Excess of capacity and Employment protection: evidence from the European manufacturing industry

Maria Teresa Trentinaglia De Daverio

University of Milan

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Abstract

This paper estimates the impact of labour rigidity on the accumulation of over-capacity to understand whether firms in countries with more stringent institutions experience lower capacity utilization rates. We retrieve excess of capacity for a panel of European manufacturing industries from the Business and Consumer Survey and evaluate the joint effect of two constraints: an institutional one, represented by Employment Protection Legislation, and a technological one, using the time invariant capital intensity of the corresponding US industry, following the approach of Rajan and Zingales (1998).

Preliminary results show that labour institutions do accrue the rise of over-capacity, with an effect increasing in the industry capital intensity. This effect is essentially driven by the more stringent effect of temporary workers protection. Robustness checks with the share of temporary workers of Bassanini et al. (2010) identify a relation between capital intensity and temporary labour, thus confirming our prediction. When instead we look at the effect of collective dismissal procedures, we find a more severe impact on labour intensive industries.

Keywords: Industrial organization, Labour economics

JEL Classification: J, L.

1 Introduction

During economic and financial crisis, such as the 2009 global crisis, manufacturing industries in industrialized countries generally experience a severe excess of
Table 1: Actual and output production, European Automotive Industry

<table>
<thead>
<tr>
<th>Country</th>
<th>2007</th>
<th>2011</th>
<th>2012</th>
<th>Total capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>89%</td>
<td>89%</td>
<td>90%</td>
<td>6.4 million</td>
</tr>
<tr>
<td>France</td>
<td>74%</td>
<td>67%</td>
<td>60%</td>
<td>3.3 million</td>
</tr>
<tr>
<td>Spain</td>
<td>86%</td>
<td>79%</td>
<td>70%</td>
<td>3.0 million</td>
</tr>
<tr>
<td>Russia</td>
<td>72%</td>
<td>69%</td>
<td>70%</td>
<td>2.7 million</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>93%</td>
<td>87%</td>
<td>92%</td>
<td>1.6 million</td>
</tr>
<tr>
<td>Italy</td>
<td>78%</td>
<td>53%</td>
<td>54%</td>
<td>1.4 million</td>
</tr>
<tr>
<td>Turkey</td>
<td>90%</td>
<td>79%</td>
<td>68%</td>
<td>1.4 million</td>
</tr>
<tr>
<td>Poland</td>
<td>95%</td>
<td>86%</td>
<td>70%</td>
<td>1.2 million</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>90%</td>
<td>92%</td>
<td>84%</td>
<td>6.4 million</td>
</tr>
</tbody>
</table>

Table 1: Actual and output production, European Automotive Industry

Source: Sole 24 Ore

capacity. To cope with the drop in consumption levels, firms, often unable to implement massive lay-offs, are forced to reduce their utilization level of physical capacity. Because of their inability to shut down their unprofitable production facilities, plants are kept partially idle; workers are temporarily laid-off and effective industrial output falls well below potential output.

The European automotive industry is a perfect example that combines all these three different elements: as demand for vehicles dropped in 2009, automotive assembly plants began experiencing, in a more or less severe way, over capacity. As Table 1 illustrates, Italy has been the most affected country, as the drop in its plant capacity utilization rate, from 78% to 54% in less than five years, confirms. On the other hand, production facilities in the United Kingdom and in Germany are still running at almost full capacity, with an 92% utilization rate in 2012.

Though limited in its scope of analysis, this example paves the way to the main topic of this paper, that is the relationship between labour institutions and over capacity. More precisely, we investigate if firms in countries with more rigid labour markets tend to experience overcapacity.

The theoretical model set up by Trentinaglia De Daverio (2013) emphasizes this relation: in this framework, two firms in two asymmetric countries engage in a two stage quantity competition game. Under demand uncertainty, firms initially invest in capacity and, once uncertainty is resolved, they adjust output accordingly, by either producing above or below capacity. This model provides a theoretical explanation for the rise of over capacity as the firm in the country with a more rigid labour market is the firm committing to a higher level of output.

Extending this theoretical result to an empirical context, we look at the ex-post consequences of EPL on installed capacity. In other words, we expect that firms operating in countries with rigid labour markets face some dismissal constraints that impede the reallocation of labour force towards its most efficient
use. Factors cannot be freely modified and the best alternative option is to reduce the capacity utilization level. This reasoning is more intuitive whenever we consider economic downturns: to accommodate negative changes in final demand, firms would optimally downsize their production facilities by reducing their labour force and/or dismantling part of their plants. Still, as collective and individual dismissal procedures become more and more binding, firms must employ alternative mechanisms, such as temporary lay-offs. For instance, Italian firms can rely on the so-called "Cassa Integrazione": workers stay at home and receive a wage compensation, paid partially from the government and partially from the firm itself. In this way, production facilities are preserved, but there is a significant mismatch between actual and potential output.

Apparently this seems to be a win-win solution: workers don’t lose their jobs and firms don’t dissipate their knowledge and technology. Still, the social costs implied by this situation can be tremendous. Physical and human capital become obsolete; investments are postponed and sooner or later more public money is needed to sustain this delicate scenario.

To estimate the impact of labour market rigidity on the rise of over-capacity, this paper considers the capacity utilization rate of a country-sector panel of European manufacturing firms and looks at how it varies with the country Employment Protection Legislation (EPL). Preliminary results confirm that there is indeed a positive relationship between these two elements, which is more significant when EPL on collective dismissal procedures is considered. More specifically, we show that the effect of total employment protection is more stringent in industries relatively capital intensive. Still, this result is mainly driven by the effect of protections of temporary and regular workers. Robustness check using the share of temporary workers of Bassanini et al. (2010) confirm that more capital intensive industries tend to employ, on average, more temporary workers: thus, an increase in the protection for temporary workers is more detrimental to capital intensive industries. When we look at how collective dismissal procedures impact the under-utilization of capacity, we note that the effect of this legislation is more binding in labour intensive industries.

This work is structured as follows: section 2 describes the related literature, section 3 describes the empirical strategy and the sample, section 4 shows the main results and predictions, section 5 performs some robustness checks, and section 6 draws the main conclusions and potential policy implications.

2 Literature review

This work combines two different approaches: on one side, it contributes to the empirical debate of how EPL impacts firms’ production decisions, in terms of factor demands. On the other side, it hinges upon the industrial organization debate on the trade-off between quantity commitment and flexibility by reinterpreting the level of installed production capacity as an output commitment. Within this framework, we essentially rely on the seminal contributions of Spence (1977) and Dixit (1980), who investigated the implications quantity
competition of excessive output commitment levels. They in fact explained that firms over commit to either deter entry or to face strategic interaction in quantity competition games.

As far as the empirical literature is concerned, considerable efforts have been devoted to the comprehension of the effect of EPL on labour productivity. To this purpose, Hopenhayn and Rogerson (1993) considered the impact of firing restrictions on the reallocation of resources and concluded that more stringent restrictions impede firms to freely move workers, and resources, towards their most efficient use and eventually have a negative effect on labour productivity. Also Saint-Paul (2002) confirmed the existence of a negative link between EPL and firm’s productivity: by investigating the effect of firing restrictions on innovation, he explained that this source of rigidity makes firms prefer secondary, and safer, innovation on existing products over primary, and riskier, innovation on new products. Moreover, Bassanini et al. (2009) studied the relation between EPL and Total Factor Productivity, identifying a lower growth rate in countries with a more binding labour legislation.

Still, Belot et al. (2007), and Lagos (2006) showed that, under some circumstances, EPL can ultimately have a positive impact on labour productivity. More precisely, according to Belot et al. (2007), firms facing workers’ dismissal protection might have more incentives to invest in firm specific human capital, but this result holds as long as the EPL level is sufficiently low. Under Lagos (2006), an increase in the reservation wage, under stringent EPL, can induce a more selective employee-employer matching process, with positive spillovers on overall productivity.

The EPL literature has devoted consistent attention also to labour market dynamics, linking the effects of labour legislation to a lower job turnover rate. These results are confirmed by Autor et al. (2007) and Kugler and Pica (2008), who respectively looked at job turnover rates of American and Italian firms. Also, Micco and Pages (2006) showed that a more stringent regulation implies a significant drop in turnover, with even stronger consequences in sectors with high demand volatility. Haltiwanger et al. (2006) predicted instead a more severe impact of EPL in industries with high job reallocation needs.

Last but not least, Bertola (2004) and Koeniger and Leonardi (2007) analyzed the effect of labour market regulation of firms’ investment decisions. Whereas the former work traced the reduction in the optimal investment level back to the hold-up problem, the latter paper explained that EPL, by increasing labour costs, encourages the adoption of more capital intensive technology. On the other hand, Cingano et al. (2010) identified a negative link between EPL and the capital-labour ratio, concluding that dismissal restrictions negatively affects investment, capital and value-added per-workers, with a more dramatic impact in sectors with high job reallocation needs.
3 Research method and data

3.1 Empirical strategy

To investigate the impact of labour legislation on the rise of over capacity, this paper looks at how the capacity utilization rate of a country-sector panel data of European manufacturing firms varies with the degree of EPL. More precisely, to correctly reconcile our predictions with the notion of excessive capacity, we estimate the impact on the share of production capacity that is not used.

To match the country level measure of employment protection, we look at the joint effect of EPL and capital intensity. To overcome potential endogeneity issues, we follow the seminal approach of Rajan and Zingales (1998) and use a time invariant measure of the capital intensity of the corresponding US manufacturing industry. This strategy allows us to combine two exogenous constraints faced by firms: the first one is an institutional constraint, as it reflects the current situation of labour collective bargaining. The second, technological and exogenous constraint mirrors the burden of output commitment decisions made by firms at the time of setting up their production facilities.

To predict this relation, we estimate the following equation:

\[
EC_{jct} = \beta_1 + \beta_2 EPL_{ct}^i + \beta_3 KI_j + \beta_4 EPL_{ct}^i \times KI_j + \beta_4 (X_{jct}) + \mu_j + \mu_c + \mu_{jt} + \mu_{ct} + \varepsilon_{jct}
\]

(1)

where \( EC_{jct} \) is the share of non used capacity in sector \( j \), country \( c \), year \( t \), \( EPL_{ct}^i \) is the country-year level of Employment Protection, \(^1\) \( KI_j \) is the time invariant level of capital intensity in the United States, for sector \( j \), \( X_{jct} \) is a matrix of other country sector information, \( \mu_j, \mu_c, \mu_{jt}, \mu_{ct} \) are respectively sector, country, sector/year and country/year fixed effects and \( \varepsilon_{jct} \) is the residual.

We also consider a second type of regression, in which we include all the three sub classifications of labour protection, and estimate their joint effect.

\[
EC_{jct} = \beta_1 + \beta_2 EPL_{ct}^{collective} + \beta_3 KI_j + \beta_4 EPL_{ct}^{collective} \times KI_j + \beta_5 EPL_{ct}^{temporary} + \beta_6 EPL_{ct}^{temporary} \times KI_j + \beta_7 EPL_{ct}^{regular} + \beta_8 EPL_{ct}^{regular} \times KI_j + \beta_9 (X_{jct}) + \mu_j + \mu_c + \mu_{jt} + \mu_{ct} + \varepsilon_{jct}
\]

(2)

As a robustness check, we introduce the share of temporary workers, available at the country-sector level, provided by Bassanini et al. (2010): not only we control for this additional regressor, but we also construct an alternative

\(^1\)Where \( i \) denotes the different EPL classifications: EPL on total workers, EPL on collective dismissal procedure, EPL on temporary workers and EPL on regular workers. Further information on the construction of the EPL index are reported in section 3.2
interaction term to assess its joint impact with EPL. Last but not least, we look at the results with other measures for labour protection and capital intensity: as far as labour legislation is concerned, we replace EPL with either the measure of union density or the sector country wage compensation level. On the other side, we consider two alternative measures of capital intensity: the average capital intensity, over the whole period considered, and the time variant capital intensity.

3.2 Data

To investigate the effects of labour market rigidity on the rise of excessive capacity, we exploit the following data sources:

1. The Business and Consumer Survey (BCS), that gathers capacity utilization rates for European industries;\(^2\)

2. The OECD Employment Protection Labour index;

3. The INDSTAT2 2013 Unido database, providing industry specific information;

4. As a robustness check, we also introduce the share of temporary workers provided by Bassanini et al. (2010).

The BCS\(^3\) provides quarterly and monthly time series information, collecting harmonized answers to questions\(^4\) concerning the plant operating status, mainly regarding the capacity utilization rate. This information is available for 27 European countries and 21 sectors\(^5\) from 1990 to 2010. From the assessment of the current capacity utilization rate, we retrieve a measure for the excess of physical capacity, our dependent variable, defined as

\[
\text{Excess of capacity}_{jct} = 100 - \text{capacity utilization rate}_{jct}.
\]

The OECD database\(^6\) contains information for 40 different countries, covering the period 1985-2008. This data source provides measures for labour market

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\(^2\)To the best of our knowledge, the capacity utilization rate has only been introduced by Planas et al. (2010) to assess the link between output gap fluctuations and total factor productivity.

\(^3\)Available at http://ec.europa.eu/economy_finance/db_indicators/surveys/time_series/index_en.htm

\(^4\)Quarterly questions are: factors limiting production, assessment of current production capacity, the duration of production assured by current order-book levels, new orders in recent months, export expectations for the months ahead, current level of capacity utilization, competitive position in the domestic market, competitive position inside and outside the EU. Monthly questions are instead: business confidence indicator, the production trend observed in recent month, assessment of order-book levels, assessment of export order-book levels, assessment of stocks of finished products, production expectations for the months ahead, selling price expectations for the months ahead and employment expectations for the months ahead.

\(^5\)Nace 1.1 classification, 4–digit level.

\(^6\)Available at www.oecd.org/employment/emp/oecdidicatorsemployment.htm#data
rigidity according to three different classifications: rigidity of regular employment, rigidity of temporary employment and rigidity of collective employment. Last, there is an overall measure combining all these separate faces of EPL. This summary index is also available in three different versions, according to the period considered:

1. From 1985 to 2008, the Total EPL index, as measured by ep\_v1 in the OECD dataset, is the unweighted average of sub-indicators for regular contracts and temporary contracts:

   \[ EPL_{total ct} = \frac{1}{2} EPL_{temporary ct} + \frac{1}{2} EPL_{regular ct} \]  

2. From 1998 to 2008, the Total EPL index, as measured by ep\_v2 in the OECD dataset, is the weighted sum of sub-indicators for regular contracts, temporary contracts and collective dismissals:

   \[ EPL_{total ct} = \frac{5}{12} EPL_{temporary ct} + \frac{5}{12} EPL_{regular ct} + \frac{2}{12} EPL_{collective ct} \]  

3. For 2008, the Total EPL index, as measured by variable ep\_v3 in the OECD database, is the weighted sum of sub-indicators for regular contracts, temporary contracts and collective dismissals.

   \[ EPL_{total ct} = \frac{5}{12} EPL_{temporary ct} + \frac{5}{12} EPL_{regular ct} + \frac{2}{12} EPL_{collective ct} \]

The measurement for protection on temporary and regular workers is available through the whole period considered, whereas information concerning collective dismissal constraints have been collected only after 1998. Still, all these three indicators can vary from 0 to 6, where 0 represents the least restricted legislation and 6 the most restricted one\(^7\). The OECD labour statistic database also provides a measure of the trade union density: as a control, we replace our initial EPL measure with this additional country level information.

The measure of capital intensity is retrieved from the Unido Indstat2 2013 revision and is defined as the ratio between gross fixed capital formations, in $, and the number of workers. We also gather a measure of value added, at the country-sector level, to control for potential changes in our dependent variable that can be traced back to changes in final demand.\(^8\) From the Unido database we retrieve additional industry information, such as the wage compensation and the number of plants, used as additional controls.\(^9\)

\(^7\)For more information on the methodology: www.oecd.org/els/emp/EPL-Methodology.pdf

\(^8\)We also controlled for a standardized measure of GDP, only available at the country level, but opted for a more specific level of analysis as changes in demand might not be symmetric within countries.

\(^9\)For instance, the number of plants allows us to control for changes in the excess of capacity due to plant turnover, whereas the ratio between the number of plants and the number of employees gives us an approximate estimate of the plant size.
The final sample is a panel-data of 21 European countries and 21 manufacturing industries, classified at the Nace 1.1 Revision at the 2-digit level, from 1990 to 2008. In total we have approximately 5500 observations and 441 country-sector observations. Figure 1 plots the countries included in the sample according to their average level of EPL over the period considered.

In the robustness analysis, we integrate our main data-set with the sample provided by Bassanini et al. (2010), matching 17 European countries and 13 industries, classified at the 2-digit level, ISIC 3 Revision. In this smaller sample, we have approximately 4000 observations. Bassanini et al. (2010) database mainly provides information on the job reallocation rate, meant as the sum of job openings and job separations. Still, it also contains information on the share of temporary workers in a given country industry.

Figure 1: Average EPL, 1990-2008

4 Results

As a preliminary step, we investigate the effect of the four alternative measures of EPL on the excess of capacity, without interacting them with the time invariant capital intensity. Results are reported in Table 2. Specification (1) reports the total effect of EPL whereas specification (2) considers the joint effect of the three sub-classifications of EPL. The total measure of EPL seems to have a negative and significant effect on the excess of capacity. Still, each alternative

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10 See Annex for a detailed list.
11 The panel is unbalanced.
12 For a detailed list of countries and sectors included in the analysis see Annex I.
13 Country averages are classified in quartiles: the first quartile is from 0.66 to 1.73, the second quartile ranges from 1.73 to 2.23, the third quartile from 2.23 to 2.69 and the fourth quartile from 2.69 up to 3.63.
14 In our specification we refer to the definition of EPL as defined by equation (3), to cover as many years as possible. Thus, this specification excludes collective regulations. Still, we have performed some control tests using equation (4): results are robust, given the limited weight of EPL Collective in the overall computation.
classification positively contributes to the accumulation of over capacity. Among them, the EPL on collective dismissal procedures has the most significant effect.

<table>
<thead>
<tr>
<th>Excess of capacity</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPL Total</td>
<td>-5.646**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.350)</td>
<td></td>
</tr>
<tr>
<td>EPL Collective</td>
<td>12.136**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4.812)</td>
<td></td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>1.050</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.670)</td>
<td></td>
</tr>
<tr>
<td>EPL Regular</td>
<td>0.826</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.851)</td>
<td></td>
</tr>
<tr>
<td>Year and Country FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year and Sector FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Country FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sector FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R²</td>
<td>0.296</td>
<td>0.266</td>
</tr>
<tr>
<td>N</td>
<td>5560</td>
<td>3836</td>
</tr>
</tbody>
</table>

* significant at 10%; ** significant at 5%; *** significant at 1%

Standard errors clustered at the country-sector level.

Table 2: Effect of EPL

On the basis of these results, we proceed with our main analysis, where we interact the measure of labour protection with the exogenous level of capital intensity. In Table 3 we follow the same approach as before: in specification (1), we include only the total effect EPL, in specification (2) we simultaneously include the three sub-classifications and in specifications (3)-(5) we include one sub-classification at a time.

In line with the preliminary analysis, the effect of EPL Total is negative (−1.081), but the interaction term (1.328) predicts the the effect of EPL is positive and increasing in the level of capital intensity: that is, more capital intensive industries experience over-capacity as labour market regulation becomes more and more binding. To further investigate this effect, we look at the decomposition of EPL in its three determinants: EPL Collective, EPL on temporary workers, and EPL on regular workers.

The effect of collective dismissal procedures, as reported by the coefficients 6.118 and 4.928 respectively in specifications (2) and (3), is positive, suggesting that firms in countries with more severe lay-off mechanisms tend to experience over-capacity. As plants shut-down and massive lay-offs cannot be easily implemented, firms have to reduce their capacity utilization rate by keeping their workers partially inactive. Capacity cannot be dismantled, workers cannot be fired, but production is not profitable: the inevitable result is over capacity. The interaction term is instead negative and decreasing in the degree of capital intensity (−3.557 and −3.961): this means that the effect of EPL Collective is
Table 3: Joint effects of EPL

more severe is labour intensive industries.

When we look at the impact of protection on temporary workers, specifications (2) and (4) reveal a pattern similar to the effect of total EPL: temporary EPL alone is negative (−0.528 and −1.990), but the interaction term is positive (0.558 and 0.667). This means once more that this type of labour protection is more severe as capital intensity increases. Capital intensive industries employ more capital relative to labour but to accommodate for changes in demand, they
prefer to exploit temporary workers rather than regular and permanent employment. In Annex II, we provide a more detailed interpretation of this result after integrating the baseline analysis with the share of temporary workers, provided by Bassanini et al. (2010).

Also the labour protection on regular workers present a trend in line with EPL Total and EPL Temporary, as estimated through specifications (2) and (5). Still, the two regressions differ in the coefficient sign of EPL Regular alone, which is negative when estimated jointly with the other classifications (respectively −3.850 and 3.998), and positive when included alone. Despite this twofold effect, what matters is the sign of the interaction term, which is positive and increasing in the level of capital intensity (2.475 and 0.394).

Before integrating our analysis with the share of temporary workers and some additional robustness checks, we graphically represent the linear combination of EPL and capital intensity, along the whole distribution of our measure of capital intensity. More precisely, from equation (1), we estimate the following linear marginal effect for each dimension of EPL:

$$\text{marginal effect of EPL} = \beta_2 + \beta_4 K I^p, \quad (6)$$

where $K I^p$ denotes the value of the capital intensity variable at percentile $p$. Figures 2, 3, 4, and 5 respectively represent the marginal effect for Total, Collective, Temporary and Regular EPL and provide a more intuitive interpretation of the interaction term.

As far as total EPL is concerned, Figure 2 displays a marginal effect increasing in the level of capital intensity, which is significant for low and high levels of capital intensity. As already claimed, it means that the effect of total EPL is stronger in those industries using more extensively capital than labour. Still, to disentangle the driving forces behind this positive relation, we investigate the effect of the different measure and confirm what emerged from the regression analysis, that is, that the positive impact is mainly driven by the effect of Temporary and Regular labour protection, as Figures 3 and 4 exhibit.

When considering collective labour regulation, Figure 5 confirms the interpretation provided for the regression analysis: the impact of Collective EPL is decreasing in the level of capital intensity, and its effects are thus more binding in labour intensive industries. Intuitively, this effect is more predictable: firms unable to implement massive lay-offs must keep their workers and installed capacity idle, accumulating unexploited capacity.

What emerges from this analysis is thus a positive relation between labour protections and the accumulation of excessive capacity. Interestingly, the overall effect of EPL is negative, but its marginal effect is positive and increasing in the

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$^{15}$Since the variable refers to one country only and it is time invariant, it has a discrete distribution over the interval (639.9, 37142.86). Note that we had to divide this measure by 10000 to match the limited range of excess of capacity, which is a percentage. To overcome the issue of limited observations available, when computing the marginal effect we generated a fictitious distribution for the reclassified capital intensity: starting from its minimum realization, we increased it by an additional 0.01 at each iteration, up to the original maximum realization.
Figure 2: Marginal effect of EPL Total on 1990 US Capital Intensity

Figure 3: Marginal effect of EPL Temporary on 1990 US Capital Intensity
Figure 4: Marginal effect of EPL Regular on 1990 US Capital Intensity

Figure 5: Marginal effect of EPL Collective on 1990 US Capital Intensity
level of capital intensity. To disentangle this evidence, we decomposed the total EPL into its three main characterizations, and noted that this positive effect is mainly driven by the protection on temporary and regular workers, whereas collective regulation is more binding in labour intensive industries. In the next section we further investigate the link between capital intensity and temporary employment, to shed some light on the main predictions of this analysis.

5 Robustness check

5.1 The share of temporary workers

The main analysis predicts that the effect of temporary employment protection is stronger in more capital intensity industries. To better understand this result, we explore this relation by including the share of temporary labour retrieved from Bassanini et al. (2010): the resulting panel data-set consists of 17 countries and 13 sectors, from 1995 to 2007, for approximately 3000 observations. In this section, we estimate two alternative regressions. Equation (7) simply adds the country, sector, and year share of temporary workers, $ST_{jct}$, whereas equation (8) provides a new interaction term, between employment protection and an exogenous measure for the share of temporary workers, using the time invariant US share for the corresponding industry, $ST_j$:

$$EC_{jct} = \beta_1 + \beta_2 EPL_{ct}^i + \beta_3 KI_J + \beta_4 EPL_{ct}^i \ast KI_J + \beta_4 ST_{jct} + \beta_5 (X_{jct}) + \mu_j + \mu_c + \mu_{jt} + \mu_{ct} + \varepsilon_{jct}. \quad (7)$$

$$EC_{jct} = \beta_1 + \beta_2 EPL_{ct}^i + \beta_3 ST_J + \beta_4 EPL_{ct}^i \ast ST_J + \beta_4 (X_{jct}) + \mu_j + \mu_c + \mu_{jt} + \mu_{ct} + \varepsilon_{jct}. \quad (8)$$

Before introducing the regression results, we perform a correlation analysis between capital intensity and temporary employment to predict whether the two are effectively related or not. In Table 4 we correlate the US share of temporary workers with the US level of capital intensity, as well as the US sector ranks for share of temporary workers and capital intensity. Both correlation coefficients are positive, thus suggesting that capital intensive industries tend to employ more temporary workers. This result supports the finding of the previous section, that is, the more binding impact of protection on temporary workers in capital intensive industries.

If we think of this evidence as a solution to the trade-off between commitment and flexibility, capital intensive industries prefer commitment, or capital, over flexibility, that is regular labour. Still, they need to employ temporary labour to accommodate for changes in final demand and an increase in the protection of temporary workers has more effects on capital intensive industries, that must inevitably reduce their temporary employment labour force and slow down their capacity utilization rate.

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16See Annex I for the list of countries and sectors.

17In this context, we use the a time variant specification for both regressors.
<table>
<thead>
<tr>
<th>Correlation</th>
<th>Sh_Temp</th>
<th>Cap_Int</th>
<th>Rank Sh_Temp</th>
<th>Rank Cap_Int</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sh_temp</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cap_Int</td>
<td>0.1377*</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0005)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Rank Sh_Temp</td>
<td></td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rank Cap_Int</td>
<td></td>
<td>0.0630*</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0143)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statistical significance is reported in parentheses.

Table 4: Correlation analysis

Table 5 displays the regression coefficients for equation (7) on the new sample. Results are in line with what emerged in the main analysis: the marginal effect of total labour protection is increasing in the level of industry capital intensity. On the other hand, EPL on collective dismissal confirms the initial prediction that its effect is more intense in labour intensive industries. Still, the inclusion of the share of temporary workers partially captures the impact of the related EPL measure. Although not significant, an increase in the share of temporary labour has a negative and direct effect on the excess of capacity: firms employ more temporary workers to better accommodate changes in demand, and so the capacity utilization must inevitably go up. Still, the share of temporary labour indirectly impacts our dependent variable, by altering the sign of EPL Temporary. if the share of non-permanent workers increases, their protection increases as well, which in turns imply that firms face higher labour protection and employ less temporary workers, with an overall reduction in their capacity utilization rate.

As a last step, we construct an alternative interaction term and estimate equation (8). Rather then evaluating the joint effect of EPL with the exogenous level of capital intensity, we follow an approach similar to that of Bassanini et al. (2010) and Cingano et al. (2010), who investigated the effect of EPL in terms of job reallocation needs: we interact the measure of labour employment protection with the time invariant US share of temporary workers. Table 6 reports these last results. Notwithstanding their low statistical significance, interaction terms follow the same pattern of the baseline specification. Recalling our idea that more capital intensive industries employ, on average, more temporary workers than labour intensive ones, we can conclude that our initial predictions are robust: as far as employment on total, temporary and regular workers is concerned, the marginal effect of labour legislation is increasing in

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18 In Annex II we report the results for the initial regression specification, equation (1), on the new sample.
19 But not the sign of the interaction term, which is confirmed to be increasing in capital intensity.
20 The correlation coefficient between EPL temporary and the share of temporary workers is positive (0.3929) and significant at the 0.01 level.
21 We use the share of temporary workers in 1995, that is at the beginning of the period considered by Bassanini et al. (2010).
<table>
<thead>
<tr>
<th>Excess of capacity</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPL Total</td>
<td>-4.771**</td>
<td>(2.324)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Total</td>
<td></td>
<td>0.190</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital Intensity$_{1990}$</td>
<td>(1.495)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Collective</td>
<td>0.779</td>
<td>10.652**</td>
<td>(3.107)</td>
<td>(5.235)</td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital Intensity$_{1990}$</td>
<td>(1.720)</td>
<td>(1.772)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>EPL Temporal</td>
<td>1.900</td>
<td>0.728</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital Intensity$_{1990}$</td>
<td>(1.243)</td>
<td>(1.053)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>EPL Regular</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital Intensity$_{1990}$</td>
<td>(.)</td>
<td>(.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of temporary workers</td>
<td>-0.100</td>
<td>-0.065</td>
<td>-0.065</td>
<td>-0.100</td>
<td>-0.099</td>
</tr>
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<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in # of plants</td>
<td>0.006</td>
<td>0.026**</td>
<td>0.026**</td>
<td>0.007</td>
<td>0.007</td>
</tr>
</tbody>
</table>

| Year and Country FE | Yes | Yes | Yes | Yes | Yes |
| Year and Sector FE  | Yes | Yes | Yes | Yes | Yes |
| Country FE          | Yes | Yes | Yes | Yes | Yes |
| Sector FE           | Yes | Yes | Yes | Yes | Yes |

$R^2$ | 0.393 | 0.398 | 0.398 | 0.393 | 0.393 |

$N$ | 1570 | 1388 | 1388 | 1570 | 1570 |

1990 capital intensity is constant over time and has been omitted.  
* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors clustered at the country-sector level.

Table 5: Joint effects of EPL controlling for the share of temporary workers

the share of temporary workers. The marginal effect of collective procedures confirms instead to be more binding in industries with less temporary workers, or, following our interpretation, on more labour intensive industries.
### Table 6: Interacting EPL with the US share of temporary workers in 1995

<table>
<thead>
<tr>
<th>Excess of capacity</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPL Total</td>
<td>-2.661*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.405)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Total</td>
<td>0.873</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; Share temporary workers\textsubscript{1995}</td>
<td>(0.693)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Collective</td>
<td>-0.171</td>
<td>8.331***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.659)</td>
<td>(2.976)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Collective</td>
<td>-2.139</td>
<td>-2.181</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; Share temporary workers\textsubscript{1995}</td>
<td>(1.686)</td>
<td>(1.753)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Regular</td>
<td>0.000</td>
<td>-1.412</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.</td>
<td>(2.851)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Regular</td>
<td>1.003</td>
<td>-0.139</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; Share temporary workers\textsubscript{1995}</td>
<td>(1.157)</td>
<td>(1.825)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>-0.789</td>
<td>-2.223***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.195)</td>
<td>(0.798)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>0.639</td>
<td>0.452</td>
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<td></td>
</tr>
<tr>
<td>&amp; Share temporary workers\textsubscript{1995}</td>
<td>(0.661)</td>
<td>(0.373)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share temporary workers\textsubscript{1995}</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td></td>
<td>(.</td>
<td>(.</td>
<td>(.</td>
<td>(.</td>
<td>(.</td>
</tr>
<tr>
<td>Value added</td>
<td>0.000</td>
<td>0.000**</td>
<td>0.000**</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Change in # of plants</td>
<td>-0.003</td>
<td>0.007</td>
<td>0.007</td>
<td>-0.003</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.007)</td>
</tr>
</tbody>
</table>

| Year and Country FE | Yes | Yes | Yes | Yes | Yes |
| Year and Sector FE | Yes | Yes | Yes | Yes | Yes |
| Country FE         | Yes | Yes | Yes | Yes | Yes |
| Sector FE          | Yes | Yes | Yes | Yes | Yes |
| \( R^2 \)          | 0.431 | 0.422 | 0.421 | 0.431 | 0.430 |
| \( N \)            | 2718 | 1991 | 1991 | 2718 | 2718 |

* significant at 10%; ** significant at 5%; *** significant at 1%

Standard errors clustered at the country-sector level.

Table 6: Interacting EPL with the US share of temporary workers in 1995

### 5.2 Additional robustness checks

In Table 7, we perform the baseline specification of equation (1) constructing a new interaction term, replacing the 1990 level of capital intensity with the 1990-
2008 average. Once more, the predictions of the main analysis are confirmed: EPL on total and temporary labor display a positive marginal effect, increasing in the level of capital intensity, whereas the marginal effect of EPL Collective is increasing in labour intensity.

<table>
<thead>
<tr>
<th>Excess of capacity</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
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<tbody>
<tr>
<td>EPL Total</td>
<td>-4.004**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.997)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Total &amp; Average Capital Intensity</td>
<td>0.542</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>(0.338)</td>
<td></td>
<td></td>
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<tr>
<td>EPL Collective</td>
<td>3.120**</td>
<td>7.189***</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(1.259)</td>
<td>(2.500)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Collective &amp; Average Capital Intensity</td>
<td>-2.683***</td>
<td>-2.571***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.933)</td>
<td>(0.948)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>-3.908***</td>
<td>-1.822*</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.674)</td>
<td>(0.979)</td>
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<tr>
<td>EPL Temporary &amp; Average Capital Intensity</td>
<td>-0.085</td>
<td>0.243</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.311)</td>
<td>(0.182)</td>
<td></td>
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</tr>
<tr>
<td>EPL Regular</td>
<td>0.000</td>
<td></td>
<td></td>
<td>-1.661</td>
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</tr>
<tr>
<td></td>
<td>(.)</td>
<td></td>
<td></td>
<td>(2.102)</td>
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<td>EPL Regular &amp; Average Capital Intensity</td>
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<td>(0.000)</td>
<td>(0.000)</td>
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<td>(0.000)</td>
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<tr>
<td>Change in # of plants</td>
<td>-0.007</td>
<td>-0.004</td>
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</tbody>
</table>

<table>
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<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year and Country FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year and Sector FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Country FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Sector FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.325</td>
<td>0.298</td>
<td>0.296</td>
<td>0.325</td>
<td>0.325</td>
</tr>
<tr>
<td>( N )</td>
<td>4352</td>
<td>3316</td>
<td>3316</td>
<td>4352</td>
<td>4352</td>
</tr>
</tbody>
</table>

Average capital intensity is constant over time and has been omitted.
* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors clustered at the country-sector level.

Table 7: EPL and average capital intensity

Table 8 interacts the measure of EPL with a time variant measure of capital intensity. Results are not particularly significant but the coefficients of the interaction terms are in line with the results of the other analysis.

To investigate alternative sources of labour protection, we eventually replace
<table>
<thead>
<tr>
<th>Excess of capacity</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPL Total</td>
<td>-4.980**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.429)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Total &amp; Capital Intensity</td>
<td>0.084</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.194)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EPL Collective</td>
<td>6.793***</td>
<td>1.862</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.190)</td>
<td>(1.583)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Collective &amp; Capital Intensity</td>
<td>-0.047</td>
<td>-0.062</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.300)</td>
<td>(0.315)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>-1.081</td>
<td>-1.031</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.238)</td>
<td>(0.918)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Temporary &amp; Capital Intensity</td>
<td>0.072</td>
<td>0.111</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.192)</td>
<td>(0.156)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Regular</td>
<td>-3.569*</td>
<td>3.329</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.008)</td>
<td>(2.147)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Regular &amp; Capital Intensity</td>
<td>-0.313</td>
<td>-0.181</td>
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<td></td>
<td>(0.281)</td>
<td>(0.272)</td>
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<tr>
<td>Capital Intensity</td>
<td>0.049</td>
<td>0.300</td>
<td>-0.107</td>
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<td>(0.332)</td>
<td>(1.334)</td>
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<td>(0.592)</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Change in # of plants</td>
<td>-0.009</td>
<td>-0.008</td>
<td>-0.008</td>
<td>-0.009</td>
<td>-0.008</td>
</tr>
<tr>
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<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.006)</td>
</tr>
</tbody>
</table>

| Year and Country FE   | Yes | Yes | Yes | Yes | Yes |
| Year and Sector FE    | Yes | Yes | Yes | Yes | Yes |
| Country FE            | Yes | Yes | Yes | Yes | Yes |
| Sector FE             | Yes | Yes | Yes | Yes | Yes |

$R^2$          0.331  0.294  0.293  0.332  0.331  
N               3781  2983  2983  3781  3781  

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors clustered at the country-sector level.

Table 8: EPL and yearly capital intensity

the country level EPL with two alternative variables: the wages and salaries paid at the country-sector level and the union density, at the country level. Still, results do not show any particular prediction and, for sake of brevity, are omitted from this analysis.
6 Conclusions and discussion

Throughout this paper, we contribute to the analysis of the effects of labour legislation and estimate its impact on the accumulation of overcapacity, a topic currently affecting the policy debate after the global financial crisis of 2009. Rather then looking at the outcome of firms’ investment decisions, as done, for instance, by Cingano et al. (2010), we look at the ex-post consequences of employment protection. By exploiting the capacity utilization rate of a panel of European manufacturing industries, we can quantify the excess of capacity, proxied by the share of installed capacity not entirely exploited. To assess its institutional determinants, we construct an interaction term to take into account two different constraints faced by firms. The first exogenous term reports exactly the level of employment protection in the country where firms are to operate. The second interacted regressor refers to the industry technological constraint and captures the production and investment decisions made by firms. To overcome potential endogeneity issues, we partially follow the seminal approach of Rajan and Zingales (1998) and consider a time invariant degree of capital intensity for the corresponding US industry.

Results confirm the existence of a link between labour legislation and the inability of firms to fully exploit their installed capacity. More precisely, our analysis predicts that the effect of Employment Protection Legislation is more binding in capital intensive industries. To justify this result, we distinguish employment protection into its main determinants: protection on temporary and regular workers and collective dismissal procedures. The positive marginal effect of total employment protection can be in fact traced back to the similar pattern that emerges in the analysis of temporary and regular workers. Opposite to this result is the impact of collective dismissal procedure, which is instead more stringent in labour intensive industries. This latter result can be intuitively justified: whenever firms cannot freely implement massive lay-offs, they have to keep their production factors, i.e. installed capacity and workers, temporarily idle, inevitably accumulating excessive, or underexploited, physical capacity.

The robustness of the former prediction, according to which protection on temporary labour accrues over-capacity, relies on the inclusion of an additional information, the country-sector share of temporary labour, from Bassanini et al. (2010). What emerges is that capital intensive industries do employ more temporary workers: if we think of the investment decision as a trade-off between commitment and flexibility, we can assess, with no loss of generality, that capital intensive industries have preferred commitment over flexibility, or capital over regular workers. Still, capital intensive industries need to employ temporary workers to accommodate for changes in final demand. This is precisely the reason why an increase in the protection on temporary workers leads to an increase in the excess of capacity in more capital intensive industries.

This paper, though at an early stage, can be matched to the theoretical analysis of Trentinaglia De Daverio (2013), in whose framework of oligopolistic competition and demand uncertainty firms end up installing over capacity in response to employment costs and legislation. These two works combined can
provide strong policy implications in terms of coordinating collective labour bargaining and firms’ investment decisions. The theoretical approach explains why firms invest too much in capacity, whereas the empirical study explains the ex-post effects of excessive labour regulation on the rise of over-capacity.

Excess of supply is costly not only from the firms’ point of view. It also entails a variety of social costs: rising unemployment, firms filing for bankruptcy, public money saving firms from bankruptcy, dismantling costs, environment related issues, and so on. This is why our contributions could provide some relevant policy guidelines, suggesting that labour market rigidity does generate excessive capacity, either ex-ante or ex-post. Policy makers and managers should in fact be forward thinking when dealing with industry union representatives, as industries at risk of excessive capacity should deserve more accommodating and more flexible labour negotiations: prevention is better than a cure.

Annexes

I Countries and sector

In the main specification sample, we include the following European countries: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. In the robustness sample, when we match our data with Bassanini et al. (2010), we omit Estonia, Luxembourg, Netherlands and Slovenia.

The sectors included are reported in Table 9.

II Robustness analysis

In Table 10, we report the regression result of the same specification as of Table 3 on the observations classification in line with Bassanini et al. (2010). Results are robust, with EPL Total, EPL Temporary having a negative intercept but a positive marginal effect, increasing in the level of capital intensity. Also EPL Collective has a pattern similar to the main analysis, with a positive intercept and a negative marginal effect, thus confirming that EPL Collective is more binding in labour intensive industries.
<table>
<thead>
<tr>
<th>Code</th>
<th>Sector description</th>
<th>Code</th>
<th>Sector Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Food products and beverages</td>
<td>15-16</td>
<td>Food, beverages, and tobacco</td>
</tr>
<tr>
<td>17</td>
<td>Textiles</td>
<td>17-19</td>
<td>Textiles, textile, leather and footwear</td>
</tr>
<tr>
<td>18</td>
<td>Wearing apparel; dressing and dyeing of fur</td>
<td>17-19</td>
<td>Textiles, textile, leather and footwear</td>
</tr>
<tr>
<td>19</td>
<td>Tanning and dressing of leather; luggage, handbags, saddlery, harness and footwear</td>
<td>17-19</td>
<td>Textiles, textile, leather and footwear</td>
</tr>
<tr>
<td>20</td>
<td>Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials</td>
<td>20</td>
<td>Wood and of wood and cork</td>
</tr>
<tr>
<td>21</td>
<td>Pulp, paper and paper products</td>
<td>21-22</td>
<td>Pulp, paper, paper, printing and publishing</td>
</tr>
<tr>
<td>22</td>
<td>Publishing, printing and reproduction of recorded media</td>
<td>21-22</td>
<td>Pulp, paper, paper, printing and publishing</td>
</tr>
<tr>
<td>23</td>
<td>Coke, refined petroleum products and nuclear fuel</td>
<td>23</td>
<td>Coke, refined petroleum and nuclear fuel</td>
</tr>
<tr>
<td>24</td>
<td>Chemicals and chemical products</td>
<td>24</td>
<td>Chemicals and chemical products</td>
</tr>
<tr>
<td>25</td>
<td>Rubber and plastic products</td>
<td>25</td>
<td>Rubber and plastics</td>
</tr>
<tr>
<td>26</td>
<td>Other non-metallic mineral products</td>
<td>26</td>
<td>Other non-metallic materials</td>
</tr>
<tr>
<td>27</td>
<td>Basic metals</td>
<td>27-28</td>
<td>Basic metals and fabricated metals</td>
</tr>
<tr>
<td>28</td>
<td>Fabricated metal products, except machinery and equipment</td>
<td>27-28</td>
<td>Basic metals and fabricated metals</td>
</tr>
<tr>
<td>29</td>
<td>Machinery and equipment n.e.c.</td>
<td>29</td>
<td>Machinery, n.e.c.</td>
</tr>
<tr>
<td>30</td>
<td>Office machinery and computers</td>
<td>30-33</td>
<td>Electrical and optical equipment</td>
</tr>
<tr>
<td>31</td>
<td>Electrical machinery and apparatus n.e.c.</td>
<td>30-33</td>
<td>Electrical and optical equipment</td>
</tr>
<tr>
<td>32</td>
<td>Radio, television and communication equipment and apparatus</td>
<td>30-33</td>
<td>Electrical and optical equipment</td>
</tr>
<tr>
<td>33</td>
<td>Medical, precision and optical instruments, watches and clocks</td>
<td>30-33</td>
<td>Electrical and optical equipment</td>
</tr>
<tr>
<td>34</td>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>34-35</td>
<td>Transport equipment</td>
</tr>
<tr>
<td>35</td>
<td>Other transport equipment</td>
<td>34-35</td>
<td>Transport equipment</td>
</tr>
<tr>
<td>36</td>
<td>Furniture; manufacturing n.e.c.</td>
<td>36-37</td>
<td>Manufacturing n.e.c., recycling</td>
</tr>
</tbody>
</table>

Table 9: Sectors included in the sample
<table>
<thead>
<tr>
<th>Excess of capacity</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPL Total</td>
<td>-4.409**</td>
<td>(1.849)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Total</td>
<td>1.528**</td>
<td>(0.741)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital intensity_{1990}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Collective</td>
<td>2.800</td>
<td>(2.492)</td>
<td>2.192</td>
<td>(2.651)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.492)</td>
<td>(2.651)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Collective</td>
<td>-6.736***</td>
<td>(2.013)</td>
<td>-7.062***</td>
<td>(1.992)</td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital intensity_{1990}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>-1.866</td>
<td>(1.164)</td>
<td>-1.636*</td>
<td>(0.870)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.164)</td>
<td>(0.870)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>0.291</td>
<td>(0.769)</td>
<td>0.748*</td>
<td>(0.401)</td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital intensity_{1990}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Regular</td>
<td>-13.247***</td>
<td>(3.944)</td>
<td>1.059</td>
<td>(1.740)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.944)</td>
<td>(1.740)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL Regular</td>
<td>2.503</td>
<td>(3.011)</td>
<td>1.061</td>
<td>(2.130)</td>
<td></td>
</tr>
<tr>
<td>&amp; US Capital intensity_{1990}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value added</td>
<td>0.000</td>
<td>(0.000)</td>
<td>0.000</td>
<td>(0.000)</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td></td>
</tr>
<tr>
<td>Change in # of plants</td>
<td>-0.005</td>
<td>0.012</td>
<td>0.011</td>
<td>-0.006</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.009)</td>
<td>(0.008)</td>
<td>(0.006)</td>
<td></td>
</tr>
</tbody>
</table>

Year and Country FE  Yes  Yes  Yes  Yes  Yes  
Year and Sector FE  Yes  Yes  Yes  Yes  Yes  
Country FE  Yes  Yes  Yes  Yes  Yes  
Sector FE  Yes  Yes  Yes  Yes  Yes  
$R^2$  0.420  0.411  0.410  0.420  0.417  
$N$  2985  2202  2202  2985  2985  

1990 capital intensity is constant over time and has been omitted
* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors clustered at the country-sector level.

Table 10: Joint effects of EPL on Bassanini et al. (2010)

References


