—that is, a combination of major slack in the economy, driven by a large adverse demand shock, and a binding zero lower bound on the monetary policy rate.<sup>1</sup>

The analysis highlights what difference the macroeconomic environment makes for the effect of different reforms.

### Short- and Long-Term Effects of Reforms

All four types of reforms studied here increase the level of output in the long term by raising productivity, employment levels, or both. For instance, in an illustrative reform scenario for the euro area as a whole, joint implementation of the four types of reforms would increase the level of output by about 4 percent and reduce the unemployment rate by about 2½ percentage points in the long term. Product market reforms would account for approximately half of the overall output gain, with increased producer entry boosting job creation and the economy also benefiting from decreased

spending on wasteful regulatory costs. These beneficial effects do not factor in any additional productivity gains that may stem from reduced inefficiency among incumbent firms (the so-called X-inefficiency) or from stronger incentives for them to innovate.

Although the types of reforms considered here unambiguously raise output over the long term, they pay off only gradually, and some can entail short-term costs. Gains materialize as new firms start producing and new workers are hired, both of which occur only gradually. By contrast, some reforms can trigger quick downsizing of incumbent firms and dismissal of workers. In particular, in the model-based analysis, easing employment protections induces firms to dismiss relatively less productive workers immediately, whereas its positive impact on hiring incentives creates jobs only gradually. As a result, unemployment increases, aggregate demand declines, and output contracts for a time (Figure 3.4, panels 1 and 2). Lowering entry barriers in nontradables sectors initially boosts demand by triggering entry of new firms, which demand intermediate goods and ultimately labor and capital, but subsequent downsizing of incumbents more than offsets these new firms' (expansionary) contributions to aggregate output, leading to net job and output losses overall in the short term (Figure 3.4, panels 3 and 4).<sup>2</sup>

Unemployment benefit reforms have ambiguous short-term effects. The model-based analysis finds positive short-term effects because reduced unemployment benefits boost hiring by lowering wages, while firing is basically unaffected. However, the model abstracts from a potential counteracting force: a cut in unemployment benefits often disproportionately affects lower-income workers who face credit constraints, inducing them to curtail consumption. Even if the government fully redistributes the fiscal gain from benefit reductions through broad-based tax cuts, aggregate consumption may still decline and output fall (see, for instance, Kollmann and others 2015).

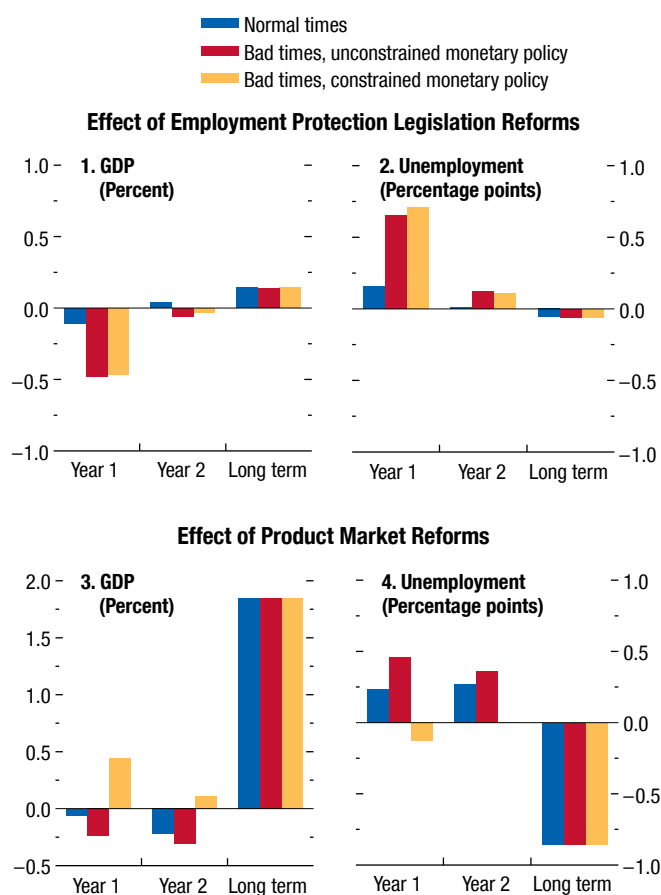
Likewise, the short-term impact of active labor market policy reforms depends on two conflicting effects. By increasing workers' incentives to look for and accept job offers, such reforms boost job creation. But by making it easier for firms to find new workers, they also provide an incentive to lay off relatively less productive workers.

<sup>1</sup>Although this chapter focuses on a model calibrated for the euro area, the key insights of the analysis apply to advanced economies more broadly. Alternative versions of the model, such as for a small open economy operating either a flexible or a fixed exchange rate regime, yield qualitatively similar implications—although the quantitative effects of reforms can differ. See related work by Cacciatore and others (2015).

<sup>2</sup>The analysis here focuses on barriers to entry, which offer the greatest scope for reform in most countries. However, other types of product market reforms, such as reductions in administrative burdens on existing corporations, may yield more immediate gains by reducing fixed costs of production.

**Figure 3.4. Selected Model Results**

Employment protection legislation and product market reforms raise output over the long term, but they pay off only gradually and can entail short-term costs, particularly in bad times. Constraints on monetary policy do not weaken the simulated effects.



Source: IMF staff estimates.

Note: "Long term" refers to the steady state.

### The Role of Macroeconomic Conditions

Not only can the types of reforms considered here entail short-term costs, but their short-term effects can also be very different if the reforms are implemented in bad times rather than in normal times. In particular, employment protection legislation reforms are more contractionary in the short term when there is substantial economic slack—even when the monetary policy response is unconstrained (Figure 3.4, panels 1 and 2). Firms seek to dismiss more workers in bad times than in normal times, but stringent job protections partly discourage them from doing so.

Relaxing the constraint imposed by such protections benefits individual firms taken in isolation. But by triggering a wave of layoffs, reforming employment protections further weakens aggregate demand and delays economic recovery. To a lesser extent, product market reforms also have a weaker short-term impact in bad times compared with normal times (Figure 3.4, panels 3 and 4), although the difference is small, as higher profit margins per firm due to fewer competing firms under adverse macroeconomic conditions offset lower expected profits among prospective entrants. In addition, binding external financial constraints—not considered in the analysis here—that prevent new firms from financing investment can make product market reforms substantially more contractionary in the short term (Cacciato and others, forthcoming-a). This suggests that easing external borrowing constraints—on firms and the economy as a whole—may enhance the short-term effect of product market deregulation.

Unemployment benefit reforms can have either stronger or weaker short-term effects in bad economic times, depending on various factors. On one hand, the model-based analysis highlights that a sizable pool of unemployed workers makes it easier for firms to recruit, and job creation responds more strongly to the reduction in wages brought about by a cut in benefits. This larger employment *gain* from unemployment benefit reforms in bad times contrasts with the larger job *losses* observed following a relaxation of employment protections and illustrates the broader point that wage flexibility may be more desirable than employment flexibility in bad times (see, for example, Boeri and Jimeno 2015).<sup>3</sup> On the other hand, in periods of economic slack, a reduction in benefits may have a larger adverse effect than in normal times through fiscal multipliers, which tend to be larger in general during recessions (Auerbach and Gorodnichenko 2012; Blanchard and Leigh 2013; Jordà and Taylor 2013; Abiad, Furceri, and Topalova 2015), and this may hold true particularly for changes in unemployment benefits, because households also become more credit constrained during downturns (Mian and Sufi 2010).<sup>4</sup> In addition, a cut in benefits tends to have

<sup>3</sup>Boeri and Jimeno (2015) also argue that high minimum wages for underrepresented groups in the labor market may have higher employment costs in recessions.

<sup>4</sup>The argument could still hold even if reform were implemented in a budget-neutral way, insofar as changes in unemployment benefits entail a higher fiscal multiplier than do offsetting tax cuts (spending increases). On the other hand, liquidity constraints can

a larger effect in recessions on (non-credit-constrained) households' incentives to reduce consumption in favor of precautionary saving, as their ability to insure themselves declines and their risk of idiosyncratic income loss increases.<sup>5</sup>

One way to alleviate the short-term cost of some labor market reforms—especially in bad times—is to announce credibly that they will be implemented only when the economic recovery is more solid, for instance, by passing a law that sets a future date for entry into force.<sup>6</sup> In particular, announcing future employment protection legislation reforms immediately boosts firms' hiring incentives in anticipation of lower future costs of layoff procedures, without inducing them to dismiss more workers in the short term, while the existing rules still apply. By contrast, such a strategy may not be so helpful when applied to product market reforms in bad times. For example, announcing a future reduction of entry barriers encourages new firms to postpone entry and investment until entry costs are effectively lowered, while encouraging incumbent firms to start downsizing immediately in anticipation of stronger future competition.

### The Role of Constraints on Monetary Policy

Whether constraints on monetary policy, including the zero lower bound, influence the short-term effects of reforms depends on the relative short-term effect of these reforms on demand and supply and therefore their net effect on inflation and the real interest rate. The results of the model suggest that constraints on monetary policy may have limited effects in shaping the short-term impact of reforms, as these reforms have little or no deflationary effect (Figure 3.4). For example, although relaxing employment protections puts

strengthen the response of individual job search, and therefore of job matching, to changes in benefits (Chetty 2008).

<sup>5</sup>The analysis of the impact of benefit reforms in bad versus normal times also bears some connection to the unsettled debate regarding whether unemployment insurance should be made more or less generous in recessions (see, for example, Landais, Michaillat, and Saez 2015 and Mitman and Rabinovich 2015). The answer depends not only on the short-term impact of changes in benefits, but also on the value of income insurance for workers, which is likely to be greater in recessions—an issue that is not taken into account in the analysis here.

<sup>6</sup>Grandfathering reforms may also help on this front. In particular, grandfathering employment protection legislation increases incentives for firms to create jobs—since all new contracts are subject to the new, less stringent rules—without changing their incentives to lay off existing workers. Examples include the 2015 employment protection legislation reform in Italy and some provisions of the 2012 reform in Spain.

downward pressure on inflation by weakening aggregate demand in the short term, the immediate positive impact of the reform on productivity, and thereby on bargained wages, offsets this effect.<sup>7</sup> As for product market deregulation, reducing entry barriers may be more beneficial at the zero lower bound because, unlike in normal times, monetary tightening does not offset the short-term increase in demand—and therefore in marginal costs and inflation—created by the additional investment and job creation undertaken by new firms that enter the market (Figure 3.4, panels 3 and 4).<sup>8</sup> As noted earlier, product market reform can also lead to immediate productivity gains by inducing incumbent firms to eliminate existing inefficiencies. Such a reform-driven productivity increase—not considered in the analysis here—would be expansionary even in the short term under all three alternative macroeconomic conditions studied here, but this particular channel of reform would have a milder impact when the economy is at the zero lower bound. The reason is that higher productivity, other things being equal, immediately boosts supply, lowering inflation and thus raising real interest rates.

### The Macroeconomic Effects of Reforms: An Empirical Analysis

This section quantifies empirically the macroeconomic effects of reforms and examines whether the data align with the theoretical considerations discussed in the previous sections. In contrast to a large body of literature that focuses on estimating the long-term impact of policies and institutions on economic activity, this chapter adopts a novel empirical strategy that allows estimation of both the short- and medium-term effects of product and labor market reforms on a range of macroeconomic outcomes. Specifically, it identifies major policy changes in the areas of product market regulation, employment protection legislation, unemployment benefits, active labor market policies, and labor taxation, and then traces the evolution of output, (un)employment, and inflation in the aftermath of these reforms.<sup>9</sup>

<sup>7</sup>For an alternative theoretical analysis applied to Japan's labor market, see Porcellacchia 2016.

<sup>8</sup>Using a similar setup but without focusing on the zero-lower-bound issue, Cacciatore, Fiori, and Ghironi (forthcoming) show that an expansionary monetary policy stance can smooth transition costs and contribute to front-loading the long-term benefits of reforms.

<sup>9</sup>Complementary analysis was carried out to assess the effects of these reforms on income inequality, as measured by Gini coefficients. No statistically significant effects were found, with the exception of

Major reforms are identified primarily by examining documented legislative and regulatory actions reported in all available issues of the Organisation for Economic Co-operation and Development (OECD) *Economic Survey* for advanced economies since 1970, as well as additional country-specific sources. In this respect, the methodology is closely related to the “narrative approach” used to identify monetary and fiscal shocks and periods of high financial distress by Romer and Romer (1989, 2004, 2010, 2015) and Devries and others (2011). The approach considers both reforms and “counterreforms”—that is, policy changes in the opposite direction. These major policy shifts are identified as those legislative or regulatory changes for which at least one of the following three conditions is satisfied: (1) the OECD survey uses strong normative language, suggestive of an important measure (for example, “major reform”), to describe the change; (2) the policy action is mentioned repeatedly across various issues of the OECD survey or in retrospective summaries of key past reforms for the country considered; or (3) the OECD indicator of the regulatory stance in the area considered—if available—displays a very large change. When only the last of these conditions is met, an extensive search through other sources is performed to identify the precise policy action underpinning the change in the indicator.<sup>10</sup>

The main advantage of this approach is that it identifies the precise nature and timing of significant legislative and regulatory actions taken by advanced economies since the early 1970s in all key labor and product market policy areas, including some for which no time-varying indicators exist (for example, regarding conditions for receipt of unemployment benefits or the design of active labor market policies, such as integration of job placement and benefit payment services). These four major gains (nature and timing of policy actions, coverage length and breadth) allow for a richer and more granular analysis of the short- to medium-term effects of reforms than in past studies. This approach, along with others used in the literature on this topic, has three main shortcomings, however. First, the identified events may themselves be driven by macroeconomic outcomes and may coincide with reforms in other areas—issues that are addressed in the empirical analysis. Second, two

large reforms in a given area (for example, employment protection legislation) can involve different specific actions (for example, a major simplification of the procedures for individual and collective dismissals, respectively). As a result, only the average historical impact of reforms can be estimated. Third, the database provides no information regarding the stance of current (or past) product and labor market regulations and as such is not a substitute for existing policy indicators, such as, for instance, those the OECD produces.

Finally, the approach does not rely on a common single metric to identify reforms, unlike some earlier studies that relied on changes in OECD product and labor market indicators to identify reform episodes (Bouis and others 2012; Bordon, Ebeke, and Shirono, 2016). The results presented in the chapter are robust to using this methodology, even though the effects of reforms are weaker and less precisely estimated compared with the narrative approach—suggesting that the latter better identifies major reform events and thereby reduces measurement error.

Once major policy actions are identified, their short- and medium-term impact on economic activity is quantified using two econometric specifications. The first establishes whether reforms have statistically significant effects on macroeconomic variables such as output, (un)employment, and inflation. The second assesses whether these effects vary with overall business conditions prevailing at the time of the reform (weak versus strong economic conditions) or with the stance of accompanying macroeconomic policies—that is, whether the effects of reforms differ between periods of fiscal expansion and fiscal contraction (see Annex 3.3 for details).<sup>11</sup> To provide additional insights into the

reductions in unemployment benefits, which are associated with an increase in inequality over the medium term.

<sup>10</sup>See Annex 3.2 for details on the criteria and procedure employed to identify major reform episodes using the accounts in the OECD *Economic Survey*, as well as for examples of reforms.

<sup>11</sup>The baseline specifications control for past economic growth, past reforms, and recessions dummies as well as country and time fixed effects. A possible concern regarding the analysis is that the probability of structural reform is influenced not only by past economic growth and the occurrence of recessions (Box 3.1), but also by contemporaneous economic developments as well as expectations of future growth. However, this is unlikely to be a major issue, given the long lags associated with the implementation of structural reforms and the likelihood that information about future growth is largely embedded in past economic activity. Most important, controlling for expectations of current and future growth delivers results that are very similar to, and not different with statistical significance from, those reported in this chapter. Another possible concern regarding the analysis is that the results may suffer from omitted-variables bias, as reforms may occur across different markets at the same time. However, including all the reforms simultaneously in the estimated equation does not substantially alter the magnitude and the statistical significance of the results. Furthermore, sector-level analyses address omitted-variables concerns by

channels through which product market and employment protection legislation reforms are transmitted, and to address some of the limitations of the macroeconomic analysis (by fully controlling for countrywide economic shocks that coincide with reforms), sector- and firm-level approaches complement the macroeconomic analysis.

### Product Market Reforms

This subsection focuses on the effects of product market reforms aimed at reducing domestic barriers to competition. Although this issue is high on policy-makers' current structural reform agenda, other related policies, including those directed at easing barriers to international trade and foreign direct investment, also have the potential to boost productivity and output levels (Box 3.3).

#### Macro Analysis

The analysis here shows that product market reforms have statistically significant medium-term output effects.<sup>12</sup> A major liberalization event, such as, for example, the deregulation of several network industries in Germany in 1998, leads to a statistically significant increase in the output level of about 1½ percent four years after the reform (Figure 3.5, panel 1). The effect eventually levels off, after seven years, at about 2¼ percent. In addition, the point estimates suggest that product market reforms increase employment levels and decrease price levels, though the wide confidence intervals associated with the estimates imply that these effects are not statistically distinguishable from zero (Figure 3.5, panels 2 and 3).

The macroeconomic effects of product market reforms are not statistically significantly weaker under adverse business conditions—though the point estimates suggest smaller effects—but employment (and output) effects are significantly larger where employment protection regulations are more stringent.<sup>13</sup> This

controlling for countrywide economic conditions and, in some cases, using instrumental variables. Such analyses yield results that are qualitatively similar to those from the macroeconomic analysis. See the discussion later in the chapter as well as Annex 3.3 for details.

<sup>12</sup>The macroeconomic analysis focuses on major past reforms across network industries. Qualitatively similar results are obtained for broader reforms identified as major legislative changes aimed at improving overall product market competition.

<sup>13</sup>These results may be driven by the fact that in the sample used here, major product market reforms occur in countries with strong employment protection regulation. However, no statistically significant correlation is found between the probability of major product

finding is consistent with previous theory and empirical evidence (Blanchard and Giavazzi 2003; Fiori and others 2012). The intuition is that in countries with more stringent employment protection legislation, real wages are more likely to exceed levels that clear the labor market and to leave employment below the full-employment level. In such countries, product market reform has greater potential to deliver job gains.<sup>14</sup>

#### Sector-Level Analysis

The macroeconomic effects of product market reforms identified in the macro analysis reflect not only the direct impact of deregulation in the industries considered, but also its indirect impact through two kinds of spillovers to other sectors. First, product market reforms in upstream industries (for instance, network industries, banking, professional services) can reduce the price and improve the quality and variety of the intermediate inputs used by downstream sectors (for instance, manufacturing), thereby boosting productivity and competitiveness in these sectors (*backward linkages*). Moreover, lower prices for intermediate inputs may increase profits, and therefore incentives to innovate, in downstream sectors.<sup>15</sup> Second, product market reforms raise output in the affected sectors, increasing their demand for intermediate inputs from upstream sectors (*forward linkages*). For example, deregulation in the electricity sector may positively affect other sectors by both reducing their costs of production (backward linkage) and requiring more inputs from these sectors (forward linkage).

Sector-level analysis shows that product market reforms in network sectors have statistically significant direct and indirect medium-term effects on output. On average, output in the sector affected by a particular reform increases by more than 10 percent four years after the reform, although this impact takes

market reforms and the degree of employment protection regulation. In addition, the analysis controls for the degree of current and past employment protection regulation.

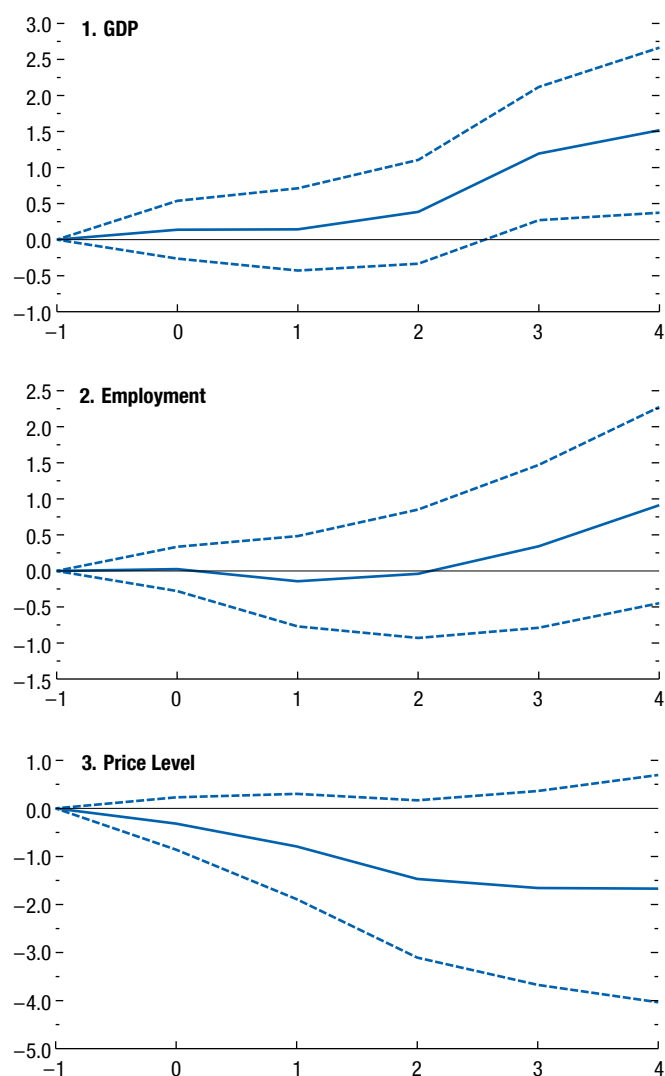
<sup>14</sup>This result should not necessarily be interpreted as lack of complementarity among structural reforms in general. Indeed, the case studies presented in Box 3.4 point to potential benefits from broad packages of reforms.

<sup>15</sup>For discussion and empirical evidence regarding the impact of reform through backward linkages, see Bourlès and others 2013 and Cette, Lopez, and Mairesse, forthcoming. Theoretically, competition has an ambiguous effect on innovation. Although some models of endogenous technological change would predict that competition curbs innovation (Aghion and Howitt 1992), more recent models predict positive or hump-shaped effects of competition on innovation (Aghion and others 2001; Aghion and Schankerman 2004).

**Figure 3.5. Macroeconomic Effects of Product Market Reforms**

(Percent; years on x-axis)

Product market reforms have a statistically significant medium-term impact on output, but not on employment and price level.



Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. Solid lines denote the response to a major reform in product market regulation, and dashed lines denote 90 percent confidence bands.

time to materialize, being, for example, zero in the first year.<sup>16</sup> Taken at face value, these estimates imply

<sup>16</sup>To minimize endogeneity concerns due to omitted-variables bias, the specification controls for country-year and country-sector fixed effects (as well as industry-specific trends), and reforms are instrumented by (1) the initial stringency of regulation, as measured by the corresponding OECD indicator; (2) the number of countries that implemented a reform in the same area over the preceding three

that simultaneous major reforms across all network sectors—a major event that has never actually happened—would increase economy-wide output by more than 1 percent (10 percent times the share of these sectors in the whole economy, which is approximately 0.1 on average) in the medium term (Figure 3.6, panel 1). Furthermore, productivity increases, and the (relative) price level falls. In addition to these direct effects, product market reforms in network sectors have statistically significant indirect medium-term effects on output in other sectors. A major reform in one of the network sectors increases output in downstream and upstream sectors by, on average, about 0.3 percent four years after the reform (Figure 3.6, panels 2 and 3).

### Firm-Level Analysis

To provide additional insights into the effects of product market reforms and the channels through which they operate, the analysis examines how their effects vary across different types of firms in different sectors, depending on firm characteristics such as their size and financial health and needs. The results of the analysis suggest that product market reforms have statistically significant positive effects on incumbent firms, whose output (sales) increases by about 2 percent in the first year and by about 3 percent three years after the reform (Figure 3.7, panel 1).<sup>17</sup> Furthermore, reforms have statistically significant medium-term effects on employment and capital, which increase by about 1½ and 3 percent, respectively (Figure 3.7, panels 2 and 3). The output effects of reforms in retail trade and professional services are comparable to those in network industries (Figure 3.7, panels 4–6). This finding suggests that the output effects estimated in the macro- and sector-level analyses for network industries may to a large extent be generalized to reforms in other key areas. Moreover, the comparable magnitudes of the (direct) medium-term effects on output estimated in the firm- and sector-level analyses tentatively suggest

years; and (3) the issuance of a new European Union directive since the last reform was implemented.

Dabla-Norris and others (2015) also find that product market reforms have a positive impact on output—via higher productivity—that increases over time. In contrast, no statistically significant employment effects are found in the deregulated sectors, in line with the results from the macroeconomic analysis. Bassanini (2015) finds a negative short-term impact of deregulation in network industries.

<sup>17</sup>Given the shorter time sample of firm-level data compared with macro- and sector-level data, the analysis examines the effect of reforms on firms' economic activity up to three years after the reform (see Annex 3.3 for a detailed description of the data and sources).

that the positive effect on incumbent firms' output contributes more to the response of sectoral output to reforms than do firms' entry and exit—although the response of incumbent firms is itself triggered largely by increased competition from potential new entrants.<sup>18</sup>

Whereas output effects are similar across sectors and firms, employment effects vary with firm size (Figure 3.8). In particular, the employment effect of reforms tends to be larger for smaller firms in network sectors, and to a lesser extent in professional services, and larger for larger firms in retail trade.<sup>19</sup> This reflects differences in production technology and the nature of regulation between these sectors. Network industries tend to be dominated by a rather small number of large firms that scale back employment and investment plans when reforms improve potential entrants' access to the network. By contrast, firms in retail trade tend to be relatively small and labor intensive; when reforms remove restrictions specific to large firms, these large firms benefit.<sup>20</sup>

Product market reforms also have a varied effect across firms depending on the firms' financial health and needs. The medium-term impact of reforms on investment among firms with low debt is about four times larger (about 20 percent) than it is among highly indebted firms (about 5 percent) (Figure 3.9, panels 1 and 2).<sup>21</sup> In addition, when credit conditions are tight across the economy, firms that depend heavily on external financing invest considerably less following a major product market reform than firms that do not (Figure 3.9, panels 3 and 4).<sup>22</sup> These results further strengthen

<sup>18</sup>Comparisons between firm- and sector-level and macro analyses should be treated with caution. First, the firm-level analysis here is restricted to incumbent firms that remain in business. While product market reforms have potentially important effects on the entry and exit of firms, the current data set does not allow those dynamics to be analyzed with confidence. Second, firm-level results are unweighted. This means that they capture the average firms' response rather than the population-weighted aggregate response. Finally, the sample does not cover all firms and industries equally well.

<sup>19</sup>Note that these results are unweighted and that weighting should reduce the estimated effect of product market reforms in network industries, given the predominance of large firms in these sectors.

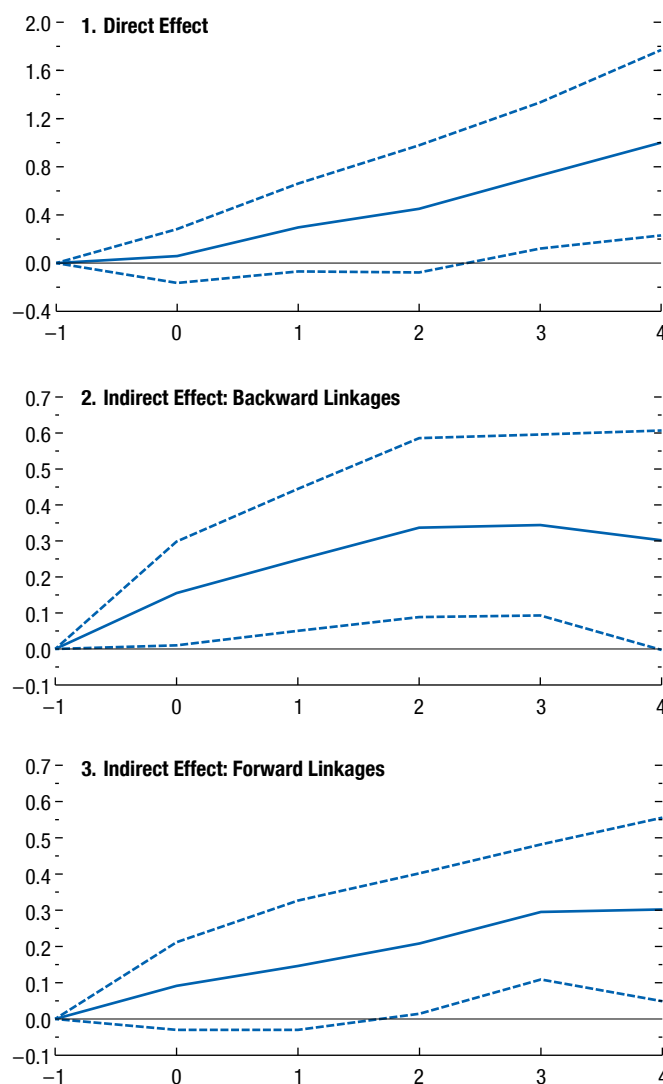
<sup>20</sup>Another key regulation in retail trade addresses the flexibility of shop opening hours and prices. Regulation in professional services relates to barriers to entry and the way services are delivered and includes, among other things, rules governing the recognition of qualifications and the determination of fees and prices.

<sup>21</sup>In an effort to isolate the role of credit constraints that may be associated with high levels of indebtedness from the confounding role of credit demand, the debt ratios are held constant over time.

<sup>22</sup>The analysis makes use of a triple-differences approach, building on previous work by Rajan and Zingales (1998), which focuses on the differential effects of product market reforms among firms in

**Figure 3.6. Direct and Indirect Sectoral Output Effects of Product Market Reforms**  
(Percent; years on x-axis)

Product market reforms in network sectors have statistically significant direct and indirect medium-term effects on output.

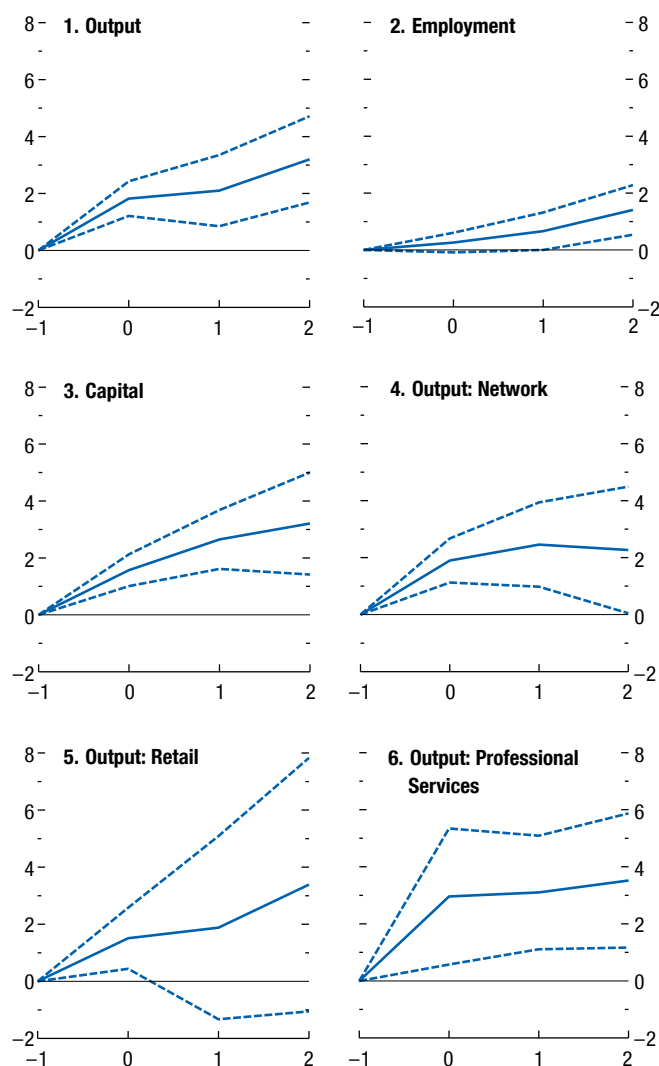


Sources: Timmer and others 2015; and IMF staff estimates.

Note:  $t = 0$  is the year of the shock. Solid lines denote the response to a major reform in product market regulation, and dashed lines denote 90 percent confidence bands. The direct effect measures the impact on GDP of deregulating all network industries only through the response of real value added in the deregulated industries themselves. It is computed assuming that all network industries together account for about 10 percent of GDP on average across sample countries. The indirect effect measures the average impact on GDP across sample countries of deregulating one network industry only through the response of real value added in downstream industries (backward linkages) and upstream industries (forward linkages). See the chapter text for details. Network industries are air, rail, and road transportation; electricity and gas distribution; and telecommunications and postal services.

**Figure 3.7. Direct Effects of Product Market Reforms on Incumbent Firms' Output**  
(Percent; years on x-axis)

Product market reforms have statistically significant positive effects on the output, employment, and capital of incumbent firms. The output effects of reforms in retail trade and professional services are comparable to those in network industries.

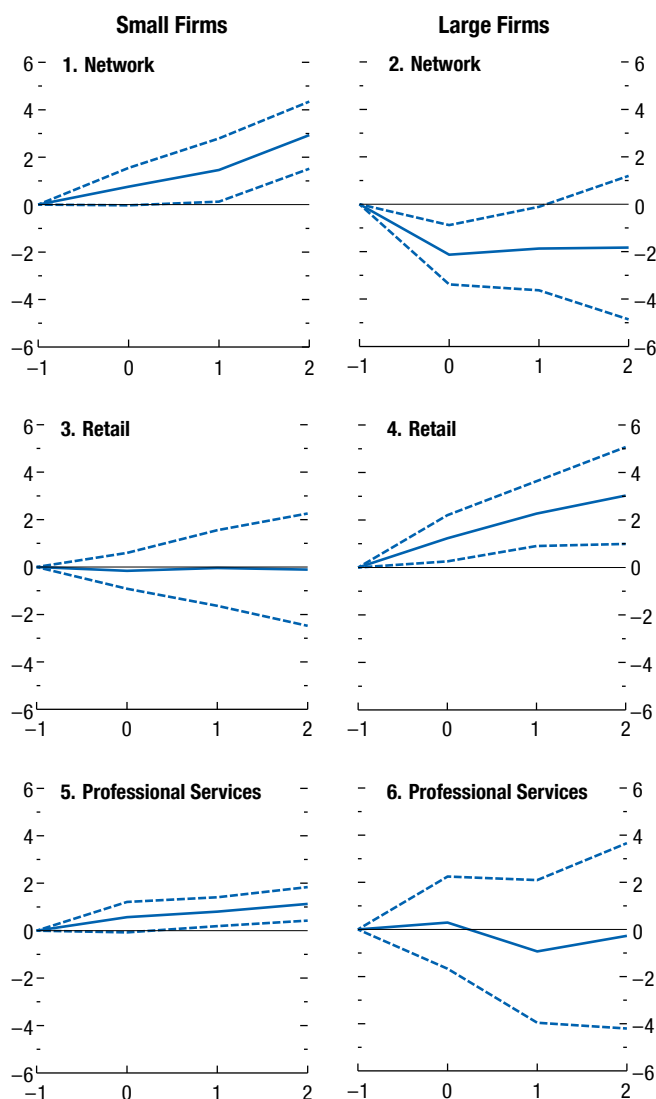


Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. Solid lines denote the response to a major reform in product market regulation, and dashed lines denote 90 percent confidence bands. Network industries are air, rail, and road transportation; electricity and gas distribution; and telecommunications and postal services.

**Figure 3.8. Direct Effects of Product Market Reforms on Incumbent Firms' Employment: The Role of Firm Size**  
(Percent; years on x-axis)

Employment effects of product market reforms vary with firm size. They tend to be larger for smaller firms in network sectors, and to a lesser extent in professional services, and larger for larger firms in retail trade.



Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. Solid lines denote the response to a major reform in product market regulation, and dashed lines denote 90 percent confidence bands. Network industries are air, rail, and road transportation; electricity and gas distribution; and telecommunications and postal services.

the case for policies aimed at addressing weak bank and corporate balance sheets, as these may enhance the investment impact of product market reforms.

### Labor Market Reforms

This subsection focuses on the effects of reforms of employment protection legislation for regular (permanent) workers, unemployment benefits, active labor market policies, and labor taxation. In addition to these policies, collective-bargaining systems also matter for high and stable employment (see Box 3.2).

#### Employment Protection Legislation

The analysis shows that reforms that ease dismissal regulations with respect to regular workers (such as, for instance, those in Spain in the mid-1990s or Austria in 2003) do not have, on average, statistically significant effects on employment and other macroeconomic variables. A look behind the average effects shows, however, that the impacts vary markedly according to overall business conditions. When economic conditions are strong, reforms have a sizable positive impact on output and employment, whereas the impact becomes contractionary if the reforms are undertaken during periods of slack (Figure 3.10, panels 1–4). In addition, the estimates suggest that in bad times, reform of employment protection legislation may reduce inflation in the short and medium term, though the wide confidence intervals associated with the results imply that these estimates are not statistically significantly different from zero (Figure 3.10, panels 5 and 6). As discussed in the chapter's theoretical section, a potential reason for this asymmetric effect across different economic regimes is that whereas in periods of strong economic activity, these reforms may stimulate hiring by reducing the cost of future dismissals, in periods of slack they may trigger immediate layoffs.

Another potential mechanism behind the limited average macroeconomic impact of employment protection legislation reforms could be that the effect varies

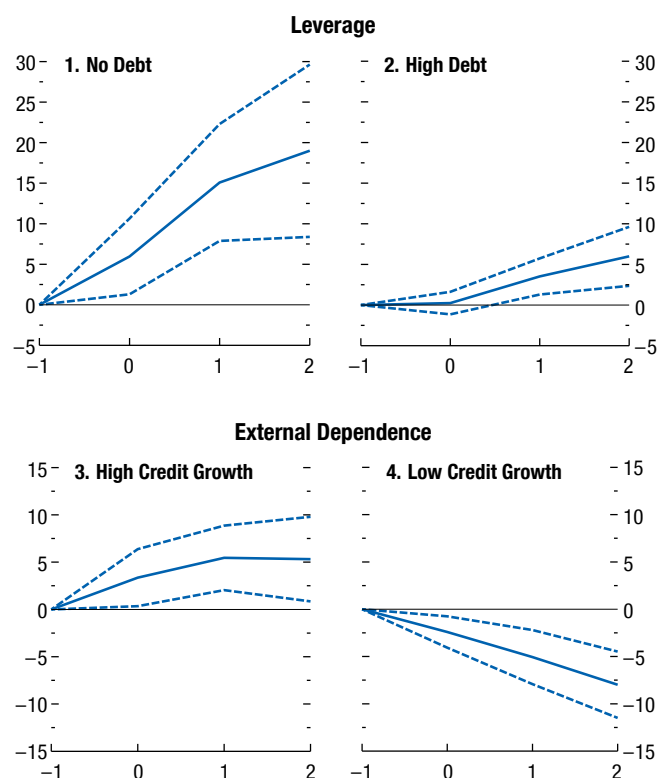
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industries that are heavily dependent on external financing in periods in which credit supply is constrained and those in which credit is readily available. External dependence is measured by the ratio to capital expenditure of the difference between capital expenditure and cash flows. Firms' intrinsic dependence on external credit is measured by the average level of external dependence in the firms' industry across the United Kingdom and the United States. Credit conditions are measured using the regime-switching method—described in Annex 3.3—applied to credit growth in each country. The analysis is limited to network industries.

**Figure 3.9. Direct Effects of Product Market Reforms on Incumbent Firms' Investment: The Role of Financial Conditions**

(Percent; years on x-axis)

The effect of product market reforms on investment tends to be weaker for firms with high debt and for firms that depend heavily on external financing during periods of tight credit conditions.



Source: IMF staff estimates.

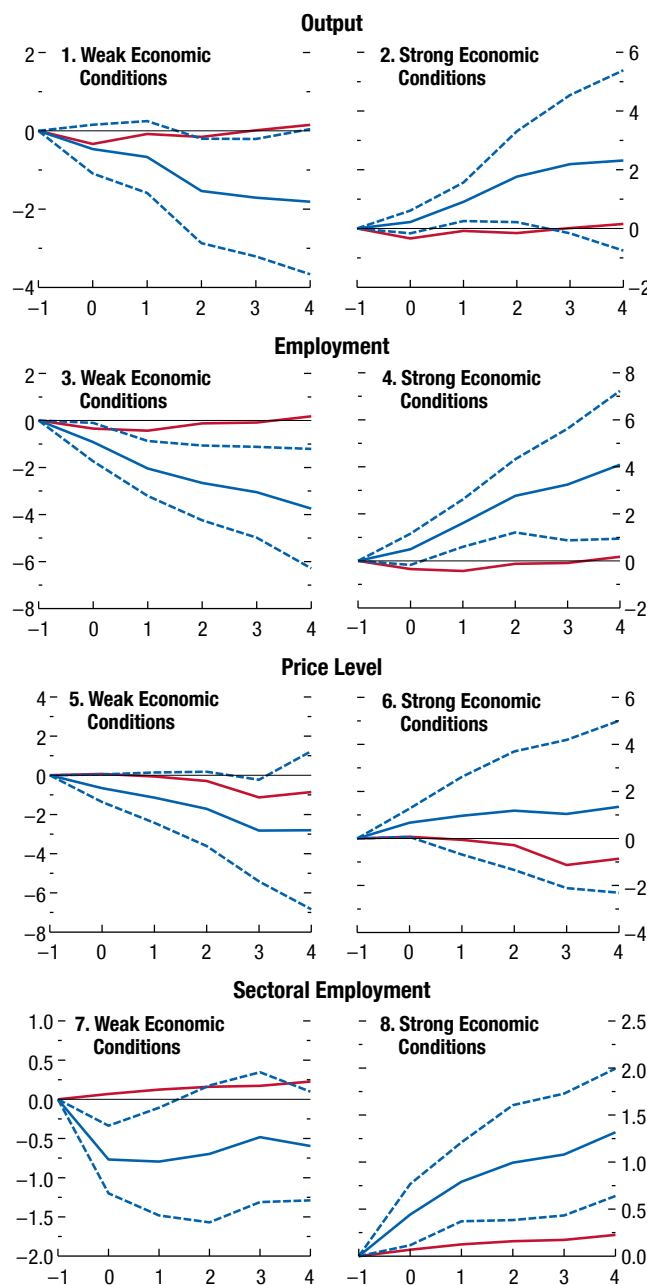
Note:  $t = 0$  is the year of the shock. Solid lines denote the response to a major reform in product market regulation, and dashed lines denote 90 percent confidence bands. External dependence is defined as the difference between capital expenditure and cash flows as a share of capital expenditure. This measure is then averaged across firms over time and across countries within each industry. Only data from the United Kingdom and United States are used for the calculation of this measure. This definition is based on Rajan and Zingales 1998. Under high and low credit growth, respectively, panels 3 and 4 show the difference in the investment response to reform between firms in sectors that depend strongly on external financing and firms in sectors that depend weakly on external financing.

across economic sectors, depending on how binding the regulations are in each sector. Specifically, stringent regulations governing dismissal are likely to be more binding in sectors that are characterized by a higher “natural” propensity to adjust their workforce to idiosyncratic shocks.<sup>23</sup> Reforms to employment protection legislation

<sup>23</sup>An example of a sector among those with highest natural layoff rates is construction; one of those with the lowest layoff rates is electricity and gas.

**Figure 3.10. Macro and Sectoral Effects of Employment Protection Legislation Reforms**  
(Percent; years on x-axis)

Employment protection legislation reforms have a sizable positive impact on output and employment when economic conditions are strong, whereas the impact becomes contractionary if the reforms are undertaken during periods of slack.



Source: IMF staff estimates.

Note:  $t = 0$  is year of the shock. Solid blue lines denote the response to a major reform in employment protection legislation; dashed lines denote 90 percent confidence bands; and solid red lines represent the unconditional result. The differential effect of employment legislation reforms for a sector with relatively high layoff constraints compared with a sector with relatively low layoff constraints is about 1¾ percent.

could then lead to reallocation of workers away from sectors in which regulations are less binding toward those in which regulations are more binding and could thus result in small aggregate employment effects. To test this hypothesis, and also as a robustness check for the economy-wide results presented earlier, the analysis looks at how reforms affect within-country differences in the response of output and employment between sectors with high and low natural layoff rates.<sup>24</sup> The empirical approach follows the methodology proposed by Bassanini, Nunziata, and Venn (2009), who assess the long-term effect of regulations governing dismissal on sectoral total factor productivity growth. The results of this analysis suggest that the effects of employment protection legislation reforms vary positively with the degree of natural layoff, increasing employment more in sectors in which regulations are more binding.<sup>25</sup> The magnitude of the estimated coefficient suggests that the differential effect of employment legislation reforms for a sector that has relatively high constraints on layoffs (at the 75th percentile of the distribution of layoff rates) compared with a sector that has relatively low constraints on layoffs (at the 25th percentile) is about 1¾ percent. In addition, for a given natural layoff rate, the effect is positive under strong economic conditions and negative during periods of slack, confirming the results of the macro analysis (Figure 3.10, panels 7 and 8).

### Unemployment Benefits

Reforms that reduce the income replacement rates of unemployment benefits are found to have statistically significant and long-lasting effects on the unemployment rate (Figure 3.11, panel 1). In particular, reforms—which in the sample are associated with reductions in the OECD indicator of average gross income replacement rate that range between 2 and 12 percentage points—reduce the rate of unemployment by about ½ percentage point in the short term (one year after the reform) and by about 1½ percentage points on average in the medium term (four years after). This result is consistent with the evidence provided by Bouis and others (2012), who find that

<sup>24</sup>The main advantage of this approach, compared with the macroeconomic analysis, is that it can control for country-year fixed effects and therefore for all the macroeconomic variables as well as unobserved factors that can affect economic activity and be correlated with employment protection legislation reforms. Data for sectoral layoff rates have been kindly provided by Andrea Bassanini. See Annex 3.3 for details.

<sup>25</sup>Similar results are obtained for sectoral real value added.

large reductions in the initial income replacement rate increase employment rates by, on average, about 1 percentage point over the medium term.

The results also suggest that undertaking unemployment benefit reductions jointly with major reforms aimed at increasing the efficiency of active labor market policies, including through enhanced public employment services—for example, integration between job placement and benefit payment services to create so-called one-stop shops for the unemployed—amplifies their effects. Similarly, although major reductions in the duration of unemployment benefits do not have, on average, statistically significant effects on unemployment, they are associated with a statistically significant medium-term reduction in unemployment (more than 2 percentage points) when implemented together with reforms that enhance the design of active labor market policies.<sup>26</sup>

However, unemployment benefit reforms have weaker—indeed, statistically nonsignificant—effects during periods of slack (Figure 3.11, panels 2 and 3). This asymmetric impact may reflect the larger adverse fiscal multiplier effect from benefit cuts, as well as their bigger impact on workers' incentives to reduce consumption in favor of precautionary saving, in bad times compared with good times (Whang 2015).<sup>27</sup> Furthermore, insofar as the number of jobs is limited in recessions, enhancing search incentives by cutting benefits is likely to be less effective (Landais, Michaillat, and Saez 2015).

### Labor Tax Wedges

The analysis shows that shocks to labor tax wedges have statistically significant short- and medium-term effects on output and employment (Figure 3.12, panels 1 and 2).<sup>28</sup> A reduction of 1 percent in labor

<sup>26</sup>Reforms that enhance the design of active labor market policies are not found here to have statistically significant effects on unemployment when implemented alone.

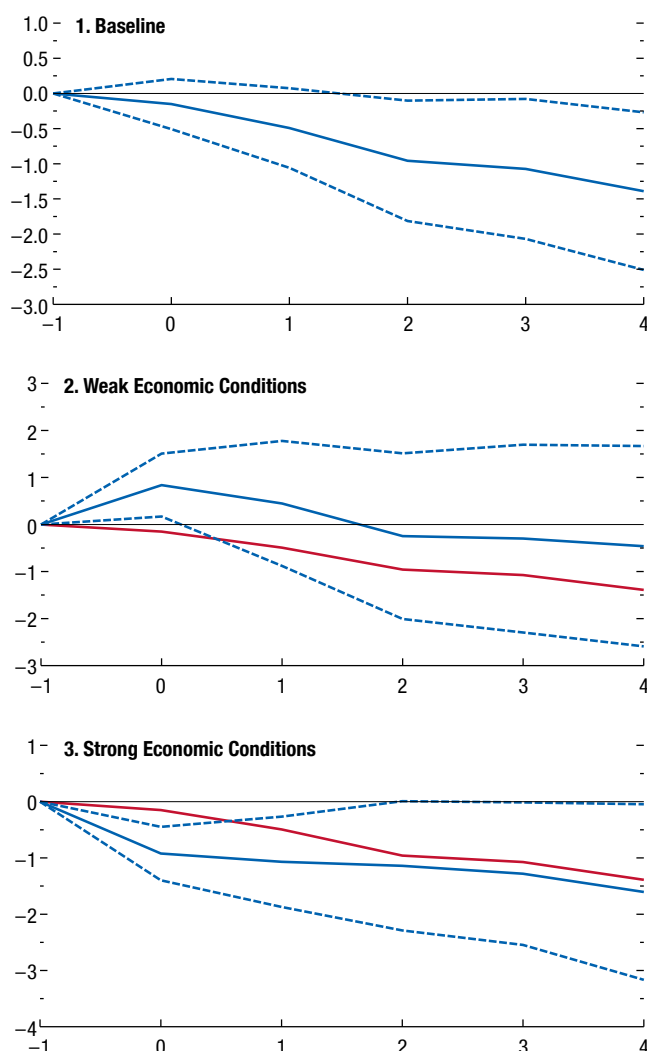
<sup>27</sup>Using a heterogeneous-agents model that combines matching frictions in the labor market with incomplete asset markets and nominal rigidities, Ravn and Sterk (2013) show that a reduction in consumption in favor of precautionary saving (brought about by an increase in job uncertainty) decreases aggregate demand and firms' hiring, thereby further weakening demand. They find that the effect is quantitatively important, being potentially large enough to explain the increase in U.S. unemployment during the Great Recession.

<sup>28</sup>The analysis uses a measure, derived from OECD tax models, that defines a tax wedge as the difference between the labor cost to the employer and the corresponding net take-home pay of the employee for a single-earner couple with two children earning 100 percent of the average productive wage. The measure expresses the sum of personal income tax and all social security contributions as a percentage of total labor cost.

**Figure 3.11. Unemployment Effects of Unemployment Benefit Reforms**

(Percentage points; years on x-axis)

Reforms that reduce the income replacement rates of unemployment benefits are found to have statistically significant and long-lasting effects on the unemployment rate. However, such reforms have weaker, statistically nonsignificant effects during periods of slack.



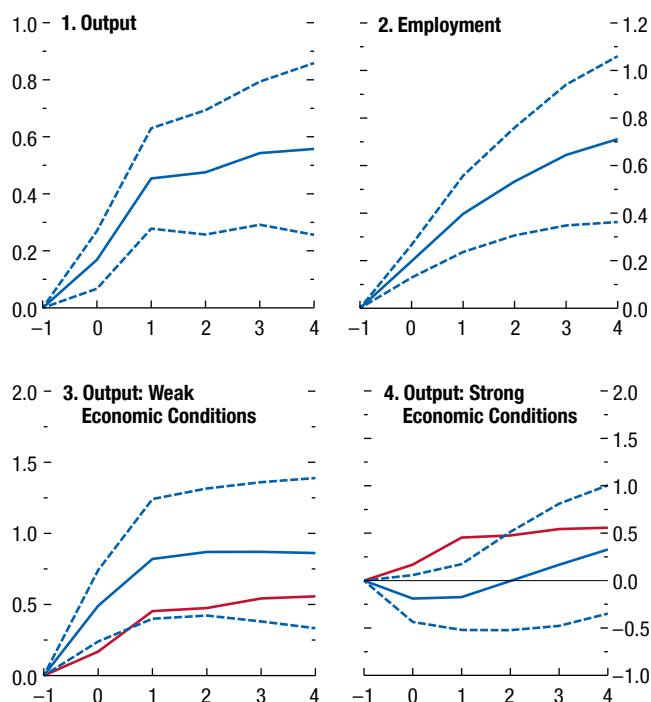
Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. Solid blue lines denote the response to a major unemployment benefit reform; dashed lines denote 90 percent confidence bands; and solid red lines represent the unconditional result.

tax wedges increases the level of output (employment) by about 0.15 (0.2) percent in the year of the shock and by about 0.6 (0.7) percent after four years. These effects eventually level off. Estimates are consistent with others reported in the literature (for instance, Basanini and Duval 2006 and references cited therein). The results are also robust, even though the effects

**Figure 3.12. Macroeconomic Effects of Labor Tax Wedge Cuts**  
(Percent; years on x-axis)

Reductions in labor tax wedges have statistically significant short- and medium-term effects on output and employment. These effects are larger under weak economic conditions.



Source: IMF staff estimates.

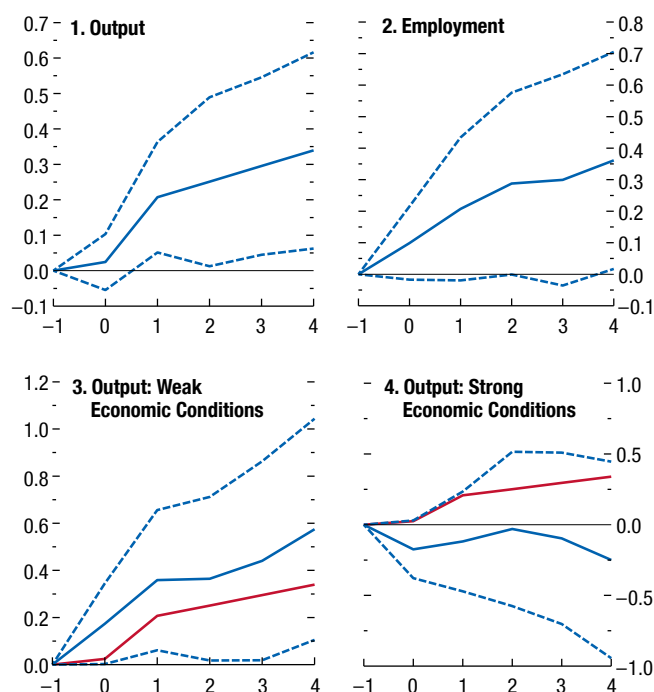
Note:  $t = 0$  is the year of the shock. Solid blue lines denote the response to a 1 percentage point reduction in labor tax wedges; dashed lines denote 90 percent confidence bands; and solid red lines represent the unconditional result.

are smaller, when tax wedge cuts are budget neutral. This finding suggests that making tax structures more employment friendly by shifting the tax burden away from labor has positive effects on output and employment (Bouis and others 2012).

Cutting labor tax wedges is found to be more effective in periods of slack (Figure 3.12, panels 3 and 4). In such periods, a 1 percent reduction in labor tax wedges increases output by 0.5 percent in the year of the reform and by 0.8 percent after four years, whereas in expansions, the impact is not statistically distinguishable from zero. This finding is consistent with a growing literature that explores the effect of fiscal policy during recessions and expansions and points to larger fiscal multiplier effects during recessions (see Auerbach and Gorodnichenko 2012; Blanchard and Leigh 2013; Jordà and Taylor 2013; and Abiad, Furceri, and Topalova 2015).

**Figure 3.13. Macroeconomic Effects of Spending Shocks on Active Labor Market Policies**  
(Percent; years on x-axis)

Discretionary increases in public spending on active labor market policies have statistically significant short- and medium-term effects on output and employment. These effects are larger under weak economic conditions.



Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. Solid blue lines denote the response to a 10 percent increase in spending on active labor market policies; dashed lines denote 90 percent confidence bands; and solid red lines represent the unconditional result.

### Spending on Active Labor Market Policies

Discretionary increases in public spending on active labor market policies are found to have statistically significant medium-term output and employment effects (Figure 3.13, panels 1 and 2). A 10 percent increase in spending raises output and employment levels by about 0.35 percent four years after the shock, and the levels stabilize afterward. In addition, the effect on output materializes quickly, reaching 0.2 percent one year after the shock.<sup>29</sup> Given that average spending on active labor market policies across the sample is

<sup>29</sup>To isolate changes in discretionary spending from fluctuations in spending driven by the business cycle, the analysis follows the approach inspired by Perotti (1999) and Corsetti, Meier, and Müller (2012), wherein spending shocks are identified as innovations to past spending and economic activity as well as to expectations about current economic activity.

about 1 percent of GDP, this implies a one-year-ahead multiplier of about 1.2, consistent with other estimates reported in the literature (see Coenen and others 2012 and literature cited therein).

Shocks to spending on active labor market policies are found to have bigger effects in bad times. During periods of slack, a 10 percent increase in spending increases output by about 0.2 percent in the year of the shock and by about 0.6 percent after four years, whereas these effects are not statistically significantly different from zero in expansions (Figure 3.13, panels 3 and 4). As is also true in the case of shocks to labor tax wedges, this finding is consistent with the presence of larger fiscal multipliers in recessions. Spending on active labor market policies remains effective—even though the effects are smaller—if implemented in a budget-neutral way, and the effects are amplified when higher spending is combined with major reforms aimed at increasing the efficiency of active labor market policies.<sup>30</sup>

### *The Role of Macroeconomic Policy*

As discussed earlier, the effects of some labor market reforms—in particular, reforms of employment protection legislation and unemployment benefit systems—can become contractionary if the reforms are undertaken under weak economic conditions. A key question, then, is whether accompanying macroeconomic policy stimulus can offset these short-term costs and maximize the benefits from reforms, either directly, through its direct effect on aggregate demand, or indirectly, because higher aggregate demand may make firms more willing to hire and less willing to dismiss workers in the aftermath of the reforms—as suggested by the model-based analysis of employment protection legislation reforms discussed earlier. Exploring this issue requires considering policy actions—both expansionary and contractionary—that are uncorrelated with reforms and can plausibly be deemed exogenous to macroeconomic conditions. For this purpose, the analysis focuses on fiscal policy shocks, which are identified as the forecast error of government consumption expenditure relative to GDP (for a similar approach, see Auerbach and Gorodnichenko 2012, 2013; and Abiad, Furceri, and Topalova 2015).<sup>31</sup>

<sup>30</sup>The effect of budget-neutral spending on active labor market policies does not vary substantially with the business cycle.

<sup>31</sup>This procedure also overcomes the problem of fiscal foresight (Forni and Gambetti 2010; Leeper, Richter, and Walker 2012; Leeper, Walker, and Yang 2013; Ben Zeev and Pappa 2014), because it aligns the economic agents' and the econometrician's

The analysis indeed confirms that expansionary fiscal policy, in addition to stimulating aggregate demand, maximizes the benefits from labor market reforms (Figure 3.14).<sup>32</sup> During periods of relatively large fiscal expansion, reforms to employment protection legislation (unemployment benefits) are found to reduce the unemployment rate by about 2½ (3) percentage points in the medium term.<sup>33</sup> In contrast, during periods of relatively large fiscal contraction, they have zero or adverse effects on unemployment.<sup>34</sup>

### **Reforms That Increase Participation of Women and Older Workers**

This subsection examines the effects of policies that can raise the labor force participation rates of women and older workers. Other labor market reforms have the potential to boost the participation rates of additional underrepresented population groups, such as youth and low-skilled migrants. Those reforms include well-designed training programs, as well as reductions in tax wedges and youth-specific minimum wages (April 2016 *Fiscal Monitor*, Chapter 2; OECD 2015). The analysis shows that reducing the (marginal) income taxation of second earners has statistically significant effects on women's labor force participation rates (Figure 3.15, panel 1).<sup>35</sup> There is also evidence that increasing incentives for part-time work and public spending on child care tends to increase women's labor force participation rates (see also Christiansen and others, forthcoming). For older workers, reducing early retirement incen-

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information sets. The correlation between the measure of fiscal shocks and reforms of employment protection legislation or unemployment benefit systems is found to be close to zero. Likewise, the correlation between fiscal shocks and economic regime (or change in economic regime) is only -0.11 (0.01) and is not statistically significant.

<sup>32</sup>Consistent with this finding, Bordon, Ebeke, and Shirono (2016) find that supportive macroeconomic policies enhance the effect of product market reforms on employment.

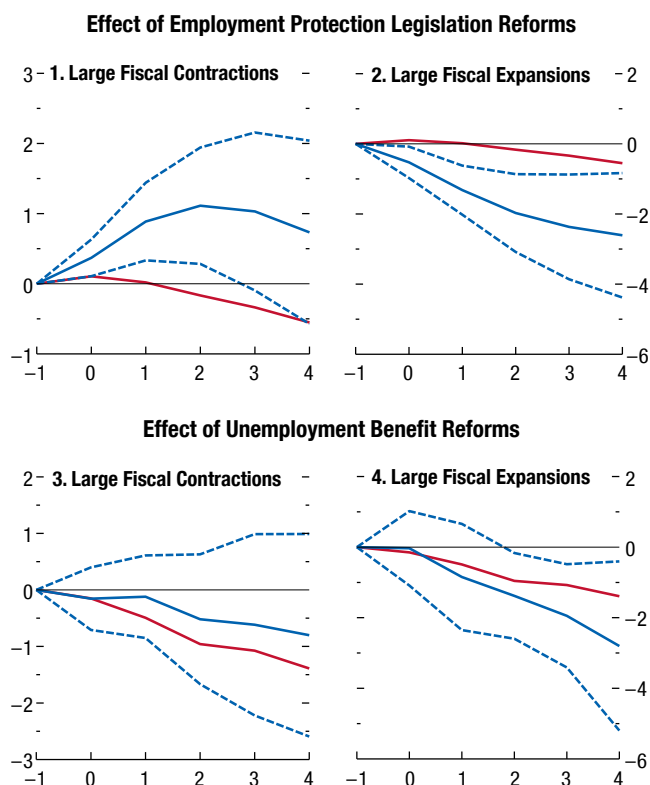
<sup>33</sup>See Annex 3.3 for details on the empirical specification used, as well as for the definition of expansionary and contractionary fiscal regimes.

<sup>34</sup>Qualitatively similar results are found for employment and output. A potential concern regarding the analysis is that fiscal shocks may respond to output growth surprises. Analysis of the data shows that these shocks are weakly correlated with growth surprises. Moreover, purifying fiscal shocks by removing the portion explained by growth surprises delivers results that are similar to, and not different with statistical significance from, those reported in Figure 3.12.

<sup>35</sup>Given the limited time sample over which a measure of tax wedges on second earners is available (2000–12), the analysis examines the effect on participation rates up to three years after the shock.

**Figure 3.14. Role of Fiscal Policy in Shaping the Effects of Employment Protection Legislation and Unemployment Benefit Reforms on Unemployment**  
(Percentage points; years on x-axis)

Expansionary fiscal policy enhances the benefits from labor market reforms. During periods of relatively large fiscal expansions, reforms to employment protection legislation and unemployment benefits reduce the unemployment rate. In contrast, during periods of relatively large fiscal contractions, they have zero or adverse effects on unemployment.



Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. In panels 1 and 2, solid blue lines denote the response to a major reform in employment protection legislation. In panels 3 and 4, they denote the response to a major reform in unemployment benefits. Dashed lines denote 90 percent confidence bands; and solid red lines represent the unconditional result.

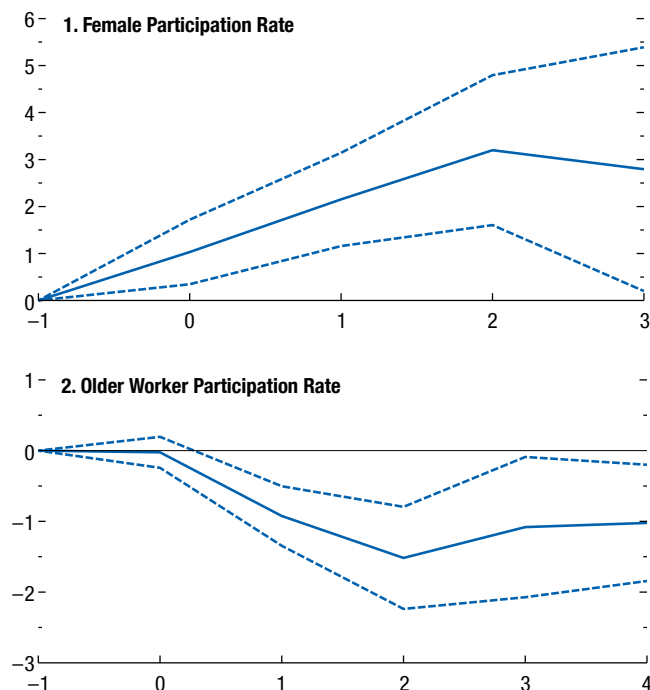
tives by lowering the implicit tax on continued work embedded in old-age pension systems—for example, by increasing bonuses for deferred retirement or minimum statutory retirement ages—is found to boost these workers' labor market participation (Figure 3.15, panel 2), as well as employment rates overall. The magnitude of the effect is consistent with other estimates reported in the literature (see, for example, Duval 2003).

## Summary and Policy Implications

Is now a good time to make a big push for additional structural reform in advanced economies? The

**Figure 3.15. Effects of Reforms on Participation Rates of Women and Older Workers**  
(Percentage points; years on x-axis)

Reductions in marginal taxation of second earners and continued work at older ages boost the labor market participation of women and older workers, respectively.



Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. In panel 1, the solid line denotes the response to a 1 percent reduction in the (marginal) labor tax wedge for second earners. In panel 2, the solid line denotes the response to a 10 percentage point reduction in implicit tax on continued work. Dashed lines denote 90 percent confidence bands.

three basic findings of this chapter support a qualified “yes,” for several reasons:

- There is a strong need and scope for substantial further reforms of product market regulations—especially those governing retail trade and professional services—and labor market institutions.
- The political environment is currently conducive to such reforms, at least for product markets, given the worries about weak growth (see Box 3.1).
- Product and labor market reforms can raise potential output and employment levels over the medium term (Table 3.1). These findings justify further reform efforts in many advanced economies, particularly in those with the greatest scope for reform—such as, to various extents, some euro area countries, Japan, and Korea. But the “yes” must be qualified by three other considerations:

- Most reforms are likely to make only a small near-term contribution to the ongoing economic recovery, as it takes time for the gains to materialize, particularly in countries where economic conditions are weak.
- Wherever possible, labor market reforms need to be accompanied by supportive macroeconomic policies—including fiscal stimulus where space is available and a strong medium-term fiscal framework is in place—to enhance their short-term benefits at the current juncture.
- Structural reforms can raise the long-term level of output, as the chapter shows, but their growth effects appear to be transitory.

The qualifications highlight the need for careful prioritization and sequencing of reforms as well as for complementary macroeconomic policies, especially for labor market reforms. Product market reforms should be implemented forcefully, as they boost output even under weak macroeconomic conditions and would not worsen public finances. In contrast, narrowing unemployment benefits and easing job protections should be accompanied by other policies to offset their short-term cost; alternatively, they might even be grandfathered or be enacted with their implementation deferred until a (suitably defined) better time arrives.

Finally, because product and labor market reforms are no silver bullet, policymakers should undertake them in combination with other growth-oriented reforms.

### Annex 3.1. Modeling the Effects of Product and Labor Market Reforms

This annex presents the dynamic stochastic general equilibrium model used to assess the effects of reforms. The model considers a currency union that consists of two countries and two sectors (tradables and nontradables) in each country—although key insights are qualitatively robust to considering a small open economy under a flexible exchange rate regime instead.<sup>36</sup> Full details are provided by Cacciatore and others (forthcoming-b), who in turn build on earlier work by Cacciatore and Fiori (2016) and Cacciatore, Fiori, and Ghironi (forthcoming) that develops a novel theoretical framework for studying the consequences of product and labor market reforms and their interactions with macroeconomic policy. The main features of the model are the following:

- *Households*—These consist of a continuum of members and maximize the present value of their utility, which

depends on consumption of a basket of nontradable and (domestic and foreign) tradable goods. Because of labor and product market imperfections described later, a fraction of the household members will be unemployed and receive unemployment benefits from the government, financed through lump-sum taxes. The representative household owns the capital stock and also invests in a noncontingent bond, as well as in a mutual fund of nontradables sector firms through which new entrants can finance their entry costs.

- *Firms*—In each country, there are two vertically integrated production stages. Upstream, perfectly competitive firms use capital and labor to produce a nontradable intermediate input. Downstream, monopolistically competitive firms purchase intermediate inputs and produce differentiated nontradable goods. These goods are consumed, but also used by competitive firms in the tradables sector to produce a tradable good that is sold to consumers in both countries.
- *Job destruction*—While the rental market for capital is fully competitive, the labor market is imperfect and characterized by job-search-and-matching frictions with endogenous job creation and destruction as in Mortensen and Pissarides 1994 and den Haan, Ramey, and Watson 2000. Jobs are located in the intermediate goods sector. They can be destroyed for exogenous and endogenous motives. One endogenous motive is that jobs are subject to both common and job-specific productivity shocks in each period. If productivity is less than an endogenously determined threshold below which the value of keeping a particular job is less than the cost of discontinuing it, the firm dismisses the worker and pays the firing costs. The higher the firing costs, the lower the productivity threshold below which jobs are destroyed. Firing costs take the form of administrative costs of layoff procedures, and hence, are not transferred to workers and therefore should not be misconstrued as severance payments. Laid-off workers become unemployed and immediately begin searching for a new job.
- *Job creation*—Job creation is subject to matching frictions. To hire a worker, firms post job vacancies, incurring a cost. The probability of finding a worker depends on the degree of tightness of the labor market and the efficiency of the matching process. In turn, matching efficiency may be thought of as being partly affected by active labor market policies, although these are not specifically modeled. The representative intermediate goods producer chooses the number of vacancies, the job destruction threshold, and its capital stock so as

<sup>36</sup>See related work by Cacciatore and others (2015).

to maximize the present value of profits. Profits, and therefore job creation, also depend on wages, which are set through a negotiation process between firms and workers—so-called Nash bargaining. Stronger bargaining power of workers in this process, more generous unemployment benefits, or both raise wage claims and thereby reduce profits and job creation incentives, all else being equal. At the same time, higher wages raise consumption, aggregate demand, and—through this effect—job creation incentives, also all else being equal. The hiring-firing process creates dynamics (turnover) in the labor market, and employment varies depending on endogenous variations in job creation and destruction.

- *Product market dynamics and regulation*—The number of firms serving the nontradable goods market is endogenous.<sup>37</sup> Prior to entry, firms pay a sunk entry cost that reflects both a technological component (for example, sunk technological costs required to start producing electricity) and administrative costs of regulation. New entrants start producing after one period, increasing competition among firms and reducing profit margins and prices for all. Entry occurs until a new entrant's discounted value of future profits equals the sunk entry costs. Firm exit is exogenous and occurs when a firm is hit by a “death shock.” This entry-exit process creates firm dynamics in the goods market. Finally, producers face (quadratic) price adjustment costs, resulting in sticky prices.
- *Monetary policy*—Since model parameters are chosen to match features of euro area macroeconomic data, monetary policy is assumed to respond to inflation and the output gap as estimated historically in the euro area. The policy rate cannot fall below a certain threshold—in practice, here, the zero lower bound—but the argument is more general.

### Implementation of Reforms under Alternative Macroeconomic Conditions

The analysis simulates permanent unanticipated reforms across the whole currency union. It considers four possible reforms to product market regulation, employment protection legislation, unemployment benefit systems, and active labor market policies. More precisely, the analysis focuses on (1) a reduction in entry barriers to the level estimated for the United

States (for details, see Cacciato and others, forthcoming-b); (2) the elimination of administrative costs of layoff procedures;<sup>38</sup> (3) a reduction to U.S. levels in workers' average unemployment benefit replacement rate over a five-year unemployment spell; and (4) a 50 percent increase in the efficiency of the job-matching process, which, according to estimates by Murtin and Robin (2014), would bring average matching efficiency across the euro area roughly to the (higher) average level across Sweden and the United Kingdom.

Reforms are carried out under three alternative macroeconomic conditions: (1) in “normal times,” corresponding to the economy's initial steady state; (2) in “bad times with constrained monetary policy,” which means in the immediate aftermath of a recession driven by a risk-premium shock that increased the required return on financial assets, depressing output and generating deflation (see, for instance, Eggertsson and Woodford 2003);<sup>39</sup> and (3) in “bad times with unconstrained monetary policy,” which is situation (2) but now assuming as a thought experiment that the policy rate can freely fall below zero.

## Annex 3.2. Identification of Reforms and Policy Shocks

### Product Market, Employment Protection Legislation, and Unemployment Benefit Reforms

#### Identification Approach

Major reforms of product market regulation, employment protection legislation, and unemployment benefit systems are identified by examining documented legislative and regulatory actions reported in all available Organisation for Economic Co-operation and Development (OECD) *Economic Surveys* for 26 individual advanced economies since 1970, as well as additional country-specific sources (see Annex 3.4 for the list of countries covered). In this respect, the methodology is closely related to the “narrative approach” used by Romer and Romer (1989, 2004, 2010, and 2015) and Devries and others (2011) to identify monetary and fiscal shocks and periods of high financial distress. The approach also considers both reforms and “counterreforms”—namely, policy changes in the opposite direction.

<sup>38</sup>Relaxing employment protection legislation may also lower workers' bargaining power (Blanchard and Giavazzi 2003). This effect is not considered here.

<sup>39</sup>The size of the risk premium shock is chosen so as to deliver a 4 percent peak-to-trough decline in output, while its persistence is such that, in the absence of reform, the zero lower bound binds for approximately two years.

<sup>37</sup>The model focuses on entry in the nontradables sector to capture the focus of current policy discussions on this sector. Cacciato, Fiori, and Ghironi (forthcoming) focus on entry in the tradables sector.

In a first step, more than 1,000 legislative and regulatory actions are identified in the areas of product market regulation, employment protection legislation, unemployment benefits, and the design of active labor market policies over the entire sample. In a second step, for any of these actions to qualify as a major reform, one of the following three alternative criteria must be met: (1) the OECD survey uses strong normative language to define the action, suggestive of an important measure (for example, “major reform”); (2) the policy action is mentioned repeatedly across different issues of the OECD survey or in the retrospective summaries of key past reforms that are featured in some issues, for the country considered; or (3) the OECD indicator of the regulatory stance in the area considered—if available—displays a very large change (in the 5th percentile of the distribution of the change in the indicator). When only the last of these conditions is met, an extensive search through other sources is performed to identify the precise policy action underpinning the change in the indicator. Annex Table 3.2.1 provides an example of how these criteria have guided the identification of major reforms and counterreforms in the area of product market regulation, employment protection legislation, and unemployment benefits (for details, see Duval and others, forthcoming).

One important advantage of this approach is that it identifies the precise nature and timing of *major* legislative and regulatory actions taken by advanced economies since the early 1970s in key labor and product market policy areas. Specifically, compared with existing databases on policy actions in the area of labor market institutions (such as the European Commission Labref, Fondazione Rodolfo de Benedetti–IZA, and International Labour Organization EPLex databases), the approach allows identification of major legislative and regulatory reforms as opposed to just actions. This is particularly useful for empirical analysis that seeks to identify, and then estimate, the effects or the drivers of reform shocks.

The approach also improves along several dimensions on indirect methods that rely exclusively on changes in OECD policy indicators to identify policy shocks. Specifically, the approach is able to do the following:

- Identify the exact timing of major legislative and regulatory actions
- Identify the precise reforms that underpin a gradual decline in OECD policy indicators without any obvious break (for example, for some countries in some network industries—air, rail, and road transportation; electricity and gas distribution; telecommunications and postal services)
- Cover reform areas for which no time-varying policy indicators exist, such as conditionality in the provision of unemployment benefits or major reforms regarding the design of activation policies, such as the integration of job placement and benefit payment services
- Identify reforms in areas for which OECD indicators exist but do not cover all relevant policy dimensions (for example, a major reform that lowers the duration of unemployment benefits from an indefinite period to five years is not captured by the corresponding OECD indicator, which covers the first five years of an unemployment spell)
- Cover a longer time period in some policy areas, such as employment protection legislation, for which OECD indicators are available only starting from the mid-1980s
- Document and describe the precise legislative and regulatory actions that underpin observed large changes in the OECD indicator
- Differentiate between announcement and implementation dates of reforms, in some cases<sup>40</sup>

In contrast, the approach does not allow any information to be provided regarding the stance of current or past product and labor market regulations and as such is clearly no substitute for existing policy indicators, for instance, those produced by the OECD.

### *Number of Identified Reforms*

Annex Figure 3.2.1 shows the number of reforms identified in the sample and illustrates the heterogeneity of reform efforts across regulatory areas. Product market reforms have been most frequently implemented, in particular as regards the regulation of network industries (Annex Figure 3.2.1, panel 1).<sup>41</sup> In general, fewer reforms have been implemented in the areas of employment protection legislation and unemployment benefit systems. One exception has been the rather widespread relaxation of employment protection legislation for temporary contracts. In part, this may reflect political

<sup>40</sup>While the limited number of cases for which the announcement and the implementation date of reforms is available prevents systematic use of this information in the cross-country analysis, this information could be useful in microstudies aimed at assessing the impact of reforms, including through anticipation effects.

<sup>41</sup>Economy-wide product market reform episodes are then defined as events during which reform occurs in at least two out of the seven network industries, which corresponds to the 90th percentile of the distribution of the sum of all seven reform dummy variables. Similar results are obtained when the distribution of the weighted sum of the reform dummies is used instead, with weights equal to the (country-sector-specific time-varying) share of value added of each sector in GDP.

**Annex Table 3.2.1. Examples of Reforms Identified**

Reform (+) or Counter-reform (-)	Announcement Year	Implementation/ Scored Year	Area	Country	Content	Normative Language	Mention in Reports	Large Change in OECD Indicator
+	1982	1984	Product market (telecommunications)	United States	Antitrust suit against AT&T	The most important deregulatory move in telecommunications came with the antitrust suit against AT&T by the United States. Competition for long-distance voice services entered a new phase in 1984.	1986, 1989, 2004	No
+	1993	Mid-1994/1995	Employment protection legislation	Spain	Draft law modifying the existing law regulating employment. It introduced dismissals of permanent workers.	... far-reaching labor market reforms aimed at lifting barriers to job creation. A decree was passed at the end of December 1993, and a draft has been presented to Parliament and is expected to become law by the middle of 1994.	No	Yes for 1995
-	...	1970	Employment protection legislation	Italy	Act of 1970, referred to as the "workers' statute"	The Act of 1970 referred to as the "workers' statute" laid the basis for employer-employee relations and regulations concerning hiring. The two main sources of rigidity seem to be the regulations governing hiring and firing. The conditions and procedures for hiring workers are extremely stringent, particularly for large firms.	1986	...
+	...	1994	Unemployment benefits	Denmark	Labor market reforms of 1994: activation of the unemployed, limiting the duration of unemployment benefits, enforcing job availability criteria, compulsory full-time activation, stricter eligibility criteria	The measures taken ... are steps in the right direction. Training and education offers are fully operational, a foundation has been established for reducing the duration of unemployment benefits on a sustainable basis.	2000	Yes for 1994 (replacement rate); other aspects (duration, eligibility, active policies) not captured

Source: Organisation for Economic Co-operation and Development (OECD).

economy obstacles that in some cases have made it difficult to reform poorly functioning institutions (Box 3.1), but also that societal preferences (for insurance against economic risk) vary across countries and that different labor market institutional models can be successful.

### Labor Tax Wedge Shocks

Labor tax wedge shocks are identified as the annual change in the main tax wedge measure derived from OECD tax models. This measure is defined as the wedge between the labor cost to the employer and the corresponding net take-home pay of the employee for an average single-earner couple with two children, and it expresses the sum of personal income tax and all social security contributions as a percentage of total labor cost.

### Discretionary Shocks to Public Spending on Active Labor Market Policies

The methodology used to identify shocks to discretionary spending on active labor market policies follows the approach inspired by Perotti (1999) and Corsetti, Meier, and Müller (2012). In this approach, spending shocks are identified as innovations to past spending and economic activity as well as to expectations about current economic activity.<sup>42</sup> Data for

<sup>42</sup>Specifically, spending shocks are identified as the residuals of the following regression:

$$\Delta s_{it} = \alpha_i + \gamma_t + \beta_i \Delta y_{it-1} + \delta_i \Delta y_{it-1}^E + \vartheta_i \Delta s_{it-1} + \varepsilon_{it}$$

in which  $\Delta s$  denotes the growth rate of public spending on active labor market policies;  $\Delta y$  is GDP growth;  $\Delta y^E$  denotes the forecast for GDP growth at time  $t$ , made at  $t-1$ ; and  $\alpha_i$  and  $\gamma_t$  are country and time fixed effects, respectively.

spending on active labor market policies are taken from the OECD Social Expenditure Database.

### The Wedge between the Tax Rates of Second Earners and Single Individuals

The wedge between the tax rates of second earners and single individuals is computed as the ratio of *Tax second earner* to *Tax single individual*. The *Tax second earner* variable is calculated as

$$\text{Tax second earner} = 1 - \frac{(\text{Household Net Income})_B - (\text{Household Net Income})_A}{(\text{Household Gross Income})_B - (\text{Household Gross Income})_A},$$

in which A represents the case in which the second earner does not earn any income and B the case in which the second earner's gross earnings are 67 percent of average earnings. The *Tax single individual* variable is computed using the same formula for a single person. Data on tax rates of second earners and single individuals are taken from the OECD Family Database.

### Implicit Tax on Continued Work

Data for implicit tax on continued work embedded in old-age pension systems are taken from and updated using the methodology described by Duval (2003). This variable measures the change in pension wealth—calculated as the change in present value of the stream of future pension payments net of contributions to the system—from working five more years, for “typical” workers at ages 55, 60, and 65. It varies depending, for instance, on the minimum age of eligibility for benefits or the existence and magnitude of pension adjustments for early or deferred retirement.

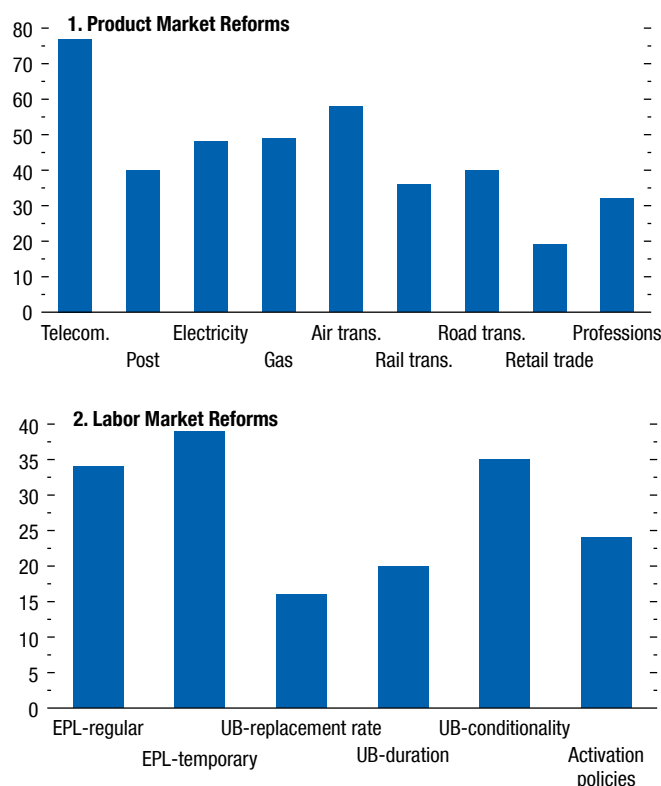
## Annex 3.3. The Macroeconomic Effects of Reforms: Empirical Analysis

### Cross-Country Analysis

#### Empirical Strategy

The analysis in this section assesses the macroeconomic impact of reforms. Two econometric specifications are used. The first establishes whether reforms have statistically significant effects on macroeconomic variables such as output, (un)employment, and inflation. The second assesses whether these effects vary with overall business conditions prevailing at the time of a particular reform (weak versus strong economic conditions) or with the stance of accompanying macroeconomic policies (fiscal expansions versus fiscal con-

Annex Figure 3.2.1. Number of Reforms Identified



Source: IMF staff calculations.

Note: EPL = employment protection legislation; gas = gas distribution; post = postal services; professions = professional services; telecom. = telecommunications; trans. = transportation; UB = unemployment benefit.

tractions). The statistical method follows the approach proposed by Jordà (2005) to estimate impulse-response functions. This approach has been advocated by Stock and Watson (2007) and Auerbach and Gorodnichenko (2012), among others, as a flexible alternative to vector autoregression (autoregressive distributed-lag) specifications since it does not impose dynamic restrictions. It is also particularly suited to estimating nonlinearities (including interactions between shocks and other variables of interest) in the dynamic response. The first regression specification is estimated as follows:

$$y_{t+k,i} - y_{t-1,i} = \alpha_i + \gamma_t + \beta_k R_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}, \quad (\text{A3.3.1})$$

in which  $y$  is the log of output (log of employment, unemployment rate, log of productivity, log of price level);  $\alpha_i$  are country fixed effects, included to take account of differences in countries' average growth rates;  $\gamma_t$  are time fixed effects, included to take account of global shocks such as shifts in oil prices or the

global business cycle;  $R$  denotes the reform; and  $X$  is a set of control variables, including past economic growth, past reforms, and recession dummies.

In the second specification, the response is allowed to vary with the state of the economy and the stance of fiscal policy:

$$y_{i,t+k} - y_{i,t-1} = \alpha_i + \gamma_t + \beta_k^L F(z_{i,t}) R_{i,t} + \beta_k^H (1 - F(z_{i,t})) R_{i,t} + \theta Z_{i,t} + \varepsilon_{i,t}, \quad (\text{A3.3.2})$$

with

$$F(z_{it}) = \frac{\exp(-\delta z_{it})}{1 + \exp(-\delta z_{it})}, \quad \delta > 0,$$

in which  $z$  is an indicator of the state of the economy (or the stance of fiscal policy) normalized to have zero mean and unit variance and  $Z$  is a set of control variables, including past economic growth, past reforms, recession dummies, and the state of the economy or the stance of fiscal policy.<sup>43</sup> The indicator of the state of the economy considered in the analysis is GDP growth.<sup>44</sup> The indicator of the stance of fiscal policy is a government consumption shock, identified as the forecast error of government consumption expenditure relative to GDP (for a similar approach see, for example, Auerbach and Gorodnichenko 2012, 2013; and Abiad, Furceri, and Topalova 2015).<sup>45</sup>

Equations (A3.3.1) and (A3.3.2) are estimated for each  $k = 0, \dots, 4$ . Impulse-response functions are computed using the estimated coefficients  $\beta_k$ , and the confidence bands associated with the estimated impulse-response functions are obtained using the

<sup>43</sup>This approach is equivalent to the smooth-transition autoregressive model developed by Granger and Teräsvirta (1993). The advantage of this approach is twofold. First, compared with a model in which each reform variable is interacted with the unemployment rate or business cycle measures, this approach tests directly whether the effect of reforms varies across different regimes such as recessions (for example, output growth below a given threshold) and expansions. Second, compared with estimating structural vector autoregressions for each regime, it allows the effect of reforms to change smoothly between recessions and expansions by considering a continuum of states to compute the impulse-response functions, thus making the response more stable and precise.

<sup>44</sup>Following Auerbach and Gorodnichenko (2012),  $\delta = 1.5$  is used here for the analysis of recessions and expansions. Periods of very low (high) growth identified in this analysis also correspond to periods of large negative (positive) output gaps. Similar results are indeed found when the output gap rather than GDP growth is used.

<sup>45</sup>This procedure also overcomes the problem of fiscal foresight (Forni and Gambetti 2010; Leeper, Richter, and Walker 2012; Leeper, Walker, and Yang 2013; Ben Zeev and Pappa 2014), because it aligns the economic agents' and the econometrician's information sets. Here,  $\delta = 1$  is used to assess the role of the fiscal policy stance. The results do not qualitatively change for different values of  $\delta > 0$ .

estimated standard errors of the coefficients  $\beta_k$ , based on clustered robust standard errors.

The macroeconomic series used in the analysis come from the Organisation for Economic Co-operation and Development (OECD) Economic Outlook: Statistics and Projections database, which covers an unbalanced sample of 26 OECD economies over the period 1970–2014 (see Annex 3.4 for details). The forecasts of government consumption used in the analysis are those reported in the fall issue of the OECD's *Economic Outlook* for the same year. As a robustness check, the forecasts of the spring issue of the same year and the fall issue of the previous year are used.

### Robustness Checks

A possible concern regarding the analysis is that the probability of structural reform is influenced not only by past economic growth and the occurrence of recessions (Box 3.1), but also by contemporaneous economic developments as well as expectations of future growth. However, this is unlikely to be a major issue, given the long lags associated with the implementation of structural reforms and that information about future growth is likely to be largely embedded in past economic activity. Most important, controlling for expectations of current and future growth delivers results that are very similar to, and not statistically significantly different from, those reported in the chapter text (Annex Figure 3.3.1).

Another possible concern regarding the analysis is that the results may suffer from omitted-variables bias, as reforms may occur across different areas at the same time. However, including all reforms across all areas simultaneously in the estimated equation does not substantially alter the magnitude and the statistical significance of the results (Annex Figure 3.3.1).

Finally, estimates could be biased in the event of reform reversals. In practice, however, this bias is negligible, as there are only a very few such cases. Furthermore, the results are robust to controlling for future reforms and counterreforms, as well as to focusing exclusively on reform episodes.

### Sector- and Firm-Level Analysis

To provide additional insights into the transmission channels of product and labor market reforms and to address some of the limitations of the macroeconomic analysis (by fully controlling for countrywide economic shocks that coincide with reforms), the macroeconomic analysis is complemented by sector- or firm-level approaches or both.

### Product Market Reforms: Direct Effects

The direct effects of product market reforms on sectoral (or firm) output are estimated using a specification similar to (A3.3.1) but augmented by country-year ( $\alpha_{ij}$ ) and country-sector ( $\gamma_{ij}$ ) fixed effects as well as by sector time trends ( $trend_j$ ):

$$y_{j,i,t+k} - y_{j,i,t-1} = \alpha_{it} + \gamma_{ij} + trend_j + \beta_k R_{j,i,t} + \varepsilon_{j,i,t}, \quad (\text{A3.3.3})$$

in which  $i$  denotes country,  $j$  sector (or firm), and  $t$  year.

The inclusion of these two types of fixed effects provides two important advantages compared with the cross-country analysis: (1) country-year fixed effects make it possible to control for any variation that is common to all sectors of a country's economy, including aggregate output growth as well as reforms in other areas; and (2) country-industry fixed effects allow industry-specific factors, including, for instance, cross-country differences in the growth of certain sectors that could arise from differences in comparative advantage, to be controlled for. The firm-level analysis in addition controls for past and future reforms, industry-year fixed effects, and key firm characteristics such as age, size, debt, and labor productivity.

The sectoral series used in the analysis of direct effects of product market reforms come from the OECD Structural Analysis (STAN) database, which provides annual information on sectoral input, output, and prices over the period 1970–2011.<sup>46</sup> The firm-level series are taken from the Orbis database, which covers an unbalanced sample of 20 advanced economies over the period 1998–2013.<sup>47</sup>

### Product Market Reforms: Indirect Effects

The indirect effects of product market reforms on sectoral output through their spillovers to other sectors are estimated using a specification similar to (A3.3.3) but focusing instead on a term for the interaction between product market reforms in each network industry and the total input requirement of downstream (upstream) industries from upstream (downstream) industries:

$$y_{j,i,t+k} - y_{j,i,t-1} = \alpha_{ij} + \gamma_{it} + trend_j + \beta_k \sum_{s \neq j} \omega_{js,i,t}^{I/O} R_{s,i,t} + \varepsilon_{j,i,t}, \quad (\text{A3.3.4})$$

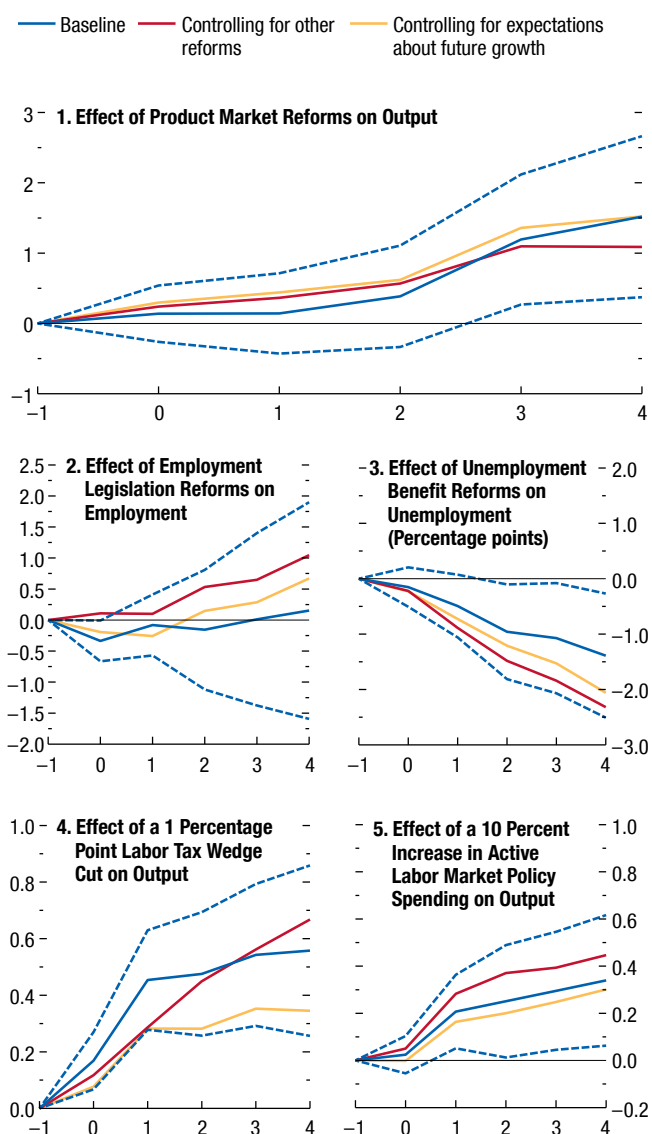
in which  $\omega_{js,i,t}^I$  is the share of intermediate inputs provided by each network industry  $s$  in country  $i$

<sup>46</sup>See Bouis, Duval, and Eugster, forthcoming, for further details on the construction of the data set and the analysis.

<sup>47</sup>See Gal and Hijzen, forthcoming, for further details on the construction of the data set and the analysis.

### Annex Figure 3.3.1. Effects of Reforms on Economic Activity: Robustness Check

(Percent, unless noted otherwise; years on x-axis)



Source: IMF staff estimates.

Note:  $t = 0$  is the year of the shock. Dashed lines denote 90 percent confidence bands.

to downstream industry  $j$ , and  $\omega_{js,i,t}^O$  is the share of intermediate inputs provided by each industry  $j$  in country  $i$  to downstream network industry  $s$ . To minimize endogeneity issues and measurement errors, the weights  $\omega_{js,i,t}^{I/O}$  are based on 2000 input-output data. Similar results are obtained using 1996 input-output data instead.

The sectoral series used in this analysis come from the EU KLEMS and World KLEMS databases, which provide annual information on sectoral input, output, and prices over the period 1970–2007.

### Employment Protection Legislation Reforms

The empirical approach used to assess the effect of employment protection legislation reforms on sectoral employment builds on the methodology proposed by Bassanini, Nunziata, and Venn (2009). The analysis relies on the identification assumption that stringent dismissal regulations are likely to be more binding in sectors that are characterized by a higher natural propensity to regularly adjust their workforce ( $L_j$ ):

$$y_{j,i,t+k} - y_{j,i,t-1} = \alpha_{it} + \gamma_{ij} + trend_j + \beta_k L_j R_{i,t} + \varepsilon_{j,i,t}. \quad (A3.3.5)$$

The sectoral series used in this analysis come from the EU KLEMS and World KLEMS databases (Timmer and others 2015). Data on layoff rates are taken from Bassanini, Nunziata, and Venn 2009 and are computed based on industry-level U.S. layoff rates reported in the 2004 Current Population Survey *Displaced Workers Supplement*. While relying on U.S. layoff rates can be considered a good proxy for underlying layoff propensity in the absence of dismissal regulations, one potential problem with this approach is that they may not be representative for the whole sample—that is, U.S. layoff rates may be affected by U.S.-specific regulations or sectoral patterns. To check for the sensitivity of the results to this assumption, the analysis is replicated using U.K. layoff rates computed from the U.K. *Labour Force Survey*. The results based on U.K. layoff rates are very similar to, and not statistically significantly different from, those based on U.S. layoff rates.

## Annex 3.4. Country Coverage and Data Sources

### Annex Table 3.4.1. Country Coverage

Australia	Finland	Italy	Norway	United Kingdom
Austria	France	Japan	Portugal	United States
Belgium	Germany	Korea	Slovak Republic	
Canada	Greece	Luxembourg	Spain	
Czech Republic	Iceland	Netherlands	Sweden	
Denmark	Ireland	New Zealand	Switzerland	

### Annex Table 3.4.2. Macroeconomic Data Sources

Variable	Source
Potential Output Growth and Components	April 2015 <i>World Economic Outlook</i> , Chapter 3
Product Market Regulations	Koske and others 2015 (Organisation for Economic Co-operation and Development, Indicators of Product Market Regulation)
Employment Protection Legislation	Organisation for Economic Co-operation and Development, Indicators of Employment Protection database
Unemployment Benefits	Organisation for Economic Co-operation and Development, Benefits and Wages database
Labor Tax Wedge	Organisation for Economic Co-operation and Development, Tax Statistics database
Spending on Active Labor Market Policies	Organisation for Economic Co-operation and Development, Social Expenditure database
Real GDP	Organisation for Economic Co-operation and Development, <i>Economic Outlook</i>
Employment	Organisation for Economic Co-operation and Development, <i>Economic Outlook</i>
Consumer Price Index	Organisation for Economic Co-operation and Development, <i>Economic Outlook</i>
Unemployment Rate	Organisation for Economic Co-operation and Development, <i>Economic Outlook</i>
Female Participation Rate	Organisation for Economic Co-operation and Development, <i>Labor Force Survey</i>
Older Worker Participation Rate	Organisation for Economic Co-operation and Development, <i>Labor Force Survey</i>

### Box 3.1. Breaking the Deadlock: Identifying the Political Economy Drivers of Structural Reforms

Despite broad recognition that many advanced economies are in need of product and labor market reforms, progress in these areas over the past two decades has not always met expectations. This deadlock over major reforms has inspired a significant number of studies in political economy research (see, for instance, Saint-Paul 2000 and Galasso 2014 and references cited therein). This literature has emphasized the role of macroeconomic conditions and policies and the vested interests of incumbents (firms and workers), as well as political factors—such as the degree of fractionalization in the parliament, ideology, political systems, and electoral cycles—as potential determinants of reforms. However, the empirical evidence on each of these reform drivers remains inconclusive, and different studies have often reached contrasting conclusions due to different samples, uncertainty regarding the exact timing of reforms, and the choice of control variables used in the analysis.<sup>1</sup>

This box tries to address the limitations of previous studies by (1) focusing on a more homogenous group of 26 advanced economies (see Annex 3.4 for the list of countries covered in the sample); (2) using this chapter's new database on reforms, which focuses on documented changes in regulation or legislation reported in Organisation for Economic Co-operation and Development (OECD) *Economic Surveys* and additional country-specific sources to identify the exact nature and timing of reforms (see Annex 3.2); and (3) using model averaging techniques to identify the most robust determinants of reforms.<sup>2</sup> The analysis focuses on six reform areas for which major legislative changes are identified in the database: product market, employment protection legislation for regular and temporary contracts, generosity of and conditionality embedded in unemployment protection benefit systems, and efficiency of activation policies—more specifically,

major overhauls of public employment services (which, for instance, enhance their effectiveness by merging job placement and benefit payment services).

The analysis points to several common drivers across reforms (Table 3.1.1). First, and most strikingly, product and labor market reforms typically occur during periods of weak economic growth, high unemployment, or both. This highlights that crises can break the political deadlock over reforms. Second, there is also clear evidence across the board that reform pressure is stronger if little action has been taken in the past. For example, if product market regulation is high in the preceding period, the likelihood of reform increases. Third, parliamentary systems are generally more likely to implement reforms, with the exception of major reforms to activation policies. Fourth, peer pressure matters: a given country is more likely to undertake reform in a particular area when neighboring countries and trade partners do so.

In addition to these common drivers, the analysis also points to some important area-specific determinants. The timing of elections seems to be particularly relevant for reforms of employment protection legislation in regard to regular contracts; these reforms tend to occur far away from elections, possibly reflecting their unpopularity. Aging countries tend to implement more product market and employment protection legislation reforms than do younger societies, possibly because such reforms may benefit older nonworking people more than prime-age workers. Furthermore, many product market reforms in European Union countries tend to have occurred during their accession process, reflecting greater pressure for reform during that period. In contrast, other variables that feature prominently in the political economy literature—such as union density, the political orientation of governments, and fiscal positions—are found to be only weakly correlated with the occurrence of product and labor market reforms.

In sum, this box points to weak economic conditions and the size of structural reform gaps as the most robust drivers of product and labor market reforms. This implies that the current economic environment and the remaining scope for reforms in many countries provide political conditions that ought to be conducive to a push for structural reforms.

The authors of this box are Jakob Miethe and Davide Furceri. The analysis presented here draws on Duval, Furceri, and Miethe, forthcoming.

<sup>1</sup>For example, for conflicting results on the role of fractionalization, see Wiese 2014; Bortolotti and Pinotti 2008; and Alesina, Ardagna, and Trebbi 2006.

<sup>2</sup>The analysis builds on the approach proposed by Sala-i-Martin (1997) and further extended by Doppelhofer, Miller, and Sala-i-Martin (2000). It applies extreme bounds and model averaging techniques to logit models. For each reform variable, the analysis considers up to 30 possible determinants of reforms suggested in the literature and 100,000 randomly chosen models from 1.3 million different combinations. In this approach, a variable is assessed to be a robust determinant of reforms if more than 90 percent of its effects are either positive or negative. See Duval, Furceri, and Miethe, forthcoming, for details.

**Box 3.1 (continued)****Table 3.1.1. Drivers of Reforms**

Category	Area of Reforms					
	PMR	EPR reg.	EPR temp.	UB	UB cond.	ALMP
Initial Stance	+	+	+		+	–
Domestic Spillovers from Reforms in Other Areas						
International Spillovers	+		+		+	–
Weak Economic Conditions	+	+	+	+	+	+
Closeness to Elections		–				
Ideology			–			
Political System	+	+	+	+		+
European Union–Related Variables	+					
Demographic Variables	+		+			

Source: IMF staff estimates.

Note: + = positive effect on reforms (more than 90 percent of cumulative distribution function of coefficient positive); – = negative effect on reforms (more than 90 percent negative). ALMP = active labor market policies; Demographic Variables = population older than 65, population 50–65; Closeness to Elections = the inverse of the number of months to the next elections, the inverse of the number of years of the executive in office, years left in term, dummy variable that takes value 1 if elections occur within the next 18 months, 0 otherwise; EPR reg. = employment protection reforms, regular workers; EPR temp. = employment protection reforms, temporary workers; European Union–Related Variables = Economic and Monetary Union, European Union accession, transition; Ideology = takes value 1 for right-leaning governments, 2 for center-leaning, and 3 for left-leaning; Initial Stance = lagged and initial indicator; PMR = product market regulations; Political System = democracy, union density, regional autonomy, system, centralization, parliamentary stability; Spillovers = domestic and international (raw as well as weighted by trade shares and distance); UB = unemployment benefits; UB cond. = unemployment benefits with conditionality; Weak Economic Conditions = unemployment, low growth, recessions, crises.

### Box 3.2. Reforming Collective-Bargaining Systems to Achieve High and Stable Employment

Since the global financial crisis, there has been a renewed focus on the macroeconomic performance of collective-bargaining systems as a key tool to strengthen the responsiveness of wages and working hours to macroeconomic shocks and, ultimately, to help achieve high and stable employment—so-called macro flexibility (Blanchard, Jaumotte, and Loungani 2014). Collective bargaining tends to be particularly important in continental western Europe, where it covers about 80 percent of the workforce and mostly takes the form of sector-level bargaining. Against this backdrop, this box sheds light on some of the key features that can help collective-bargaining systems achieve these goals.

Much of the early policy debate focused on the degree of centralization of wage bargaining. The prevailing view was that highly centralized systems (which provide macro flexibility by inducing unions and firms to internalize the effects of wage claims on economy-wide employment) and decentralized systems (by providing wage flexibility at the firm level) would be preferable to sector-level bargaining (Calmfors and Driffill 1988). However, as flagged, for instance, by Blanchard, Jaumotte, and Loungani (2014), the implications of alternative bargaining structures remain insufficiently understood. Indeed, experiences have diverged noticeably among countries where sector-level bargaining is widespread. This suggests that the ability of collective-bargaining systems to sustain high and stable employment rates depends not only on the degree of centralization, but also on the systems' specific features in terms of institutional design and national practices. This includes the scope for flexibility at the firm level, the reach of sector-level collective-bargaining agreements, and the effectiveness of coordination among bargaining units. These issues are particularly relevant for countries predominantly characterized by sector-level bargaining.

One important feature of a sector-level bargaining system is whether it provides for any flexibility at the firm level to accommodate temporary shocks that affect different firms in different ways—such as the global financial and euro area crises, whose impact on sales and access to credit varied widely

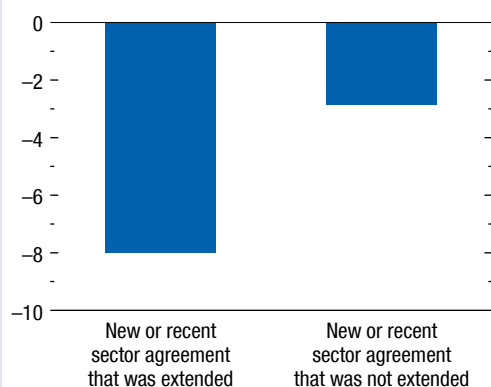
across firms within a number of countries. For example, the widespread use of hardship and opening clauses, which allow firms to set less favorable wages and working conditions than those in the applicable sector-level agreement if certain conditions are met, is often seen as one of the factors behind the resilience of the German labor market during the global financial crisis (Dustmann and others 2014). By contrast, countries such as Portugal and Spain entered the crisis with bargaining systems that continued to rely on strict application of the “favorability principle,” which says that working conditions can be no less favorable to workers than those specified in the sector-level agreement. Since the crisis, both countries have introduced reforms to provide more flexibility to firms. Opening clauses come with drawbacks, however, suggesting they need to be carefully calibrated. In the absence of any constraints on timing and scope, depending on the relative importance of their effects on employment levels and the shape of the wage distribution, they might raise inequality—directly, and possibly also indirectly by weakening the position of trade unions.

The presence and design of extensions of collective-bargaining agreements also matter for the ability of a sector-level bargaining system to withstand shocks. Despite the decline in union membership, collective-bargaining coverage has remained largely stable in countries relying on sector-level bargaining. This is due to the role of extensions that expand the coverage of collective-bargaining agreements beyond the membership of employer associations and trade unions to all workers in a sector. Extensions limit the scope of competition on the basis of poor working conditions and also reduce the transaction costs of engaging in negotiations, which may be particularly important for small firms that lack the resources to engage in firm-level bargaining. However, depending on the way they are administered, extensions have the potential to hurt employment and increase its sensitivity to changes in macroeconomic conditions. As an illustrative example, Figure 3.2.1 provides tentative new evidence based on a policy reform in

The author of this box is Alexander Hijzen, with contributions from Eric Gould (Hebrew University) and Pedro Martins (Queen Mary College, University of London).

## Box 3.2 (continued)

**Figure 3.2.1. Portugal: Employment Growth during the Global Financial Crisis among Firms Not Affiliated with an Employer Association**  
(Percent)



Source: IMF staff estimates.

Portugal that resulted from the unanticipated June 2011 decision by the government to suspend with immediate effect the extension of collective agreements. Because of the usual administrative delay associated with extensions, this effectively implied that any agreements signed in March 2011 or later were not extended. Figure 3.2.1 compares employment growth in firms that were not affiliated with an employer association in sectors in which a collective agreement was introduced or revised just before this date (and hence, the agreement was extended) with firms in sectors in which a collective agreement was introduced or revised just after this date (and hence, the agreement was not extended). It suggests that employment growth between 2010 and 2011 declined considerably more in nonaffiliated firms that were subject to an extension compared with those that were not.<sup>1</sup>

Good policy design can help mitigate the adverse effects of extensions. For instance, subjecting extensions to representativeness criteria (as, for example, in the Netherlands) or a meaningful test of public interest (as, for example, in Germany) can

<sup>1</sup>Similar findings are reported by Martins (2014).

help ensure that the interests of all firms, including small ones, are taken into account. The availability of clear and transparent procedures for exemptions from extensions, as they evolved in the Netherlands, for example, can provide some flexibility at the firm level when needed. By contrast, if in downturns extensions are applied retroactively starting from the date of the collective-bargaining agreement, the implied wage increases may harm liquidity-constrained firms.

When collective bargaining takes place predominantly at the sector level, coordination among bargaining units also matters for macro flexibility. Coordination can arise when smaller players follow the lead of a major one (“pattern bargaining”) or through confederations of trade unions and employer associations. Indeed, many countries with some form of coordinated sector-level bargaining, such as Scandinavian countries, Germany, and Japan, have enjoyed comparatively high and stable employment over the years.

However, the effectiveness of coordination is likely to depend on the quality of industrial relations and the degree of trust among the social partners (Blanchard, Jaumotte, and Loungani 2014). Indeed, there is evidence to suggest that the importance of trust for macro flexibility is greatest in countries whose bargaining systems place more emphasis on coordination—in practice, countries with some form of sector-level or national-level bargaining.<sup>2</sup> In these countries, the unemployment response to the global financial crisis was much smaller where trust was high than where it was low (Figure 3.2.2).<sup>3</sup> While determining which fac-

<sup>2</sup>Under a decentralized bargaining system, trust may not matter as much, since the required macro flexibility is readily achieved through flexibility at the firm level.

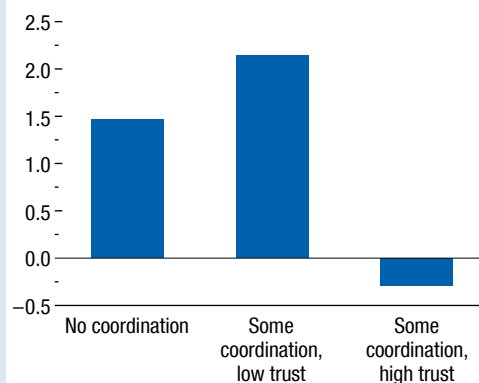
<sup>3</sup>In Figure 3.2.2, a country is said to have no coordination when collective bargaining is completely decentralized and coordination is absent. The measure of trust is constructed using a question in the *World Values Survey* that asks, “Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?” The response “most people can be trusted” is coded 1; “you need to be very careful in dealing with people” is coded 0. The responses are averaged across individuals aged 25 to 55 within each country and, subsequently, across years to obtain a time-invariant measure of trust. A country is said to have high trust when trust is above that of the median across the countries considered. Based on the information on trust and coordination, the following

**Box 3.2 (continued)**

tors can enhance trust is beyond the scope of this box, it seems plausible that trust depends to some extent on the way collective-bargaining systems operate in practice, including such factors as the inclusiveness of the system (in particular, whether social partners are broadly representative), the transparency of procedures (for example, for extensions or opt-outs), the effectiveness of agreement implementation, and built-in incentives for regular renegotiation.

three groups of countries are defined: (1) no centralization/coordination (Canada, Czech Republic, Estonia, Israel, New Zealand, Slovak Republic, United Kingdom, United States); (2) some centralization/coordination and low trust (France, Italy, Korea, Slovenia, Spain); and (3) some centralization/coordination and high trust (Finland, Germany, Netherlands, Norway, Sweden). The effects shown here are qualitatively robust to a regression analysis that would control for the role of other institutions, such as the stance of employment protection legislation.

**Figure 3.2.2. Change in Unemployment Rate**  
(Percentage points; mean change before versus after 2008)



Sources: Organisation for Economic Co-operation and Development; World Values Survey; and IMF staff calculations.

Note: Low and high are defined as below and above the median.

### Box 3.3. The Potential Productivity Gains from Further Trade and Foreign Direct Investment Liberalization

While this chapter's analysis of product market reforms focuses primarily on "behind-the-border" barriers to competition, easing barriers to international trade and foreign direct investment (FDI) also has the potential to boost long-term productivity and output levels. This issue features high on policymakers' agendas, as exemplified by the recent Trans-Pacific Partnership agreement. Despite past major liberalization, efforts have stalled more recently, and there remains some scope for further progress in advanced economies, particularly regarding nontariff barriers to trade and barriers to FDI (Figure 3.3.1, panel 1).<sup>1</sup>

Broadly speaking, even though the specifics vary across different types of measures, trade and FDI liberalization may boost productivity and thereby output through three channels:

- *Increased competition*—Lower trade and FDI barriers strengthen competition in the liberalized sector(s), putting pressure on domestic producers to lower price margins, exploit economies of scale (Helpman and Krugman 1985), improve efficiency, absorb foreign technology, or innovate (Aghion and others 2005).
- *Enhanced variety and quality of available inputs*—Trade liberalization can boost productivity by increasing the quality and variety of intermediate inputs available to domestic producers (Grossman and Helpman 1991; Kasahara and Rodrigue 2008; Halpern, Koren, and Szeidl 2015).
- *Resource reallocation across firms and sectors*—Liberalization enables larger and more productive firms to gain market share at the expense of smaller and less productive firms, thereby yielding an aggregate productivity gain within the liberalized sector (Melitz 2003; Pavcnik 2002). Liberalization may further involve productivity-enhancing reallocation of resources across sectors.

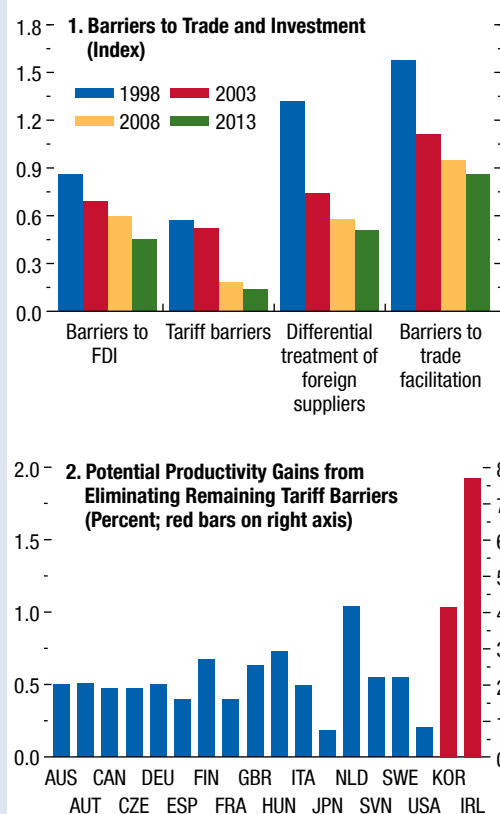
This box provides new quantitative evidence on the potential gains from further trade liberalization through these mechanisms and finds a sizable and dominant impact of the input channel. This is consistent with, but generalizes and quantifies the macroeconomic implications of, the recent empirical literature at the firm level.<sup>2</sup> Because of data constraints, the

The authors of this box are JaeBin Ahn and Romain Duval. It draws on Ahn and others 2016.

<sup>1</sup>Figure 3.3.1 presents the Organisation for Economic Co-operation and Development (OECD) indicator of barriers to trade and investment in four subcategories: barriers to FDI, tariff barriers, differential treatment of foreign suppliers, and barriers to trade facilitation. They are expressed as averages across OECD countries in 1998, 2003, 2008, and 2013. More details on the indicator can be found in Koske and others 2015.

<sup>2</sup>See, in particular, Amiti and Konings 2007 and Topalova and Khandelwal 2011.

Figure 3.3.1. Trade Liberalization



Sources: EU KLEMS; Koske and others 2015; World Bank, Trade Analysis Information System (TRAIS); and IMF staff calculations.

Note: Panel 1 is an average of 28 OECD country indexes, each on a scale of 0 to 6, from least to most restrictive. Panel 2 is based on tariff rate data in latest available years. FDI = foreign direct investment; OECD = Organisation for Economic Co-operation and Development. Data labels in the figure use International Organization for Standardization (ISO) country codes.

analysis focuses exclusively on tariff liberalization and its complementarities with reductions in barriers to FDI. As such, it captures only a fraction of productivity gains to be reaped from comprehensive trade liberalization in advanced economies.<sup>3</sup>

A unique database of effective tariffs is constructed for 18 manufacturing and nonmanufacturing sectors across 18 advanced economies spanning more than two

<sup>3</sup>Indeed, recent trade liberalization efforts have increasingly centered on reducing nontariff barriers, particularly in services sectors, from expediting customs procedures to intellectual-property provisions. Ongoing efforts to enhance data availability on nontariff barrier measures will gradually help complement existing studies of the impact of tariff liberalization (for example, Bacchetta and Beverelli 2012; Staiger 2015).

## Box 3.3 (continued)

decades. For each country and year observation, the effective “output tariff” in each sector  $j$  is computed as a weighted average of most-favored-nation (MFN) preferential tariff and non-MFN rates, in which weights reflect the relative importance of the individual products and trade partners to which each type of rate applies.<sup>4</sup> For each country and year, the effective “input tariff” in each sector  $j$  is then computed as a weighted average of output tariff rates in all sectors, with weights reflecting the share of imported inputs from each of these sectors used in the production of sector  $j$ ’s output. Specifically,

$$\tau_j^{\text{input}} = \sum_k \omega_{jk} \tau_k^{\text{output}},$$

in which the share  $\omega_{jk}$  of inputs from sector  $k$  in total inputs used in sector  $j$  is calculated using input-output matrices for each individual country, taking into account all input linkages—that is, factoring in that tariff changes affect not only imported inputs, but also domestic ones, insofar as these in turn can be produced using other imported inputs (for details, see Ahn and others 2016).

To quantify the respective effects of output and input tariffs on productivity at the country-sector level, the following empirical specification is then estimated:

$$\ln TFP_{ist} = \alpha_{is} + \gamma_{it} + \beta_1 \tau_{is,t-1}^{\text{output}} + \beta_2 \tau_{is,t-1}^{\text{input}} + \varepsilon_{ist}$$

in which  $\ln TFP_{ist}$  denotes log total factor productivity (TFP) in country  $i$  and sector  $s$  in year  $t$ , while  $\tau_{is,t-l}^{\text{output}}$  and  $\tau_{is,t-l}^{\text{input}}$  are the corresponding country-sector-level output and input tariff rates lagged by  $l$  years. The analysis tests for different lag structures ( $l = 1$  to 5). The specification also includes country-sector ( $\alpha_{is}$ ) as well as country-year ( $\gamma_{it}$ ) fixed effects. This baseline specification is then extended to include interactions between tariffs and barriers to FDI.

This empirical analysis yields the following main findings:<sup>5</sup>

- There is a statistically significant and robust impact of input tariff liberalization on sector-level TFP,

<sup>4</sup>On this front, the analysis significantly improves on existing studies that typically consider MFN rates only, which have become increasingly misleading as preferential bilateral or regional agreements have gained prominence around the world.

<sup>5</sup>The main findings are robust to alternative lags of the output and input tariff variables as well as to alternative clustering strategies—at the country-sector or country-year level—for standard errors. Considering the effective rate of protection à la Corden (1966)—which essentially takes into account potential anticompetitive forces from cheaper imported inputs—instead of the output tariff rate yields virtually identical results.

which is much stronger than the effect of output tariff liberalization. In other words, the input variety and quality channels that underpin the input tariff effect appear to matter more for TFP than the procompetition impact of lower output tariffs: a 1 percentage point reduction in the input tariff raises productivity by about 2 percent, whereas the output tariff effect is not statistically significant.

- The productivity gains from liberalization appear to materialize rather quickly within one to five years, with the estimated impact dissipating over time—in line with the findings of the chapter regarding product market deregulation in nontradables industries.
- Although tariff barriers in advanced economies have been reduced substantially over the past decades, there is still much scope for further reductions, and therefore for further productivity gains, in some sectors in some countries.
- A back-of-the-envelope calculation of the potential productivity gains from full elimination of remaining tariffs suggests that aggregate productivity could rise by about 1 percent on average across advanced economies, varying from a 0.2 percent gain in Japan to a 7.7 percent gain in Ireland, depending on current sector-level tariff rates as well as each sector’s importance in a particular country (Figure 3.3.1, panel 2). For instance, potential gains for Ireland and Korea are estimated to be larger than those for other advanced economies because Korea has higher remaining tariffs on average than other advanced economies in the sample—partly reflecting that its trade partners differ from those of the European Union countries that dominate the sample, while strong reliance on imported inputs, especially in specific sectors—the chemical and pharmaceutical industries—is estimated to dominate the potential gains for Ireland.
- The effects of both input and output tariff liberalization are greater when barriers to FDI are lower, highlighting the importance of complementarities between trade and FDI liberalization.

These findings provide a clear case for further liberalization efforts to raise productivity and output in advanced economies—all the more so as the estimates vastly understate the potential gains since they ignore the (presumably much larger) benefits to be reaped from easing nontariff trade barriers, as well as gains from reallocation of resources across sectors. Given their comparatively higher barriers to trade, emerging market economies and low-income countries would benefit even more.

### Box 3.4. Can Reform Waves Turn the Tide? Some Case Studies Using the Synthetic Control Method

A number of advanced economies carried out a sequence of extensive reforms of their labor and product markets in the 1990s. Using the Synthetic Control Method, this box studies four cases of well-known waves of reforms—those of Australia, the Netherlands, and New Zealand in the early 1990s, and Germany in the early 2000s.<sup>1</sup> The results suggest that output in three of the cases was higher as a result of the reforms than it was in the control group; the exception was the case of New Zealand, which may partly reflect the fact that reforms were implemented under particularly weak macroeconomic conditions.

#### *The Synthetic Control Method*

A vexing problem in assessing the impact of structural reforms is defining the counterfactual, namely, how output would have evolved in the absence of reforms. The Synthetic Control Method is a data-driven way of finding the counterfactual when carrying out a case study. It identifies a control group—in practice, a weighted average of a set of “similar” countries—whose prereform macroeconomic outcomes were similar to those of the reformer country.<sup>2</sup> The performance of the reformer country is then compared with that of the control group in the postreform period. To assess whether the control group is indeed a good counterfactual, a measure of fit developed by Adhikari and Alm (2015) is used in this analysis. The Synthetic Control Method is thus an alternative to a difference-in-difference method, as the difference in outcomes before and after reforms for the reformer country is being compared to the difference in outcomes before and after the reforms for the control group.

Like any method, the Synthetic Control Method has its pros and cons. One advantage is that it avoids

subjective biases involved in picking a control group through a statistical procedure for creating a synthetic control group. The method can also reduce any omitted-variables bias. The intuitive explanation is that only countries that are alike in both observed and unobserved predictors of output should produce similar trajectories of the outcome variable over extended periods of time. The method obtains the impact estimates one (country) case at a time, which allows an exploration of the cross-country heterogeneity in the effects of reform in a very flexible way. Among the limitations, the method does not fully address potential reverse causality; if structural reforms are motivated, say, by an expectation of weaker future growth prospects, this would bias the estimates obtained from the method, as long as growth expectations are not captured by the unobservable heterogeneity included in the estimation. Furthermore, the method will tend to ascribe to the treatment—here, a reform episode—the impact of any *idiosyncratic* shock (for instance, a natural disaster or a domestic banking crisis) that may occur around the treatment date—a source of omitted-variables bias that the method cannot address.

#### *The Reform Waves*

The cases of big labor and product market reform episodes are well known and have been extensively discussed in policy and academic circles. Nevertheless, to avoid any selection bias in picking cases, the analysis uses the reforms data set assembled for this chapter to cross-check that the selected episodes were indeed associated with major reform initiatives across a broad array of areas. Among the identified episodes, some then had to be discarded because a suitable synthetic control unit could not be found (for example, New Zealand in the early 1980s). The four reform packages this box focuses on are described briefly; while the reforms spanned many years, the initial year is chosen as the treatment date in applying the method:

- *New Zealand (1991)*—In 1991, the Employment Contract Act replaced the country’s long-standing centralized bargaining system with decentralized enterprise bargaining. This permitted firms and workers either to negotiate an individual employment contract with one another or to be bound by a collective contract at the firm level. Product market reforms included a massive reduction in direct government assistance to industries as well as an avoidance of policies to boost specific industries.

The authors of this box are Prakash Loungani and Bingjie Hu. A companion working paper (Adhikari and others, forthcoming) contains technical details and an extended discussion of the reform episodes.

<sup>1</sup>The Synthetic Control Method was developed by Abadie and Gardeazabal (2003) and has been applied, for instance, to study the effect on growth of trade liberalization (Billmeier and Nannicini 2013) and natural disasters (Cavallo and others 2013). For recent IMF analysis of case studies of major reform events, see IMF 2015.

<sup>2</sup>The macroeconomic outcomes considered here are some of the conventional determinants of GDP per capita used by Billmeier and Nannicini (2013), namely, physical and human capital per capita, trade openness, population growth, and a democracy dummy variable.

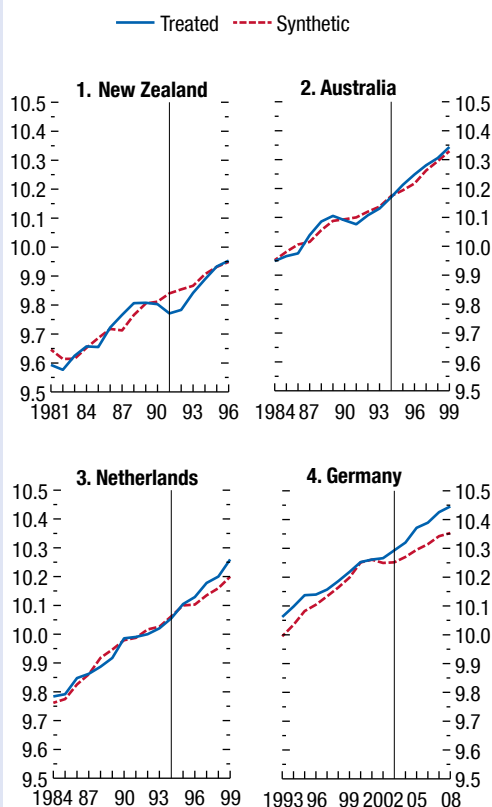
## Box 3.4 (continued)

- *Australia (1994)*—Legislation adopted in 1993, which took effect in 1994, strengthened decentralized wage bargaining by increasing the scope for employers to negotiate agreements directly with employees. Product market reforms consisted of privatizing major industries and reducing regulatory protection of incumbent firms. This increased competition in a wide range of industries, such as infrastructure industries, agriculture, network industries (air, rail, and road transportation; electricity and gas distribution; telecommunications and postal services), and professional services. The mid-1990s wave of reforms followed an earlier wave in the second half of the 1980s.
- *Netherlands (1994)*—Starting in 1994, labor reform aimed to make wage agreements more flexible and more conducive to job creation. For instance, an agreement was reached to reduce the gap between the legal minimum wage and minimum wages set in collective labor agreements, and “opening clauses” allowed firms to negotiate with their workers to pay below the minimum set in collective contracts. Various measures were taken to increase competition in a wide range of industries, new legislation resulted in a major liberalization of shopping hours, and the labor tax wedge was significantly reduced.
- *Germany (2003)*—The so-called Hartz reforms created new types of temporary employment contracts, introduced additional wage subsidies, significantly cut unemployment benefits for the long-term unemployed, restructured the public employment agency, and strengthened activation policies more broadly.

## Output Effects of Reforms

To analyze the impact of reforms, the path of output in the reformer country before and after reform is compared and how it differs from that of the control group examined (Figure 3.4.1). With the exception of the New Zealand case, structural reforms appear to have had positive output effects. The results also show the advantage of having a counterfactual in assessing the success of reforms: for instance, while growth in New Zealand started to increase substantially a few years after the reforms, this improvement was not noticeably larger than in the (“nonreforming”) control group, and a recession had struck in the meantime.

**Figure 3.4.1. Log of Real GDP per Capita in Purchasing-Power-Parity Terms**  
(2005 international dollars)



Source: IMF staff calculations.

Note: The two countries with the largest weights in the synthetic control groups are the United States and Greece (for New Zealand and Australia); Belgium and the United States (for the Netherlands); and Italy and Sweden (for Germany). The number and estimated weights of other countries in the synthetic control groups vary across the four case studies. Vertical lines indicate the starting year of the reform episode.

As this chapter shows, the success of some structural reforms depends in part on prevailing macroeconomic conditions at the time the reforms are introduced. In the case of New Zealand, the reforms were carried out at the same time that the government was also trying to tame chronic budget deficits and inflation. Hence, of the four cases considered here, New Zealand's reforms were arguably the ones introduced with the least amount of support from macroeconomic

**Box 3.4 (continued)**

policies.<sup>3</sup> The recession that ensued has been attributed by observers to the macroeconomic stance rather than to short-term adverse effects of the structural reforms themselves (Reddell and Sleeman 2008).

In the other three cases, when compared with that in the synthetic country, per capita output after five years was about 5 percent higher on average in the reformer country, though the range is fairly wide, being weaker for Australia than for Germany and the Netherlands. Earlier studies generally corroborate the view that reforms had positive output effects in these countries. There is general acceptance that reforms

<sup>3</sup>While the Dutch case also has some similarities with respect to the macroeconomic stance, the more effective social dialogue in the country, which led to a shared agreement on wage moderation combined with expanded employment and investment by firms, may have played a role in preventing adverse output effects (see Blanchard 2000).

made a major contribution to the growth surge of the 1990s in Australia (for instance, Parham 2004 and the studies cited therein), although some have provided a more skeptical view (Quiggin 2004). The Netherlands' experience has typically been described as a "miracle" for its positive employment and output effects—see Watson and others 1999 for an early view along these lines, which has been corroborated in later work. The source of the "miracle" has sometimes been traced back as far as the 1982 Wassenaar Arrangement among social partners (for example, Blanchard 2000). Krebs and Scheffel (2013) show an increase in output following the Hartz reforms in Germany, though the magnitude of the effect is considerably larger here than in their calibrated model. Some have suggested that decentralization of wage bargaining may also have played a role (Dustmann and others 2014).

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