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DOES COMPETITION KILL OR CREATE JOBS?

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DOES COMPETITION KILL OR CREATE JOBS? - EVIDENCE FROM THE LITERATURE*

We rarely hear, it has been said, of the combinations of masters, though frequently of those of workmen. But whoever imagines, upon this account that masters rarely combine, is as ignorant of the world as of the subject. Masters are always and everywhere in a sort of tacit, but constant and uniform, combination, not to raise the wages of labour above their actual rate...

- Adam Smith, The Wealth of Nations

Executive summary

1. The causes of unemployment and the drivers of job creation are a major concern for policy makers, both in developed and developing countries. Is competition one of these drivers? Does competition kill or create jobs? This short paper tries to answer these questions by giving a brief overview of the current state of economic research on the main interactions between competition and employment. It focuses in particular on the question whether increased competition in product markets leads to job losses, but does not discuss the impact of import competition.
2. The theme of the relationship between competition and employment is relevant to Competition Authorities because the public is often persuaded that competition leads to outsourcing and job losses. This belief can push the governments, the media and the public to exert pressure on competition agencies to ask them to take employment and other such “public interest” effects into account in their work. This happens mainly in merger reviews but occasionally also in other assessments of anti-competitive practices, such as abuse of dominant position. A few countries also have such “public interest” considerations written into their national competition law, such as South Africa. For these reasons, clarity on the real impact of competition on unemployment is needed.
3. There is broad agreement both from economic theory and available economic evidence that competition has a positive impact on employment in the aggregate or overall level. At the micro (firm, industry) level, the evidence is more ambiguous. As for the underlying mechanisms, competition influences employment creation through two main channels: (i) an output expansion effect driven by an increase in productivity and a reduction in mark-ups and (ii) an effect on wage formation.
4. Concerning the output expansion effect, a vast body of research confirms that productivity levels or growth rates are negatively correlated with market power. More precisely, it proves that increases in product market competition can boost productivity growth.
5. Economic theory tells us that higher productivity growth reduces production costs, mark-ups and consequently prices. Lower prices in turn cause a shift of aggregate demand which expands output and increases the demand for labour, for a given level of wages. The effect of competition on employment through productivity is therefore positive. The empirical findings in the literature confirm that the final impact on employment from increased competition is more job creation, possibly associated with higher real wages (as prices are reduced).

* This Background note was prepared by Ania Thiemann, Head of Global Relations, and Silvia Carrieri, Junior Policy Analyst

6. Obstacles to competition can also come from barriers to entry and exit, the involvement of the State in an industry through ownership or very strict regulations. A change in one of these factors will reduce market power and consequently mark-ups, triggering the output expansion effect described earlier. Using measures of product market regulation as a proxy for the state of competition in the market, several OECD working papers and studies obtain results that are consistent with the findings above: the presence of rigid product market regulations that act as a barrier on competition prevents some countries from making productivity gains, and thus indirectly from stimulating employment growth in non-manufacturing sectors. It has also been proved that stricter product market regulation is associated with a higher unemployment rate among the total labour force, as well as among female and young workers.

7. The discussion on the effect of competition in the product market on unemployment cannot disregard labour market institutions such as the unemployment benefit system, the systems of wage determination, employment protection legislation and labour taxes. All the available evidence demonstrates that product markets and labour markets inevitably affect each other. Indeed, in principle, the presence of market power or productivity gaps alone does not necessarily lead to unemployment, unless frictions, such as wage rigidities, exist elsewhere. Market power may shift labour demand, but as long as wages are flexible, adjustments in wages make full employment still possible. Thus, the impact of market power on unemployment arises only if labour market institutions are rigid.

8. This hypothesis is confirmed in the empirical economic literature, where several studies have tried to identify the explaining factors of unemployment. What emerges is that labour market institutions alone cannot entirely account for the general evolution of unemployment over time. The economic models that can better explain the rise and the heterogeneity in the changes in unemployment across countries are those that include as determining factors: (i) macroeconomic shocks, (ii) product market institutions, (iii) labour institutions, and (iv) the interactions of the latter two.

9. The second channel through which competition influences employment creation is the effect on wage formation. Higher competition in the market decreases mark-ups and consequently prices. Lower prices imply an increase in real wages, which in turn make more people willing to work. In other words, higher real wages affect the labour supply. At the same time, higher real wages mean that firms' labour costs increase and their demand for labour diminishes as a consequence. Since supply now exceeds demand, a downward adjustment in wages will be triggered until the wages reach the market-clearing level (that is, the level for which demand equals supply). In the new equilibrium wages are lower, and the final effect is a lower natural rate of unemployment. At the same time, higher real wages trigger an income effect, since workers have an augmented purchasing power which expands the aggregate demand. Therefore the effect on wage formation and the output expansion effect reinforce each other.

10. The mechanisms just described rest on the assumption that a decrease in market power will eventually translate into lower wages. This is not always the case and the outcome depends on the wage-setting process. The literature has tried to find out what impact a firm's market power will have on the wages it pays. Three main wage-setting scenarios are considered: collective bargaining through unions; efficiency wages set by the management; and profit sharing schemes whereby workers automatically enjoy higher pay, if the firm generates monopoly rents. The theoretical models show that it is perfectly plausible for collective bargaining to lead to monopoly rents being shared by workers in the form of higher wages, while in the absence of unions, this type of rent sharing is less likely. Of course, any profit sharing scheme will automatically imply rent-sharing. The empirical analyses provide strong evidence of the sharing of monopoly rents and of higher wages being associated with the existence of market power. It is not clear, though, whether the effect is due to the presence of unions or not.

11. We have seen in the earlier paragraphs how product market institutions and labour market institutions inevitably affect each other. From the policy-maker perspective, it is thus important to

understand whether the most effective way of boosting employment is reforming the two separately or at the same time.

12. The literature on product and labour market reform is unequivocal in finding clear benefits for employment creation resulting from liberalisation. However, the empirical evidence on the estimated impact of joint reforms, based mostly on papers by OECD economists, is ambiguous. Some authors find that product market reforms have a larger effect when labour markets are already flexible; i.e. that product and labour market reforms are complementary. This is due to the fact that flexible labour markets allow a fuller and faster adjustment of wages and employment. Other studies find that, on the contrary, reforming the product market yields higher employment growth at the margin when the labour markets are rigid, pointing instead to a substitution effect. The basic intuition behind is that, when labour markets are flexible and unions' bargaining power is weak, real wages are already close to the market-clearing level and employment is close to its full employment level. In this case, liberalisation measures that lead to a decrease in the mark-up have the potential to generate only small changes in employment. In contrast, if the unions' bargaining power is high and the economy is far away from full employment, a decline in the mark-up can lead to large employment responses.

13. The paper also explores the underlying mechanisms through which competition creates employment at the micro-level. Specifically, it focuses on the effects induced by competition by fostering innovation at the firm- and industry level. The evidence on the overall impact of innovation at the firm-level appears to be positive in most of the literature. Product innovation emerges as strongly associated with employment growth. By contrast, the effects of process innovation are ambiguous, and most of the times negative or weak. These results support the hypothesis that, when product innovation is implemented, the output expansion effects due to the creation of new markets and to the enlargement of demand prevails; when process-innovation is introduced, instead, the displacement effect driven by the shift to a less labour-intensive production process predominates. R&D investment is often found to boost employment, but the evidence is not clear-cut when the analysis does not distinguish between process-related and product-related R&D.

14. At the industry-level, most of the evidence on the impact of innovation on employment is negative. As for firm-level studies, differentiating between process and product innovation is important: unlike process innovation, product innovation seems to positively affect employment. However, most of the studies focus on manufacturing, a sector where innovations are likely to be labour-saving. More evidence is needed on service sectors in order to reach more robust conclusions.

15. The paper concludes by summarising the main findings, in particular the unequivocal empirical evidence that more competition in product markets is associated with increased output growth and employment.

1. Introduction

16. The causes of unemployment and the drivers of job creation are a major concern for policy makers. In the developing world, governments grapple with creating the conditions to generate jobs for the people relocating from the countryside to the urban centres as well as their youthful populations. For instance, 47% of India's population is under the age of 25,¹ and this puts a significant burden on the Indian government to provide enough jobs for those entering the labour market every year. Everywhere, including in the OECD, the largely “jobless recovery” following the Great Recession has put pressure on governments to identify solutions that lead to more inclusive economic policies, and in particular measures driving job creation.

17. The theme of the relationship between competition and employment is relevant to Competition Authorities because the public is often persuaded that competition leads to outsourcing and job losses. This belief can push the governments, the media and the public to exert pressure on competition agencies to ask them to take employment and other such “public interest” effects into account in their work. This happens mainly in merger reviews but occasionally also in other assessments of anti-competitive practices, such as abuse of dominant position. A few countries have such “public interest” considerations written into their national competition law, such as South Africa.

18. But what is the reality of the relation between increased competition and jobs? The “public” view of the connection between competition and employment is largely negative. Ask the so-called man in the street, and he will say that competition leads to outsourcing and job losses. That companies that acquire new machines to increase output will lay off their workers. That computers and software are making banks close their branches; that higher productivity in firms means higher unemployment. Is he right?

19. This short paper proposes to give a brief overview of the current state of research in this field and to explore the main interaction between competition and job creation. We will especially focus on precisely this question: does increased competition in product markets lead to job losses? Owing to the natural constraints on a paper such as this, we do not propose to be exhaustive, rather representative. In particular, we will not discuss in any depth the impact of import competition, to avoid diverging into a discussion on trade. The bibliography at the end of the paper provides further suggestions for reading.

20. The paper is structured as follows. The first section provides an overview of the relation between output growth, competition and unemployment to set out the broad channels through which competition affects employment. Next we look at some of the evidence demonstrating the impact of product market regulation on employment, and then the way that this is related to the prevailing labour market institutions. In the fourth part, we try to account for the other way that competition affects employment, through wage formation, and then we discuss the impact of product market reform (liberalisation) on employment, and whether this is more or less effective in the presence of restrictive labour markets. We then move into a discussion of the employment effects at the firm and industry level, through the driver of innovation. The final section concludes.

2. Output growth, competition and unemployment

21. There is broad agreement both from economic theory and available economic evidence that competition has a positive impact on employment in the aggregate or overall level. At the micro (firm, industry) level, the evidence is however more ambiguous. These differences are related to whether one considers the long-run or the short run effect. This is because while increased competition may lead to redundancies at the firm level as we'll see later on, it will stimulate job creation in other firms and sectors,

¹ 2014 World Population Data Sheet (<http://www.prb.org/publications/datasheets/2014/2014-world-population-data-sheet/data-sheet.aspx>)

leading to an overall positive impact over time. Alternatively, this can be represented as thinking of competition influencing employment creation through two main channels: an output expansion effect; and through the effect on wage formation and hiring from changes in competition at the firm or industry level. We shall look at each of these in turn. We start by exploring what the literature tells us about the variables driving output growth². This in turn allows us to focus on the factors that stimulate employment. A better understanding of those variables will then enable us to unpick the variables that are more sensitive to competition and product market reform. Note that in this paper we may refer to variously employment or unemployment; our interest is purely in the drivers of job creation/destruction, and we will use either variable according to the available research³.

22. Economic theory tells us that at the national level, and in the long run, unemployment is essentially governed by the factors that determine aggregate demand⁴. Specifically, Blanchard and Wolfers (2000) and Bertola et al (2001), amongst others, highlight that the main factors responsible for changes in the rate of unemployment in the aggregate are: the level of economic growth, (particularly the level of Total Factor Productivity (TFP) growth) and aggregate demand; the real interest rate; changes in inflation and labour demand shifts. To make the link to competition, we will therefore start by briefly considering the effect of competition on aggregate demand and output growth, first, and then on employment. (We will not discuss interest rate movements and inflation here). The literature fairly consistently supports the view that an increase in competition is beneficial for employment in the long term. The main channel is through a direct effect on productivity from an increase in product market competition. In a very early paper, Blanchard and Kiyotaki (1987) investigate the effect of monopolistic competition on aggregate demand, using a model which also includes money, and find that monopolistic competition is associated with an aggregate demand externality. They find in particular that an absence of competition is a contributing factor to explain aggregate demand shocks. A vast body of research from the 1990s point to the fact that increases in product market competition can boost TFP growth⁵. Common for a great deal of the early studies is that they tend to take the wage or the labour market institutions as given. OECD (1997), Hay and Liu (1997) and Nickell (1999) find evidence that on average market power is negatively correlated with productivity or growth levels. Layard, Nickell and Jackman (1991) find that, for a given structure of the labour market, more competition in the product market reduces unemployment. Nickell (1999) spells out the relationship between competition and output, showing that an increase in product market competition leads to an increase in output, which in turn drives an increase in firms' demand for labour, for a given wage level. External shifts in the labour demand curve derive from the modification of firms' behaviour when competition becomes stronger. As competition increases, market power is reduced, leading to a reduction in mark-ups and prices. The lower prices in turn allow for labour demand to increase (for a given wage level), as firms will respond by producing more to maintain the same profit levels. Nickell points out that the final impact on employment from increased competition is higher employment, possibly associated with higher real wages (as prices are reduced). Nickell's additional finding that more competition leads to higher turnover in the labour market is also supported by Nicoletti (2000).

² Okun's Law (1962) demonstrates the empirical evidence of a clear relationship between economic growth and the change in the rate of unemployment, whereby high output growth is associated high employment growth.

³ In general it is debatable whether the published rate of unemployment is a good (or indeed the best) indicator of the state of the labour market. Many governments conceal actual un- and underemployment by not including in the unemployed training and skills courses, disability programmes, or early retirement (see Blanchard, 2006). In addition, faced with dire employment prospects, many may withdraw from the labour market, e.g. through longer studies or, for instance, a spouse deciding to stay at home to mind the children. Therefore this paper will focus mainly on the actual drivers of employment growth (or stimulants of unemployment), rather than discussing the actual state of the labour market.

⁴ Supply factors intervene in terms of the wage-setting mechanisms and will be discussed *supra*.

⁵ Gersbach (2000) provides a good overview of the research until the late 1990s.

23. Gersbach (2000), referring to empirical studies using findings from work undertaken by the McKinsey Global Institute in the early 1990s⁶, finds solid evidence that “productivity levels or growth rates are on average negatively correlated with market power”. Distinguishing initially between high-skilled and low-skilled workers, Gersbach (1999) also shows when competition intensifies, the output restrictions that result from having prices above marginal costs and the corresponding unemployment of low-skilled people diminish.

3. Product market regulation and employment

24. In general, it is hard to measure actual “competition” in a market. This is why many studies use product market regulation as a proxy for the state of competition, typically as a measure of barriers to entry and exit, or the involvement of the State in an industry through ownership. Measuring the impact of product market regulation is particularly useful for measures over time, and one can infer changes in the competitive nature in a market from relaxation or tightening of regulation⁷. Other measures of competition, such as concentration indices or market power, are generally found to be less relevant when trying to measure the impact of competition on macro variables such as employment or productivity growth, although they are used to gauge industry-level effects.

25. Several OECD working papers and studies (OECD 1997, Conway et al 2006, Bouis et al 2012) investigate the potential impact of regulation in product markets, and reform thereof, on productivity, and find that restrictive product market regulation slows the process of adjustment through which positive productivity shocks spread to other countries, and new technologies are incorporated into the production process. The model in Conway et al (2006) uses labour productivity based on the work of Aghion and Howitt (2005), and estimates the effect of regulation both at the aggregate business level and sector levels⁸. The authors also refer to work by Aghion and Griffith (2005) which identified the role played by institutions that promote market entry in stimulating firm rivalry and raise incentives to increase productivity. Their findings are unambiguous. They point out that “in some of the more restrictive OECD countries the loss of adaptability that occurs as a result of anti-competitive regulation can be sizeable. For example, estimates suggest that the improvement in domestic labour productivity that arises in these countries as a result of a one-off positive shift in the world productivity frontier can be up to 25% smaller than in a country in which product market regulation in non-manufacturing sectors is the least restrictive in the OECD” (OECD, 2006). In other words, the presence of rigid product market regulations that act as a barrier on competition prevents some countries from making productivity gains, and indirectly therefore also from stimulating employment growth in those sectors.

26. A recent, wide-ranging study seems to confirm that these findings hold in general. Feldmann (2012), taking a broad sweep across 80 countries for the period 1980-2007, and using an index of product market regulation constructed by the IMF⁹, analyses the effects of product market regulation on the labour market performance, both for total populations, but also for the more vulnerable segments of the labour force: women and youth. In his highly interesting and wide-reaching paper, Feldmann, using a high number of control variables, including labour market regulation such as minimum wages, hiring and firing, collective bargaining and so on, finds unambiguously that “stricter product market regulation is associated with a higher unemployment rate among the total labour force, as well as among female and young

⁶ Gersbach lists Baily and Gersbach (1995), and Boersch-Supan (1999, available in German only) among other sources.

⁷ The OECD’s product market restrictiveness (PMR) indicator does this.

⁸ A full description of the model used for estimation is described on p.47 (OECD, 2006).

⁹ Index constructed by Ostry et al (2009). One indicator measuring the strictness of regulation in agriculture, and one measuring the strictness of regulation in the telecommunications and electricity industries. The advantage of the indicator is that it can be applied for a large number of countries, and for a longer and consistent time period.

workers". He also finds that strict product market regulation is associated with a lower employment rate. The findings appear to be substantial, and highly statistically significant.

27. A one-standard-deviation increase in the 'product market regulation' variable is associated with a rise in the unemployment rate of around 1.0 percentage point, a rise in the female unemployment rate of 1.2 percentage points, and a rise in the youth unemployment rate of 1.7 percentage points, *ceteris paribus*. (Feldmann, 2012).

28. Moving from the highly aggregate findings for 80 countries, we also find the same impact of product market regulation at the individual sector level. A well-known and much-quoted study by Bertrand and Kramarz (2002) investigates the impact of tight zoning and entry regulation in the retail sector in France at the *département* level, using a unique database that provides time and region specific variation in approval decisions for store opening applications. The authors found that strict zoning regulation lead to high concentration and higher retail prices in the more restrictive areas, and that this in turn reduced employment growth.

4. Labour market institutions, competition and employment

29. What is common for much of the literature studying the interaction between competition and employment is the fact that most authors agree that one cannot evaluate the final effect on employment growth from increased competition in product markets without taking into account the prevailing labour market institutions. Amable and Gatti (2004b) call this a "functional complementarity" between the two markets. Changes in one market affect the other. As highlighted in Gersbach (1999, 2000), there is a vast literature discussing the specific impact of labour market institutions and labour market factors on unemployment¹⁰. We are not going to summarise those here. In the 1980s and 1990s when the term "Eurosclerosis" was coined, there was a general belief that the level of employment protection in EU labour markets, and labour market institutions in general, were the reason preventing Europe's labour markets from functioning efficiently¹¹. However, in the face of stubborn unemployment in some countries *but not in others*, it became important to untangle the relationship and seek other, possibly complementary, determinant factors.

30. Blanchard and Wolfers (2000) attempt to do just that, and find indeed that that labour market rigidities cannot be held solely accountable for the differences in unemployment found in mainland Europe and in the US. They discuss the role of respectively economic shocks and labour market institutions in causing the rise in the rate of unemployment across Europe (including Switzerland) from a Europe-wide average of 1.7% in the 1960s (far below that of the US) to an average of around 11% in the late 1990s (well above the US rate). Noting that most of Europe's labour market institutions¹² in Europe were already present when unemployment was low (and well below the rate in the US), Blanchard and Wolfers point out that hence these institutions cannot account for the "general evolution of unemployment over time". They also observe a large heterogeneity among European economies, as some countries managed to keep the rate low for 30 years (around 4% in Switzerland), whereas other countries saw the rate increasing sharply

¹⁰ Authors such as Blanchard, Layard and Nickell, amongst others, have studied this topic in-depth, as has the OECD. A good overview of the main effects of the most common labour market institutions on unemployment can be found in Nicoletti and Scarpetta (2005).

¹¹ This belief still exists. However, the facts are that unemployment continues to be heterogeneous across Europe, despite the existence of labour market institutions (unions, unemployment benefits). In the second quarter of 2015, for instance, the rate of unemployment in a number of (arbitrarily selected) OECD countries was: Denmark 6.2%; France 10.3%; Spain 22.5%; Switzerland 4.2%; UK 5.5%; US 5.4%. OECD average: 6.9%. (Source: OECD unemployment rate indicator.)

¹² "Institution" is here taken in its largest sense, including labour market legislation, but also wage bargaining, labour taxes and so on.

(Spain for instance has had a rate of unemployment exceeding 20% for years). Therefore they discard as solely explanatory theories that emphasise the role of macroeconomic shocks (i.e. exogenous shifts in the macroeconomic environment) as these shocks were felt across Europe, and those that focus only on adverse labour market institutions (as they cannot account for low unemployment in the beginning of the period). Rather, Blanchard and Wolfers find that model specifications that allow for shocks, institutions, and interactions of these can account both for much of the rise and much of the heterogeneity in the evolution of unemployment in Europe. “The magnitudes of the effects of the shocks on unemployment are plausible. The magnitudes of the effects of institutions are equally so. And their interactions explain much of the difference across countries”.

31. Nickell, Nunziata and Ochel (2005) take this work further and present an empirical analysis of unemployment patterns in the OECD countries from the 1960s until the late 1990s. The labour market institutions that they analyse are the unemployment benefit system, the systems of wage determination, employment protection legislation (EPL), and labour taxes. The authors find that shifts in labour market institutions explain broad movements in unemployment across the OECD in the period. Specifically, they find that 55% of the rise in unemployment in Europe from the 1960s to the mid-1990s can be explained by such changes. They also find that interactions between the values of the indices of labour market institutions do not add any significant contribution to the explanation of unemployment. Their findings thus support the notion that secular shifts in unemployment (not accounting for shocks) are caused by secular shifts in institutions. Another significant finding, also highlighted by Blanchard and Wolfers, is that if macroeconomic shocks had been the main cause, this would not explain why the effect remains noticeable over a 30-year period (if one takes the 1979 oil shock as an example, say). On the other hand, there is no doubt that the rigidity of European labour market institutions has exacerbated the impact of macroeconomic shocks. Bertola, Blau and Kahn (2001), using the data sets and theoretical underpinnings of Blanchard and Wolfers, find that [identical] economic shocks in the US and Europe that led to an unemployment rate of around 10-12% in Europe with its “rigid wage-setting institutions and interventionist benefit systems”, led to far smaller increases in the US

32. These studies are important because they demonstrate on the one hand, that labour market institutions are not solely responsible for bringing about unemployment, but on the other hand, that they account for a significant share of the causes of unemployment. This leads us to believe that the other main variable, competition in product markets (whether derived from regulation or firm behaviour), must therefore account for some of the remaining causes of unemployment. Indeed, a similar point is made by Gersbach (1999 and 2000) who points that the presence of market power or productivity gaps alone does not lead to unemployment, “unless frictions exist elsewhere”. Market power may indeed shift labour demand, but “as long as wages are flexible, full employment is still possible. *Thus, the impact of market power on unemployment arises only if labour market frictions are also present*”. Amable and Gatti (2004a and 2004b) find that the association of inflexible labour markets (which put constraints on firms’ operations and make them less productive), and rigid product market regulation (which makes the firm selection through competition less efficient) has “strongly negative consequences in terms of employment, aggregate production and growth”.

33. As far as we can ascertain, Haefke (2003), is the only author who has tried to estimate the actual share of unemployment that can be attributed to product market restrictions. He finds that product market restrictions are accountable for 13% of the EU-US unemployment differential. Particularly, he estimates that 0.42 percentage points of unemployment is caused by stricter continental European product market regulation, while 2.79 percentage points of additional unemployment are caused by “more generous unemployment benefits” in continental Europe compared with the US.

34. In a large cross-country study, Nicoletti and Scarpetta (2005) investigate the employment effects of product market reforms aimed at increasing competitive pressures. They find that “restrictive

regulations have curbed employment rates significantly in countries where no product market reforms were implemented". In particular, Nicoletti and Scarpetta find that their composite indicator of product market regulation, which is increasing in state control and barriers to entry in competitive non-manufacturing markets, is estimated to "significantly curb the employment rate *in all regression specifications*".

35. These findings are confirmed by Griffith *et al* (2007) who analyse the impact of increased product market competition on employment, using OECD data for the 1980s and 1990s. Using policy reform as an exogenous variation in product market conditions, they show that the magnitude of the (positive) impact on employment from increased product market competition varies with the presence and strength of labour market institutions. In particular, they find clear empirical evidence that exogenous increases in competition (such as would occur through product market deregulation) are associated with increases in aggregate employment and the real wage. Interestingly, they also find that in countries with high levels of collective bargaining, the increase in real wages was less, while the increase in employment was "more pronounced". However, their results focus only on average effects across the whole economy.

36. Griffith *et al* authors note, along with many others, (for instance, Blanchard and Giavazzi, 2003) that despite the empirical findings that demonstrate the positive effect of deregulation in product markets, or the negative impact on employment of many labour institutions, tampering with either product market regulation or labour market institutions can sound the political death knell for even the hardest politician. Griffith et al suggest that this may be because existing workers in a sector, with more bargaining power, on average have less to gain from reform.

37. "Sweetening the pill" is therefore vitally important. Fortunately, there is a large volume of research that looks at the interaction between product market competition and labour market institutions, and their joint effect on growth and employment. Anticipating the discussion in the next section, it is often found that product market reform is complementary to labour market reform, through drivers such as increased real wages and more firm entry into markets, which in turn magnifies the effect of labour market reforms, although a recent debate has erupted with some findings holding that product market reforms are in fact a substitution. The differences emerge partly from the fact that studies that investigate the short-term, firm-level effect of increased competition, find ambiguous results.

38. To shed light on this, in the next section, we will briefly discuss how competition may affect wage formation, and how this in turn interacts with employment. This will help underpin a more in-depth discussion of the question of the interaction of product market reform with labour market reform.

5. Wages, competition, and employment

39. As mentioned, the other main channel through which competition in product markets (again, whether through regulation or firm behaviour) influences employment is through the lever of wages which influence labour supply. Returning to economic theory, the equilibrium (or 'natural') rate of unemployment is such that the real wage corresponds to the price setting conditions in the market¹³. Following Blanchard (1999), an increase in employment implies a decrease in the unemployment rate, and so an increase in the real wage implied by wage setting: higher employment implies a higher real wage. As the level of employment increases in the aggregate, the real wage paid to workers increases as well¹⁴. Below the aggregate level, the wage-setting relation however is the result of a complex process of bargaining between workers and firms, or unilateral wage setting by firms (typically via efficiency wages

¹³ A straightforward exposition of the theory is in Blanchard's textbook, "Macroeconomics" (1999), pp 111-120.

¹⁴ It is easy to show why this is the case; the importance of the argument however, for our purpose, is that the reverse also holds: higher real wages imply higher employment through a labour supply increase.

set by the management¹⁵), affecting the movements of labour. On the other side of the equation, the price-setting relation is affected by factors such as the degree of competition in the product markets which affect the mark-up. The wage-setting and the price-setting relations determine the industry-level or firm-level employment. Equilibrium in the national labour market requires that the real wage chosen in wage-setting be equal to the real wage implied by price setting. With the additional assumption that the expected price is equal to the actual price, this labour market equilibrium then determines the *natural rate* of unemployment (or the *structural rate* of unemployment which is preferred by some literature).

40. Most of the literature on competition, wages and employment uses partial-equilibrium analysis and occasionally scales up the results to the aggregate level. Nickell (1999) investigates whether monopoly power in the product market impacts negatively on the performance of the labour market. Specifically, he asks whether a firm's market power will have any impact on the wages it pays. When a firm enjoys monopoly power it also generates monopoly rents, and the question is whether those rents are in some ways captured by the employees in the form of higher wages. Nickell considers three possibilities: rent capture through collective bargaining, similar to Abowd and Lemieux (1993), or in Oswald et al (Oswald, 1993; Hildreth and Oswald, 1997); efficiency wages set by the management; and profit sharing schemes whereby workers automatically enjoy higher pay, if the firm generates monopoly rents.¹⁶ Nickell finds that it is "perfectly plausible" for collective bargaining to lead to monopoly rents being shared by workers form of higher [nominal] wages¹⁷. At the partial equilibrium level, the rise in wages will reduce employment, *ceteris paribus*. By contrast, at the general equilibrium level the outcome is different: standard union models suggest that an overall rise in market power throughout the economy will lead to both higher unemployment and lower wages. Indeed, a universal rise in market power reduces aggregate labour demand by reducing marginal revenue at any given output. This in turns leads to a large increase in unemployment which drives down wages across all sectors. In the new equilibrium, unemployment is higher and labour demand is low enough to imply lower wages and higher profits. Turning to empirical research, Nickell points out the strong existing evidence of the sharing of monopoly rents and of higher wages being associated with the existence of market power. It is not clear, though, whether the effect is due to the presence of unions or not.

41. Referring to the earlier work by Nickell, Amable and Gatti (2001, 2002 and 2004a and 2004b), explore in some depth the interactions between imperfections in labour and product markets and their impact on wages and employment. They find that the firm's labour demand elasticity (the ability of a firm to reject or accept any given employee), will be high in situations of a market slowdown or weak competition. In their 2001 paper, Amable and Gatti explore situations where firms endogenously determine workers' flows in and out of employment through the use of efficiency wages. They find initially that increased competition weakens the ability of firms to vary their prices to absorb shocks (whether good or bad). This is because the decrease in mark-ups leaves less room for manoeuvre for the firm. This, they hold, will increase turnover in the labour market, especially in a situation where wage rigidity implied by efficiency wages is present. In their model, efficiency-wage rigidity combined with an increase in competition induces stronger variations in employment as a response to given shocks. They conclude that

¹⁵ Efficiency wages are the outcome of a classical moral hazard problem, such as posited by Akerlof (1970). In a market with information asymmetries, and to avoid shirking, managers will pay their employees more than the market-clearing wage in order to increase their productivity or efficiency, or reduce costs associated with turnover, in industries where the costs of replacing labour are high. The increased labour productivity or decreased costs of turnover "pay" for the higher wages. However, as workers are paid more than the equilibrium wage, the presence of efficiency wages may lead to unemployment. Efficiency wages hence provide a *market failure* explanation of unemployment. However, more recent literature generally agrees that efficiency wages are necessary for high-skilled workers, and that their market friction effect may be less important than originally thought in the 1970s.

¹⁶ Oswald (1993) finds that in some cases in the presence of unions in an 'efficient bargaining model', there will be "extreme wage rigidity in which pay is independent of product demand" (p.86).

¹⁷ The distinction between nominal and real wages is important for the employment effect.

“depending on the relative elasticities of the firing and hiring rates to an increase in competition, this may ultimately lead to rising relative wages and aggregate employment losses”. Taking a different angle, Ball and Moffitt (2001) find that increases in real import prices or falls in trend productivity growth will lead to a temporary increase in unemployment *if real consumption wages do not adjust appropriately*. We therefore see that the ability of wages to adjust to changes in product market competition is a central transmission mechanism from increases in competition to employment growth.

42. Taking their work further, Amable and Gatti (2002) find a strict correlation between the structure of the labour market and the structure of the product market through the wage mechanism. They find that if wages are set according to an efficiency price mechanism (which is a good proxy for many markets, especially in the absence of collective bargaining), increased competition comes at a price: i.e. a widening of wage and employment differentials across sectors. They interpret this relationship as indicating that more competitive product markets are associated with more *de facto* flexible labour markets.

43. Certainly the point about increased competition leading to wage inequality is corroborated by other studies. Writing in the mid-1990s, Borjas and Ramey (1995) explore the relationship between increased foreign competition in durable goods (in the US), and the wages of the workers in those industries. Working for domestic industries that are highly concentrated and earn above-average rents, the workers absorb some of this rent as they tend to be paid higher-than-average-wages, although most of those workers are “less educated”. The authors test for a situation where an increase in imports (or decrease in exports) lowers the rent of these industries, leading to a decline in the relative wages of less educated workers. They find that foreign competition in concentrated industries transfers rents from less educated (American) workers to foreign producers. The more concentrated the domestic industry, the larger is the loss of rents, and hence the greater is the decline in the relative wage of less educated workers. Although this is not discussed, this study assumes that wages are flexible, as there is no mention of job losses through foreign competition. Specifically, the find that changes in trade in these industries could account for up to 10% of the aggregate increase in wage inequality.

44. Amable and Gatti (2004a) also find that in the absence of “appropriate” real wage adjustments, an increase in competition “leads to larger employment differentials across firms”. Moreover, this widening of employment differentials may ultimately lead to aggregate employment losses, depending on the relative elasticities of efficiency wages and the labour demand.

6. Interaction between product and labour market reform and employment

45. In the earlier sections we have considered the interaction of competition in product markets (or an absence thereof) and labour market institutions and their effect on employment. We have seen that the impact of competition on employment is affected by the situation in labour market, partly through the impact on wage setting and wage movements. While behaviour of firms can be influenced through the enforcement of competition law, the widest scope for direct policy action is through regulation. As noticed, the idea of a lack of competition is often captured in the form of excessive product market regulation. This section will therefore explore what the literature tells us about regulatory reform and the impact of deregulation on employment.

46. Nicoletti and Scarpetta (2005) remind us that regulation tends to reflect public interest concerns, such as natural monopoly conditions, externalities, asymmetric information and so on. However, as they point out, regulations may “drift away” from their original public interest aims, ending up protecting special interest groups. This may delay or even hinder reform, much as labour market reform can be held back by powerful unions. Indeed, we have highlighted throughout this discussion that most of the empirical evidence that we have been able to marshal points to the fact that product market reform and labour market reform are unlikely to reach their desired impact on employment growth if they are implemented

separately. The remainder of this section will discuss the degree to which labour and product market reform are complementary (or may act as substitutes), and what policy implications this may have.

47. The literature on product and labour market reform is unequivocal in finding clear benefits for employment creation resulting from liberalisation. However, research differs in the estimated impact of joint reform. Some authors find that product market reform has a larger effect when labour markets are already flexible; i.e. that product and labour market reforms are complementary. Other studies, most of them more recent, find that, on the contrary, reforming the product market yields higher employment growth at the margin when the labour markets are rigid, pointing instead to a substitution effect.

48. Berger and Danninger (2006) take a panel of annual OECD data from 1990-2004 and find that reducing product and labour market regulation together fosters employment growth, including through “sizeable interaction effects”. They find that the most “promising reform strategy” is one of comprehensive deregulation with co-ordinated reform in the labour and product markets. Specifically they find that a country moving from median levels of regulation to par with the lowest decile of OECD countries stand to gain about 1.0 percentage point in annual employment growth. On average, the growth contribution from co-ordinating reforms across markets is 17% of the growth boost, but doubles with a larger reform effort (from 75th percentile of regulation to the lowest decile). They also find that their econometric estimates with these data are “surprisingly robust”. Bassanini and Duval (2009), extending the work of Scarpetta, Nickell, and Blanchard and Wolfers, investigate the interactions of institutions by estimating a standard model of institutional determinants of unemployment. While their research focuses on labour market institutions, they include “stringent, anti-competitive product market regulations” as variables. The results indicate that employment-enhancing structural reforms reinforce each other. This, they say, suggests that “well-designed reform packages yield greater employment gains than separate, piece-meal reforms.” Both of these studies find that product market reform or deregulation is more effective with regard to employment when labour markets are flexible.

49. Amable and Gatti (2004a and 2004b) also look at whether there is reform complementarity between labour market and product market reform. In the labour market, they find that the individual effects of each rigidity are magnified by the presence of other rigidities. This “complementarity of rigidities” means that partial labour market reform is unlikely to achieve any significant reduction in unemployment. Similar to Griffith et al (2007), there are some suggestions that product market reform may yield better employment results when underlying labour market institutions are more rigid.

50. Nicoletti and Scarpetta (2005), in a very comprehensive study, try to get to the bottom of this question. Analysing the impact of product market reform on employment, and using an indicator of regulation in non-manufacturing¹⁸, Nicoletti and Scarpetta find that restrictive labour markets have lower employment rates, which would increase the potential for positive gains from product market reform. They also find that “the reduction in product market rents induced by stronger competitive pressures may translate over time into weaker inside power and a more flexible labour market, leading to employment gains over and above those that are directly due to deregulation”. Moving on then, to analyse the interaction of product market reform and labour market policies, the authors find that “reforms that would curb the highest state control and barriers to entry observed in the sample down to the best OECD practice in the indicator (a 5 points decrease in the indicator), would increase long-run employment rates by between 2.5 and 5 percentage points...” They point to the UK where product market reforms are estimated to have contributed to increase employment rates by between 2 and 4 percentage points.

¹⁸ According to the authors, this indicator is a good proxy for assessing the effects of product market reform on employment because non-manufacturing is the sector where restrictive regulations and state controls [traditionally] were the most wide-spread and where the widest reforms took place. It also accounts for a growing share of activity and employment in most countries. See Nicoletti and Scarpetta (2005) p.12.

51. Caciato, Duval and Fiori (2012) take this work further and use a DSGE¹⁹ model to simulate and analyse the short-term impacts of structural reform in labour and product markets to assess welfare effects. The authors find a positive long-run impact of product market reform, leading to gains in wages, consumption and GDP. However, in the short-run, the simulation finds that unemployment increases. This is owing to a savings and investment effect as new entry “immediately stimulates investment” by new firms. New firm entry will boost job creation. However, a fall in consumption induced by a higher savings rate means that incumbents will downsize, and the authors find that the job destruction will outweigh job creation. Moving on to assessing the impact of joint reforms, Caciato *et al* find that the aftermath of product market reforms is “smoother” if the labour market is flexible, i.e. with less job protection and lower unemployment benefits. When entry barriers are lowered, new job vacancies are filled more quickly and laid-off workers find new jobs more rapidly in a flexible market. However, they also find that, in that case, the long-run gains from product market reform are smaller. This is because employment is expected to be higher in a flexible labour market (before reform kicks in), so the marginal gains are concomitantly smaller. In other words, Caciato *et al* find that there is a *long-run substitutability* between labour and product market reform and that *labour market reform or product market reform in isolation is likely to yield higher gains*. That said, the authors nonetheless conclude their study by emphasising that a “broad reform package would be highly beneficial”. This is because it will still deliver larger long-term gains than piecemeal reforms, but also because joint reform will smooth short-term dynamics and ultimately “speed up the transition to the new steady state”. In particular, the authors highlight that reducing entry barriers through product market reform in parallel to labour market reforms would mitigate the wage losses that would result from labour market reform alone through a positive real wage effect.

52. Fiori *et al* (2012) also discuss the employment effects of product and labour market reforms, using panel data for OECD countries over the period 1980-2002 to investigate the possible synergies of joint reforms. They highlight the importance of taking into account that product market regulatory reform has been implemented across the OECD in countries that had “very different labour market settings”. This is also the point borne out from the discussions in the previous sectors: many authors have highlighted the fact that employment gains from changes in product market regulation are likely to depend on the underlying labour market institutions. Similar to the findings by Caciato *et al*, the authors’ main empirical result is that product market liberalisation is more effective in stimulating employment when the labour markets institutions are rigid. They emphasise that this result holds “even when the possible endogeneity of policies and institutions to labour market outcomes is accounted for”. Nonetheless, they do not assume that product market reform would work in isolation.

53. Finally, to return to the starting point of this paper, one could mention a recent study by Sutherland and Hoeller (2013). They analyse policies to promote growth and macroeconomic stability in the wake of the Great Recession, and find that pro-competitive product market regulations are a useful economic policy tool as *they support faster catch-up and stronger growth* by “reducing monopolistic tendencies (...) while also contributing to a more innovative and dynamic economy”. In particular they find that “light” regulation of product markets is likely to facilitate resource reallocation and thereby reduce the persistence of shocks. These findings support the idea that the key effect of competition on employment is through the channel of increased output growth, also confirming findings by Blanchard cited earlier. Sutherland and Hoeller point out that economies with lower levels of state control in product markets also appear to be better able to withstand large shocks.

54. The last part of the paper looks at the literature that particularly deals with in-firm and in-sector increases in competition induced by innovation, and the effect this has on job creation. This part of the

¹⁹ Dynamic Stochastic General Equilibrium model. Currently the most commonly used macroeconomic modelling tool in central banks. For a highly instructive discussion on the uses of the DSGE, see <http://noahpinionblog.blogspot.fr/2013/05/what-can-you-do-with-dsge-model.html>

discussion is to be taken as a complement to the discussion above which focused more on output and wages as transmission mechanisms between competition and employment.

7. Innovation, competition and employment

7.1 Firm-level evidence

55. Competition can have an indirect effect on employment through its impact on innovation. Indeed, there is evidence that intervening to promote competition will increase innovation. A seminal paper by Aghion et al. (2005) shows that moderately competitive markets are likely to be the most innovative, while monopoly or very competitive markets innovate less. A reason can be that firms in competitive markets are likely to have similar technologies and be incentivised to innovate in order to escape competition and become more profitable. More evidence exists on the positive relationship between competition and innovation, but we will not go through it here²⁰ in order to focus on the impact of innovation on job creation.

56. A growing body of literature has explored the impact of innovation on employment at the firm level. The evidence tends to be overall positive²¹. Product innovation appears as clearly associated with employment growth, while the effects of process innovation are less clear-cut. The main channel through which innovation creates jobs at this level is the output expansion effect, while the impact on wage formation does not seem to play a significant role when the driver is innovation.

57. When assessing the effects of competition on employment through the innovation channel at the firm level, a conceptual distinction has to be made between *process* innovation and *product* innovation, although in practice they often go hand in hand.

58. *Process innovation* is defined, according to Schumpeter, as “the introduction of a new method of production (...) or a new way of handling a commodity commercially²²”. Process innovations generate two opposite effects on the demand for labour. On the one hand, process innovations are likely to improve productivity and therefore reduce the quantity of productive factors, including labour, required to produce a unit of output. The savings in labour at the firm level generate a displacement effect and translate it into higher unemployment at the economy level. On the other hand, process innovations can improve product quality and reduce prices thanks to the lowered production costs. These changes stimulate demand, leading to output expansion and lower unemployment. The size of such compensation effect depends on the elasticity of demand for the firm’s products, but is also determined by the firm agents’ behaviour. For example, unions may bargain in order to transform higher profits from innovation into higher wages instead of lower unemployment. Firm managers may be tempted to exploit the firm market power with the purpose of maintaining prices above the competitive level, thus inhibiting the expansion of demand.

59. Both behaviours can represent an obstacle to the effectiveness of the compensation effect. While the bargaining power of unions depends on the institutional features of labour markets, competition policy and regulations can act so as to eliminate rents and assure that gains from innovation are not appropriated through oligopolistic power. Competition can therefore indirectly favour job creation. Economic theory does not provide an unambiguous prediction about whether the displacement effect or the compensation effect will prevail, thus leaving scope for empirical investigation.

²⁰ For a detailed discussion about the relationship between competition and innovation, see OECD (2014a).

²¹ For reviews, see Petit (1995); Chennells and Van Reenen (2002); Spiezzi and Vivarelli (2002); Pianta (2005)

²² Schumpeter, J. A. (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.

60. *Product innovation* is, again in Schumpeter's words, "the introduction of a new good (...) or a new quality of a good²³". Innovative products can be goods that are novel to the market or just novel to the firm, but also incremental improvements on already existing products. Like process innovations, product innovations can induce a change in the production method by making it either more or less labour-intensive (and causing respectively job creation or destruction). However, the main effect of product innovation is likely to be an expansion of demand, driven by the improvements in quality and variety as well as by the opening of new markets. The shift in demand results in higher output and higher employment. The compensation effect can be partially offset if the sales of the new product cannibalise existing sales.

61. One of the first micro-econometric studies was conducted by Entorf and Pohlmeier (1990). Looking at a large sample of German firms in 1984, the authors find that product innovations significantly increase employment, while process innovations have no significant effect. König et al. (1995), also using a sample of German firms, find similar results. The positive impact of product innovation on employment for German firms is corroborated by Smolny (1998 and 2002). His studies use panel data on 2,045 manufacturing firms over the period 1980-1992 collected through a business and investment survey of the IFO institute. The empirical evidence shows that product innovations positively affect both output and employment growth, while the impact of process innovations is weak. Interestingly, Smolny also finds that innovation affects competition: markets with a large share of innovators present high volatility of employment but reduced volatility of prices. This is consistent with the assumption that in such markets price competition is substituted by competition in innovative behaviour, so that manufacturers respond to changes in demand by adjusting quantities (and consequently employment) instead of adjusting prices.

62. For British companies, Van Reenen (1997) uses a database resulting from the combination of two main sources: (i) a panel of 598 manufacturing firms listed on the London Stock Exchange for at least 5 continuous years between 1976 and 1982; and (ii) innovation count data drawn from the Science Policy Research Unit's (SPRU) innovation database. Van Reenen finds that product innovations have a positive and highly significant effect on employment, whereas process innovations have insignificant and small effects.

63. Similar results are found by Peters (2004). Her study is based on a data set derived from the Third Community Innovation Survey (CIS 3) which includes information on more than 2,200 German manufacturing and service sector firms observed in the period 1998-2000. Peters finds that product innovation has a positive effect on employment both in original innovator firms and in imitators. Process innovation appears to have a negative effect.

64. Harrison *et al* (2008) undertake a wide cross-country study that uses comparable firm-level data sets for four European countries: France, Germany, Spain and the UK. The considered firms operate either in manufacturing or the service sectors. As for Peters (2004), data are derived from the Third Community Innovation Survey (CIS 3) and include information about whether the firm has introduced process and product innovations during the period under consideration. The authors conclude "Product innovations are an important source of firm-level employment growth, while process innovations, which are likely to be associated to price reductions, tend to displace employment moderately". The results about product innovations hold also after taking into account the cannibalisation of old products.

65. Hall *et al* (2008) apply the framework conceived by Harrison *et al* (2008) to a panel of 9,500 Italian firms over the period 1995-2003. Data are retrieved from surveys conducted by Mediocreto-Capitalia (MCC) that contain information on accounting items and innovation activity. The overall conclusion of the study is that process innovation causes little displacement effect in Italy while product

²³ Ibidem.

innovation increases employment. More specifically, over the study period, “product innovation contributes about half the employment growth, while sales expansion of old products accounts for the other half, in spite of some efficiency gain in their production”.

66. Other economists have obtained results partially in contrast with the evidence above, finding a positive impact of process innovation on employment growth. Early examples include Doms *et al* (1995) for firms in the US, and Blanchflower and Burgess (1998) for firms in Australia and the UK.

67. More recently, Greenan and Guellec (2000) have used micro-data on employment from 15,186 French manufacturing firms over the period 1986–1990. Data on innovation are obtained from an ‘Innovation Survey’ carried out in 1991 in firms with more than 20 employees. Greenan and Guellec find an overall positive and significant relationship between innovation and employment, with innovative firms creating more jobs than non-innovative ones. When differentiating between process and product innovations, they find that only the former have a positive impact on employment at the firm level, while the converse is true at the sectorial level. Garcia *et al* (2002) examine a micro-panel of 1,286 Spanish firms from 1990 to 1998. The authors observe positive effects of both process and product innovation on employment. However, the former tends to fade away in the long run, when competitors match the innovation, while the latter lasts in time.

68. Most of the studies mentioned above rely on *survey-based measures* of technology and innovation. Another stream of literature considers different proxies for innovation such as investment in research and development (R&D), or in new equipment.

69. R&D investment is often positively related to employment growth. For example, Blechinger *et al* (1998) find a positive impact of both product-related R&D and process-related R&D on employment growth in German and Dutch manufacturing and service firms. Similar results are found by Regev (1998) for Israeli firms. In a more recent paper, Piva and Vivarelli (2005) analyse a longitudinal dataset of 575 Italian manufacturing firms over the period 1992–1997 and find that innovation, as measured through the value of gross innovative investment, has a small but significant positive effect on employment.

70. In contrast, some studies find a negative relationship between R&D expenditures and employment. See for example Brouwer *et al* (1993) for Dutch manufacturing firms – although the negative impact turns into positive when only product innovations are considered – and Klette and Førre (1998) for Norwegian manufacturing plants. A potential explanation for these negative findings is that the effects of innovation depend on the type of innovations being introduced: distinguishing between process-related and product-related R&D may be fundamental.

71. In sum, the evidence on the overall impact of innovation at the firm-level appears to be positive in most of the literature. Product innovation emerges as strongly associated with employment growth. By contrast, the effects of process innovation are ambiguous, and most of the times negative or weak. These results support the hypothesis that, when product innovation is implemented, the compensation effect through the enlargement of demand and expansion of output prevails; when process-innovation is introduced, instead, the displacement effect driven by the shift to a less labour-intensive production process predominates. R&D investment is often found to boost employment, but the evidence is not clear-cut when the analysis does not distinguish between process-related and product-related R&D.

72. Even if firm-level studies provide useful evidence, they do not allow us to infer what the aggregate effects of innovation are at the industry and economy level. The next section explains why this is the case and explores the available evidence at sectorial level.

7.2 *Industry-level evidence*

73. The relationship between innovation and employment at the firm level may generate sector-wide effects, although they cannot always be generalised. It is important to understand the limits of this approach for the aggregate analysis. Firstly, some compensation mechanisms triggered by innovation operate not only within the innovative firm, but they also affect other firms and sectors²⁴. For example, on the one hand process innovation displaces workers in the sector where it takes place, on the other hand it creates new jobs in the sectors where the new machines are produced; the decrease in prices that follows process innovation stimulates demand, generates new output and creates jobs for more people, whose income will be spent in different sectors; the labour-saving effect of process innovation can be compensated in the labour market via a decrease in wages, which in turn pushes back towards the use of more labour-intensive production technologies. Secondly, firm-level studies often neglect the so-called “business stealing effect”, that is, the displacement of non-innovative firms. In other words, these studies do not distinguish whether the output and employment gains from innovation are achieved at the expenses of rival firms or through a market expansion. Thirdly, when panels are used, the analysis may disregard the effects of innovation on the entry or exit of firms left outside of the panel. Firm entry and exit may account for a significant proportion of the variation in employment.

74. Most of the empirical evidence at the industry-level focuses on changes in manufacturing following innovation triggered by the introduction of new technologies. Early studies by Clark (1983, 1987) investigate the effect of innovative investments on a panel of UK manufacturing firms over the period 1948-1984. The author finds a negative impact of the introduction of new technologies in the industry on employment, because the displacement effect due to the shift to a less labour-intensive production model dominates. Vivarelli, Evangelista and Pianta (1996) obtain at the industry-level results consistent with most of the research at the firm-level: applying a cross sector analysis to 30 Italian manufacturing industries in 1985, they find a negative impact on employment of process innovation, but a positive effect of product innovation.

75. Widening the scope of the analysis, Pianta (2000, 2001) uses data on 21 manufacturing industries in five European countries (Denmark, Germany, Italy, the Netherlands and Norway) over the period 1989-1993. Pianta finds that, overall, total innovation expenditure has a negative impact on employment, but the effect is reversed when only product-related R&D investment is considered. Similar results are obtained by Antonucci and Pianta (2002) for 10 manufacturing industries in 8 European countries (Italy, France, Germany, Denmark, Netherlands, Finland, the UK, and Sweden) in the period from 1994 to 1999. The authors show that “innovation in European manufacturing industry had, in the late 1990s, an overall negative impact on employment”. However, product innovation has a positive impact on employment changes.

76. Fewer studies have been conducted on service industries and the findings for are not very different from those for manufacturing. Evangelista and Savona (2002) study a sample of more than 6,000 Italian service firms with more than 20 employees over the period 1993-95, using data from the innovation survey in services carried out in Italy by the National Statistical Office. The authors find an overall negative impact of innovation on employment for Italy. However, the effect is different among industries and depends also on the level of qualification of the labour force: “Among small firms and in less than a half of the service sectors considered, the employment impact of innovation is positive, particularly in industries that have a strong scientific and technological base. A negative impact of innovation on employment is, on the contrary, found among large firms, capital-intensive industries and in all financial-related sectors (banking, insurance and other financial services).”

²⁴ For a critical discussion of compensation mechanisms, see Vivarelli (2007).

77. In sum, most of the evidence on the impact of innovation on employment at the industry-level is negative. As for firm-level studies, differentiating between process and product innovation is important: unlike process innovation, product innovation seems to positively affect employment. However, most of the studies discussed above focus on manufacturing, a sector where innovations are likely to be labour-saving. More evidence is needed on service sectors in order to reach more robust conclusions.

8. Conclusion

78. This relatively brief overview of the main literature covering the links and drivers between competition and employment confirms unambiguously that competition stimulates employment growth in the long term. The aggregate effect is mainly through a positive impact on total factor productivity growth which increases labour demand, and through aggregate demand, as more competition tends to increase real wages through a lowering of mark-ups. This generates a virtuous circle of output and demand growth in the long run. We have also seen that in the short-run, and especially at the firm level, the response to increased competition can lead to an increase in unemployment, for instance through process innovation that replaces labour intensive machinery with new machines to increase productivity at the cost of labour. Even so, econometric simulations of the effect of increased competition leading to redundancies in an industry demonstrate a return to a steady state growth path with rising employment after two-three years.

79. What does the literature tell us about the policy response, in particular structural reforms to enhance employment? In the short term, there is evidence to suggest that product market reform helps the process of reforming labour markets by reducing mark-ups and increasing the real wages, thus making the changes easier acceptable for those affected. While there is some debate of whether this is more effective when labour markets are rigid or flexible, all the literature agrees that proceeding with product market reform, either as a precursor to, or simultaneously with, labour market reform, helps the process and product market conditions adjust faster than the labour market, helping consumers, even in the case of a short-term negative effect on employment growth.

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