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ECONOMIC ADJUSTMENT DURING THE GREAT RECESSION: THE ROLE OF MANAGERIAL QUALITY

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ABSTRACT

This study investigates empirically how managerial practices have affected macroeconomic adjustment during the Great Recession after the 2008 economic crisis. We use the local projection method pioneered by Jordà (2005) on a country x industry balanced panel data over the 2007-2015 period for eighteen industries in ten OECD countries. We find that, in countries where management quality is higher, production and employment are more resilient during the Great Recession. Moreover, this effect on resilience is stronger for industries deeply affected by the 2008 crisis and goes with wage moderation as well as an unchanged labor share.

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1. Introduction

Managerial talent plays a key role in contributing to the resilience of firms to weather the storm during crises by preserving skills, production and market shares. There is an abundant literature on economic resilience to shocks (Capoani et al., 2025). Among others, Holling (1973) analyses ecological resilience to shocks and Martin (2012) analyses the possible reactions and long-term scars on UK regional economies to major recessions. But, to our knowledge, few papers analyse the role played by management in influencing economic resilience during crises.

In this paper we study the way in which average managerial quality has shaped the response of OECD economies to the financial crisis focusing on its effects on employment and related economic outcomes at sectoral level. In the medium-long run, better management quality should lead to higher productivity. During crises, productivity should fall as it is procyclical. But better management could seek to preserve production and employment by moderating wages. This would help productivity remain broadly unaltered, with uncertain impact on the labor share, depending on the relative size of changes in productivity and real wages. Aggregating up, the average quality of management in a country can therefore potentially contribute to increasing economic resilience to shocks at the sectoral and aggregate levels as well.

Research has shown that managerial practices vary a lot not only across firms in an economy but also across countries. For instance, Bloom and Van Reenen (2007) and Bloom *et al*. (2009, 2012, 2016) have collected, via firm-level surveys, data on the quality of management for 35 countries which show that the dispersion of managerial quality across countries and across firms within countries is wide. Their approach has been applied by government agencies for collecting management information or benchmarking purposes (see World Management Survey).[1] Using a different approach, the OECD (2019) has gathered survey data on cognitive abilities of adults by occupation (including managers) in 33 countries, which also suggests a wide variability across and within countries in the talent of managers.[2]

[1] For instance, the US Census Bureau MOPS collects data on managerial practices on a continuous basis and New Zealand, Australia, Canada and Ireland have been using the approach to benchmark managerial practices against those of other countries.

[2] Details in https://www.oecd.org/skills/piaac/.

Several studies have shown the effect that managers can have on firm-level and sectoral productivity outcomes in the medium to long-run (Bloom *et al.*, 2012, 2014, 2016; Syverson, 2011; Giorcelli, 2019). Another strand of research has highlighted the role of managers in efficiently allocating tasks in a firm in ways that preserve, develop and use efficiently human capital and workers' skills, including by maintaining workers' incentives and satisfaction (Bandiera *et al.*, 2007; Burgess *et al.*, 2010; Friebel *et al.*, 2017; Amodio and Martinez-Carrasco, 2018).

However, there has been relatively little research to date on the effects of managerial practices on macroeconomic outcomes during a crisis. Does the response of value-added, employment, productivity and wages to a deep downturn differ across countries depending on prevailing managerial practices? More specifically, are countries that have on average better managers able to preserve employment levels and the associated human capital in the wake of a temporary demand shock? If so, what are the trade-offs managers can leverage upon, such as wages or productivity, in weathering the shock and ensuring a rebound during the recovery period?

In this paper, we focus on these issues using the Great Recession (GR) as an exemplary case study. We rely on a country-industry panel covering 18 industries in 10 OECD countries over the 2007-2015 period and adapt the local projection approach developed by Jordà (2005) and Teulings and Zubanov (2014) to study the covariation of average managerial quality, measured by the World Management Survey indicators, with the response of employment, value-added, wages, productivity and the labor share. In other words, we estimate the extent to which country-industry differences in managerial quality are correlated with differential responses of employment and other variables to the intensity of the demand shocks induced by the 2008 Great Recession.

We find that the quality of management practices was significantly associated with employment dynamics during the Great Recession, even after controlling for a variety of country specific factors possibly related to managerial quality such as the employment protection legislation, various product market regulations and the education level. On average, countries that had better management levels suffered less employment losses. The difference in cumulated job losses between countries at the top and bottom management quality quartiles has been significant. In better managed countries, employment losses have been contained by limiting declines in production, implementing wage cuts and maintaining productivity levels. As a result, in these countries labor shares have not declined. Moreover, these positive cushioning effects of good management on employment appear to increase with the depth of

the shock suffered at sectoral level. These results are robust to an in-depth sensitivity analysis, notably to the use of the Instrumental Variable method to deal with possible Management Quality measurement errors.

Our paper contributes to three main strands of literature. First, it adds a dimension to the macroeconomic research looking at the interactions between institutions and shocks (Blanchard and Wolfers, 2000; Bertola, 2016; Monteiro, 2017). These authors have looked at the way in which the differential responses of unemployment to demand shocks in European countries have been shaped by differences in labor and product market institutions, such as employment protection, collective bargaining regimes and product market regulation. Managerial culture is closely related to historical and institutional factors, such as industrial structure, the education system and both labor and product market arrangements.[3] The quality of management can therefore be affected by policies that address these underlying factors and our study suggests that this could increase employment resilience during economic crises. Second, it explores the macroeconomic implications of evidence found at the microeconomic level concerning the link between management styles and labor reallocation within firms experiencing exogenous shocks (Adhvaryu *et al*., 2019). Third, it extends research on the way managerial quality affects the response of economic outcomes to shocks (Wang *et al*., 2016) by looking beyond the productivity dimension into the mechanisms that underlie these outcomes.

The finding that good management may contribute to smooth out the effect of deep crises on employment is potentially relevant for understanding differences in employment responses to the Covid crisis during lockdowns across countries, beyond influences exerted by other institutional arrangements such as reliance on job retention vs unemployment insurance schemes. It could also be relevant looking forward to gauge the persisting effects of the Covid-19 crisis on employment upon exiting confinement periods via the emergence of new work arrangements reflecting the need for social distancing. While there are obvious differences between the causes and mechanisms underlying the Great Recession and the Covid-19 crises and the policy responses to these crises, our results suggest that good management could have positive effects in the recovery process of both crises through comparable channels.

In the following, we start by describing our empirical approach and regression model (section 2). Next, we describe our international industry-level data, our proxies for managerial quality and the cross-country patterns these data unveil (section 3). We then report our

[3] For instance, Bloom *et al.* (2010) and Van Reenen (2011) show that managerial practices are affected by the competitive environment in which firms operate.

estimation results and robustness tests, focusing on the association of managerial quality with the time profile of value-added, employment, wages, productivity and the labor share during and after the Great Recession (section 4). Finally, we use our coefficient estimates to gauge how raising the average level of managerial quality in countries where this level was low in the wake of the Great Recession might have enhanced their resilience to the crisis and the speed and intensity of their recovery (section 5). We conclude by discussing the policy and research issues raised by our findings (section 6).

2. Approach and Model

2.1. The local projection method

The local projection approach, as developed by Jordà (2005) and recently illustrated by Jordà and Taylor (2025), is basically a flexible time-series (and panel data) statistical method to estimate the dynamic effects of shocks, or precisely the "impulse responses to shocks", defined as the differences between two forecasts – the first corresponding to a situation with the shock and the second to the same situation without this shock.[4]

Using Jordà's own words in his introduction:

- "Impulse responses (and variance decomposition) are important statistics in their own right: they provide the empirical regularities that substantiate theoretical modes of the economy and are therefore a natural empirical objective…; computing impulse responses based on local projections do not require specification and estimation of the unknown true multivariate dynamic system itself".
- "The advantages of local projections are numerous: they can be estimated by simple least squares with standard regression packages…; they are robust to misspecification of the DGP (Data Generating Process); they easily accommodate experimentation with highly non-linear specifications that are often impractical or infeasible in a multivariate context".

[4] Jordà (2005) shows in detail what are the advantages of the local projection approach to compute impulse responses in comparison to the more usual, but less flexible VAR (or VARMA) approaches. Jordà and Taylor (2025) add that local projections " can be seen as a semiparametric method that imposes relatively mild assumptions on the data and on the shape of the response[…] Local projections provide a natural nexus between empirical macroeconomics, on the one hand, and the policy evaluation literature in applied microeconomics on the other."

Our approach is a direct application of the local projection method to analyse the dynamic effects of the economic shock (noted SH) induced by the 2008 Great Recession. We look at the size and changes of these effects, over the seven subsequent years (2009-2015) covered in our sample, focusing on four interrelated economic variables: production measured by Value-Added (VA), employment (L) measured by the number of employees, wages (W) measured by the average wage per employee, labor productivity (LP) measured as the ratio of value-added to employees (VA/L), and the labor share (LS) measured as total wage compensation over value-added (LxW/VA). We are also specifically interested on studying how and to what extent these effects vary in interaction with the quality of management practices (noted MQ).

2.2. Model

Following the framework of the local projection method, we posit a system of 35 (= 5 variables x 7 years) stacked regressions defined as separate linear projections, where the five left hand side dependent variables are the log-changes of our variables of interest (VA, L, W, LP and LS) between 2007 and each of the seven years of our study period (2009, 2010, …, 2015), and the right hand side regressors are simply measures of the 2008 crisis industry-level shocks (SH), country level indicators of the average management quality (MQ) in a period before 2008 as well as the interaction between industry-level shocks and country-level management quality (SHxMQ). Denoting respectively the different countries, industries and years in our sample by the indices (c), (i) and (t), the system is specified as follows:

$$\ln(VA_{cit}) - \ln(VA_{ci07}) = \alpha_t^1 SH_i + \theta_t^1 MQ_c + \beta_t^1 (SH_i * MQ_c) + \sum_k \gamma_t^{1,k} x_c^k + \phi_t^1 + \varepsilon_{cit}^1$$

Eq1_VA(t)

$$\ln(L_{cit}) - \ln(L_{ci07}) = \alpha_t^2 SH_i + \theta_t^2 MQ_c + \beta_t^2 (SH_i * MQ_c) + \sum_k \gamma_t^{2,k} x_c^k + \phi_t^2 + \varepsilon_{cit}^2$$

Eq2_L(t)

$$\ln(W_{cit}) - \ln(W_{ci07}) = \alpha_t^3 SH_i + \theta_t^3 MQ_c + \beta_t^3 (SH_i * MQ_c) + \sum_k \gamma_t^{3,k} x_c^k + \phi_t^3 + \varepsilon_{cit}^3$$

Eq3_W(t)

$$\ln(LP_{cit}) - \ln(LP_{ci07}) = \alpha_t^4 SH_i + \theta_t^4 MQ_c + \beta_t^4 (SH_i * MQ_c) + \sum_k \gamma_t^{4,k} x_c^k + \phi_t^4 + \varepsilon_{cit}^4$$

Eq4_LP(t)

$$\ln(LS_{cit}) - \ln(LS_{ci07}) = \alpha_t^5 SH_i + \theta_t^5 MQ_c + \beta_t^5 (SH_i * MQ_c) + \sum_k \gamma_t^{5,k} x_c^k + \phi_t^5 + \varepsilon_{cit}^5$$

Eq5_LS(t)

where (α, θ and β)'s are the parameters of interest in year (t), γ^k's are the parameters of country specific control variables x^k (employment protection legislation indicator, various product market regulation indictors and the educational level) and the (ϕ and ε)'s stand respectively for year fixed effects and idiosyncratic random effects.[5,6]

The parameters ($\alpha_t^1, \alpha_t^2, \alpha_t^3, \alpha_t^4$ and α_t^5) estimate impulse responses to the 2008 crisis industry shocks (SH_i) on (VA, L, W, LP, LS) for each of the seven years of our study period (2009, 2010, …, 2015). The estimated ($\theta_t^1, \theta_t^2, \theta_t^3, \theta_t^4$ and θ_t^5) coefficients assess to what extent the country management quality practices (MQ_c) can account for country differences in the impulse responses. As management quality is here measured at the country level, we cannot estimate its direct impact at the country*industry level.

We introduce the interaction between industry-specific shocks and country-specific management quality to test whether good managerial practices have a differential impact depending on the intensity of the shock. If so, they would be overall significant and stronger for industries more deeply affected by the 2008 crisis. This allows to sharpen our identification of the impact of management quality on sectoral outcomes via a Rajan and Zingales (1998) differences-in-differences approach. [7] We measure industry-specific shocks by the fall in output in US industries and make two assumptions: (i) industries have inherent features that expose them differently to the crisis, which are unlikely to vary significantly across countries; and (ii) managerial quality is likely to be more relevant for industry responses to the crisis in industries that are more exposed to shocks. We therefore use variation across industries in their exposure to the GR shock and variation across countries in their level of management quality to assess

[5] Note that the system of 35 (=5*7) stacked regressions is structured as seven yearly blocks of five equations: Eq_VA(t), Eq_L(t); Eq_W(t), Eq_LP(t), Eq_WL(t), with identical left hand side variables $[\alpha_t SH_i + \theta_t MQ_c + \beta_t (SH_i * MQ_c)]$. We can thus take advantage of this structure to estimate these five blocks separately by simple least squares, with no need for heteroscedasticity correction of standard errors.

[6] Country or industry fixed effects are not introduced in our main specification in order to be able to estimate the α_t and θ_t parameters. However, country and industry fixed effects are introduced in our sensitivity analysis and we find that the estimates of the β_t coefficients (allowing to test whether the MQ impact is growing with the size of the shock) are robust to this change. These results are available upon request from the authors.

[7] In diff-in-diff language, management quality is the treatment, highly exposed industries are the treated variables and least exposed industries are the control group.

the impact of management quality on industry outcomes. Still, we cannot exclude the possibility that, even after replacing domestic shocks with the US ones, some endogeneity may persist due to the presence of some shock-confounding factors at the sector-country level.

The ($\beta_t^1, \beta_t^2, \beta_t^3, \beta_t^4$ and β_t^5) coefficients allow us to test these hypotheses. In other words, the β coefficients estimate how much the impulse response to the 2008 crisis depends on the management practices and how much this dependence varies with the size of the shock.

3. Data and descriptive statistics

We use data from the OECD STructural ANalysis (STAN) database to measure the 2008 shock as well as the subsequent economic adjustment, and data from Bloom, Genakos, Sadun and Van Reenen (2012) to build our indicator of Management Quality. Merging these sources, we were able to assemble a cross country-industry panel balanced over the period 2007-2015 for nine countries: France, Germany, Ireland, Italy, Japan, Poland, Spain, United-Kingdom and USA and eighteen industries listed in the following footnote.[8]Note that we have not included Sweden in our main study sample, since the Swedish data was available only until 2013, but not 2015. A balanced panel is preferable to implement the local projection method; otherwise, changes in the estimated parameters over-time could be explained by the changes in the country-industry composition of the sample. However, our estimation results are robust to the inclusion of Sweden if we restrict our country-industry panel to a shorter balanced 2007-2013 sample.[9]

[8] The market industries are (ISIC Rev. 4 code between parenthesis): 'Food products, beverages and tobacco' (10-12), 'Textiles, wearing apparel, leather and related products' (13-15), 'Wood and paper products, and printing' (16-18), 'Chemical and pharmaceutical products' (20-21), 'Rubber and plastics products, and other non-metallic mineral products' (22-23), 'Basic metals and fabricated metal products, except machinery and equipment' (24-25), 'Electrical, electronic and optical equipment' (26-27), 'Machinery and equipment n.e.c.' (28), 'Transport equipment' (29-30), 'Furniture; other manufacturing; repair and installation of machinery and equipment' (31-33), 'Electricity, gas and water supply; sewerage, waste management and remediation activities' (35-39), 'Construction' (41-43), 'Wholesale and retail trade, repair of motor vehicles and motorcycles' (45-47), 'Transportation and storage' (49-53), 'Accommodation and food service activities' (55-56), 'Publishing, audio-visual and broadcasting activities' (58-60), 'IT and other information services' (62-63), 'Professional, scientific and technical activities' (69-82).

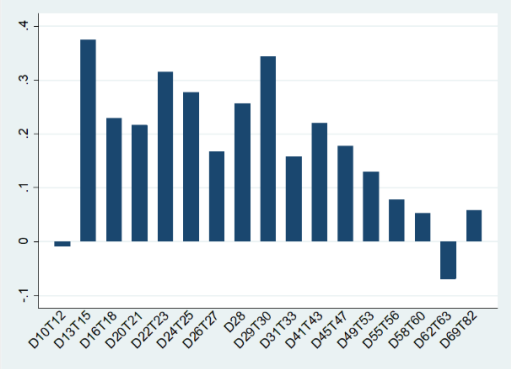
[9] These results are available upon request from the authors.

3.1. Measure of the industry specific economic shock

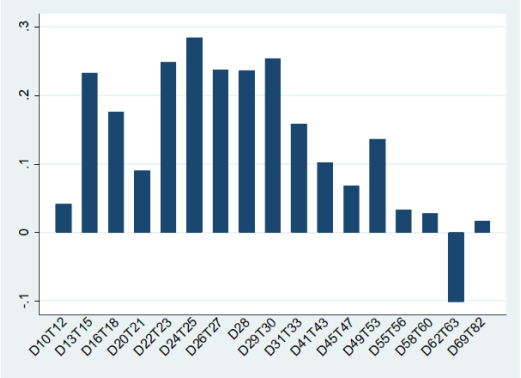
The autumn 2008 banking crisis in the USA spread out instantly to both the other industries in the USA, but also in the other countries. A key point of our identification strategy is to simply choose the industry production loss between 2007 and 2009 in the USA to proxy for the industry-specific economic shocks in the other countries of our sample. As shown in the Chart 1, the 2007-2009 production loss gap between the USA and our estimation sample average for the other countries is relatively small, whereas the industry-specific 2007-2009 production loss differs much within countries. This clearly supports our choice of using the 2007-2009 production loss in the USA industries as a reasonable proxy for the industry-specific production losses suffered in the other countries.

Chart 1: Production loss in 2008

A – USA Data



B – Sample Average excluding the US



Horizontal axis: industries, see definition in the footnote 8.

Vertical axis: average production losses, over the years 2007-2009, in %.

Source: OECD STAN Database

However, adopting the 2007-2009 industry production losses in the USA as convenient proxies for the industry-specific economic shocks in the other countries has a drawback: the risk of simultaneity biases arising from correlations between them and the dependent variables (VA, L, W, LP, LS) in our system of equations. To avoid this possibility, we have preferred to exclude the USA from our main study sample. However, we have found that our results remain basically unchanged, even if we include the USA in our study sample.[10,11]

3.2. Adjustment during the Great Recession

Chart 2 illustrates the rebound of growth after the 2008 crisis for our variables of interest (VA, L, W, LP and LS) and the six years 2009 to 2015 as measured in terms of the differences between the sample averages of their log-values in 2007 and in the current years.

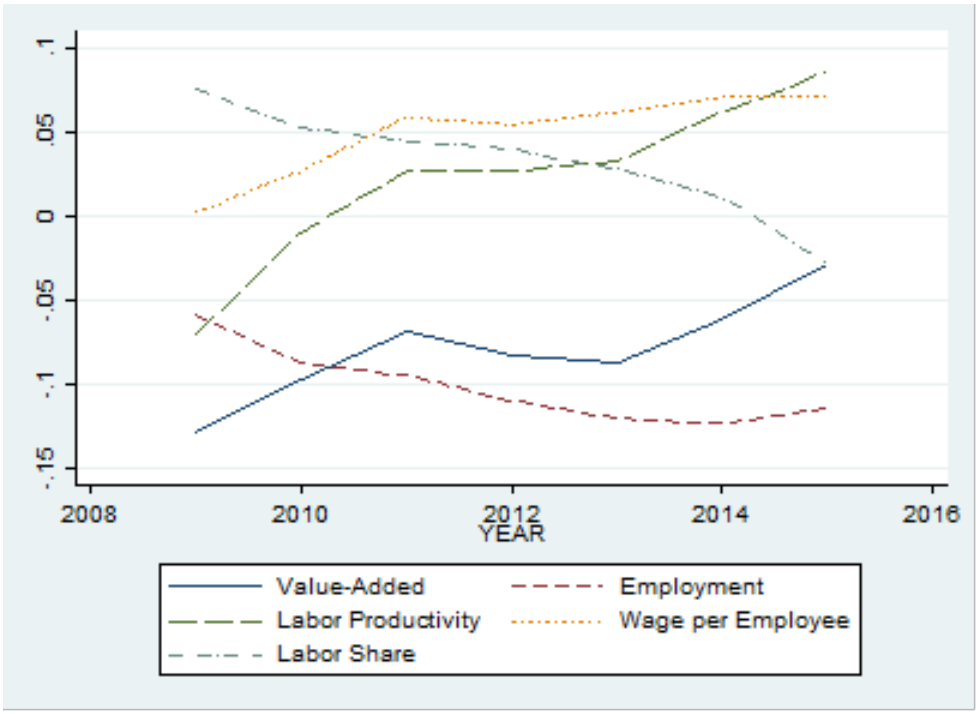
[10] These results are available upon request from the authors.

[11] Two reasons can largely explain this robustness of our results: (i) the linear correlation coefficients between the 2007-2009 production loss in the USA and the 2007-2009 production losses in the other countries are very high, above 0.70 (with the exception of Ireland and the United Kingdom where three industries are not covered); and (ii) variance analysis shows that industry fixed effects account for 48% of the variance of country-industry 2007-2009 production losses, whereas country fixed effects account for 14% only.

We see that the value-added loss in 2009 is very large, of 12.8%, but that it decreases thereafter to a loss of only 3% in 2015. On the contrary, the loss is more gradual for employment, reaching a maximum of negative cumulated growth level of 12.3% in 2014, with only a small recovery to 11.4% in 2015. Hence, the labor productivity is down by 7% in 2009, but recovers thereafter, bypassing its 2007 level in 2011 to reach a 8.5% positive cumulated growth level in 2015. Part of the rise in labor productivity is likely to originate in workers and/or jobs selection. Average wage per employee, maybe for the same reason, experiences a positive cumulated growth, from an initial 0.2% in 2009 to 7.1% in 2015. Last, interestingly, the labor share cumulated growth evolution is very different from that of wages per employee. The labor share is 7.6% higher in 2009 than in 2007 because of the more gradual adjustment of employment relative to value-added, but as value-added recovers and employment continues to decline, labor share finally shows a 2.8% loss in 2015 relative to 2007.[12]

Chart 2: Sample average cumulated change for value-added, employment, labor productivity, wage per employee and labor share for the study period 2009-2015
Cumulated change = difference between the current and the 2007 log-values

[12] Note that the rebounds of growth after the 2008 crisis for our variables of interest (VA, L, W, LP and LS) are captured by year fixed effects in the next Section 4 presenting estimation results. This is important to keep in mind for their correct interpretation. For instance, positive impacts of management quality MQ on employment growth over the years 2007-2015 signal higher increases in employment growth in higher quality countries relative to lower quality countries, but not do not indicate absolute positive impacts on employment growth.



Source: OECD STAN Database

3.3. Management quality

Management quality (MQ) is particularly hard to measure. It requires to define 'good' and 'bad' practices, then to assess the diffusion of these practices among firms. Reliable MQ indicators were not available until recently, largely thanks to the business surveys initiated and widely developed by Nicholas Bloom and John Van Reenen. Our empirical investigation here is largely based on their MQ measures, see in particular Bloom and Van Reenen (2007), Bloom, Sadun and Van Reenen (2012), and Bloom, Lemos, Sadun, Scur and Van Reenen (2014).

As management practices may be contingent upon firms' specific environment, the Bloom and Van Reenen business surveys are focused on some practices that can be deemed 'good' or 'bad' irrespective of their environment.[13] Their survey includes eighteen questions asked to medium- to large-sized manufacturing firms (with 50 to 10.000 workers).[14] These questions cover four areas: *Monitoring*: How well do organizations monitor developments inside the firm, and use this information for continuous improvement? *Targets*: Do

[13] To assess the soundness of such requirement Bloom and Van Reenen (2007) show that their MQ indicators are significantly associated with higher firm productivity, sales growth rates, profitability, Tobin's Q, and survival rates.

[14] The full set of questions is provided in Bloom and Van Reenen (2007). The data are freely available on the World Management Survey website https://worldmanagementsurvey.org/.

organizations set the right targets, track the right outcomes, and take appropriate action if the two are inconsistent? *Incentives*: Are organizations promoting and rewarding employees based on performance, prioritizing careful hiring, and trying to keep their best employees? *Operations*: Introduction and utilisation of lean production methods.

All these questions are scored on a scale from 1 to 5, increasing in the quality of practices. The composite indicator measured as the unweighted average of these scores is our underlying Management Quality measure (MQ_f) at the firm level. It is computed for all the firms (f) which have been surveyed during the pre-crisis period for the years 2003-2007 in our ten countries.[15] We then simply obtain our basic Management Quality variable at the country level (MQ_c) by taking the median of the firm level measures (MQ_f) for the firms of each of our ten countries.

The World Management Survey is very rich, but its representativeness is limited to its target populations (e.g., mid-sized to large firms in manufacturing). Moreover, as highlighted by Scur et al. (2021), the corresponding management quality measure "does not purport to encompass the entire spectrum of 'what is management'". While the broader representativeness across entire economies, sectors or managerial practices of the survey results may be limited, they are still the best (and most influential) source of information available for comparing management quality across countries. Three remarks are important to here. First, while the purpose of our paper is to investigate the impacts of management on the adjustment to the 2008 crisis during the Great Recession, it is likely that management practices have been simultaneously affected by the Great Recession. To avoid this potential source of endogeneity, we have chosen, as already mentioned, to only rely on the data from the business surveys conducted before the 2008 economic crisis to construct the country level management quality indicators (MQ_c).

Second, our main study sample is a balanced country-industry panel, covering both manufacturing and non-manufacturing industries, while our management quality indicators (MQ_c) at country level are based on the management quality measures (MQ_f) at firm level, where all the firms surveyed Bond and Van Reenen (2012) are medium- to large-sized manufacturing firms. When restricting our study main sample to manufacturing industries only, we have found that the estimates for the direct yearly impacts for the industry specific shocks

[15] Note that Spain was not included in Bloom *et al*. (2012) survey, and that we used Bloom *et al*. (2014) data for this country. When we exclude Spain from our main study sample, we find that our estimation results are basically unchanged. These results are available upon request from the authors.

and country management quality are robust, but that the ones for their interaction turn out to be not statistically significant.[16]

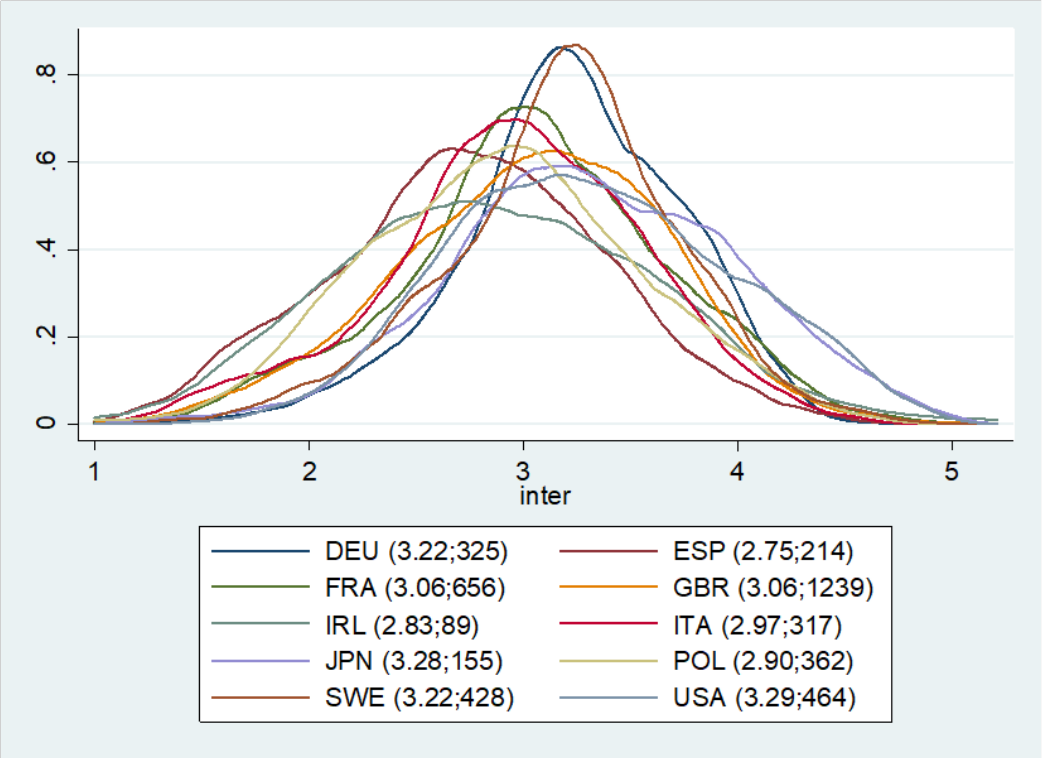
Third, based on our management quality composite indicator at firm level (MQ_f) at the firm level, we have also considered, in parallel to our basic indicator at country level (MQ_c), one at country-industry firm level (MQ_{ci}), and another one at industry level (MQ_i), all three measures being based on the same underlying sample of firms. We have found that the estimates of impacts for the country-industry level and industry level management quality measures are both very close to our main estimates of impacts for the country level measures. However, the corresponding estimates for their interaction with the industry specific shocks are not anymore statistically significant, as when we rely on the country level measure.[17]

Chart 3 shows the distribution of the firms' values of our composite management quality indicator at firm level (MQ_f) during pre-crisis period (2003-2008). It documents also in the legend their median values for each of our ten countries, that is our management quality measure at country level (MQ_c), as well as the number of individual firm observations (NbF) underlying the country (MQ_f) distributions and their median values (MQ_c).

Chart 3: Distribution of management quality at firm level by country during the pre-crisis period (2003-2008).

[16] These results are available upon request from the authors.

[17] These results are available upon request from the authors. An empirical reason why we estimate more precisely the impacts of interaction variable relying on the country level management quality indicator is its reduced collinearity with the industry specific shocks. Another reason is probably a smaller variance of random measurement errors. As already noted in previous footnote 11: "Variance analysis shows that industry fixed effects account for 48% of the variance of country-industry 2007-2009 production losses, whereas country fixed effects account for 14% only".



Source: Authors calculations using Bloom *et al*. (2012) data.

The average country management quality indicator (MQ_c) and (NbF) respectively amount to 3.06 **(**on a scale of 1 to 5, 5 for the best practices) and 425 observations. The countries with the highest (MQ_c) are Japan (3.28) and the USA (3.29), and the ones with the smallest (MQ_c) are Poland (2.90), Ireland (2.83) and Spain (2.75). The countries with the highest (NbF) are the United Kingdom (1239) and France (656), and the ones with the smallest (NbF) Japan (155) and Ireland (89). As can be seen on the Chart and could have been expected, Ireland and Japan are also the two countries with the most spread-out distributions.

4. Estimation results

Our model, as written in sub-section 2.2, is a system of 35 (=5 variables x 7 years) stacked regressions defined as separate linear projections, each of which can be simply expressed as:

$$\ln(var_{cit}) - \ln(var_{ci07}) = \alpha_t^{var} SH_i + \theta_t^{var} MQ_c + \beta_t^{var} (SH_i * MQ_c) + \phi_t^{var} + \varepsilon_{cit}^{var}$$

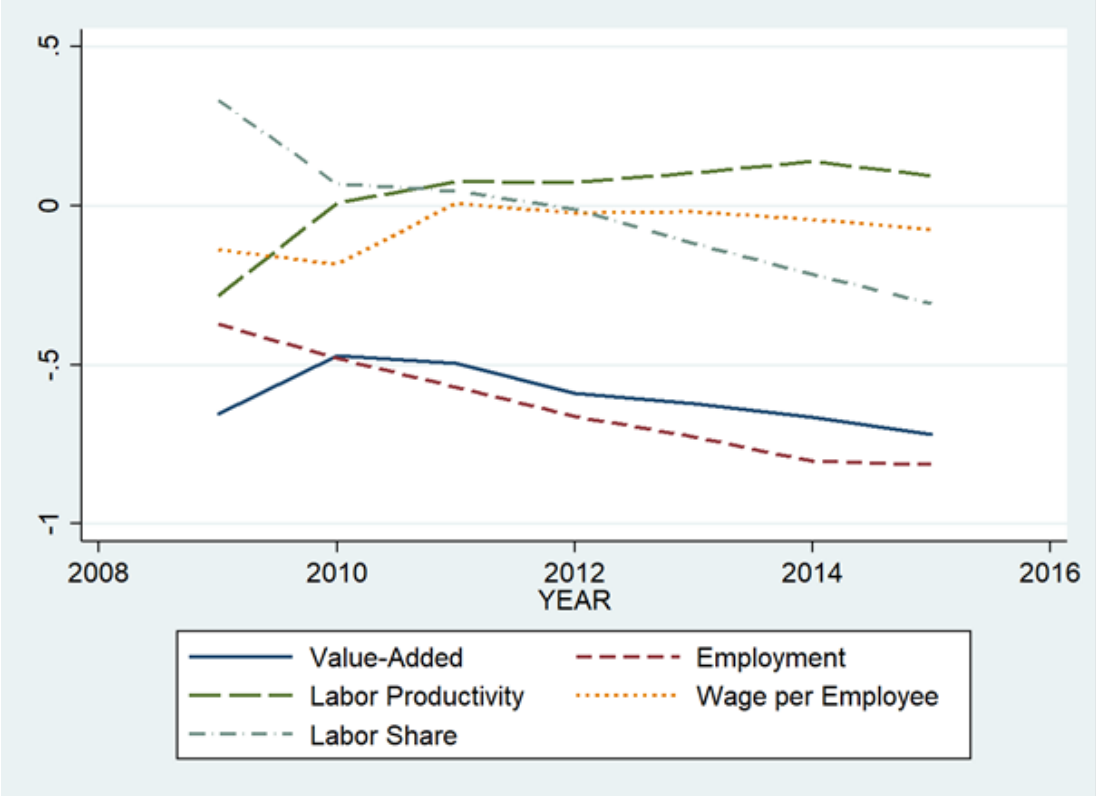
where var stands for value-added (VA), labor (L), wage (W), labor productivity (LP) and labor share (LS), and where the year (t) denotes the seven years of our study period (2009, 2010, …, 2015. The estimation results for the complete set of regressions are recorded in the Appendix Table.

Here, in the first two sub-sections 4.1 and 4.2, we present our estimation results on the direct yearly impacts (α_t^{var}) of the industry specific shock intensity and (θ_t^{var}) of country management quality (Appendix Table Panel A and B). In the sub-section 4.3, we comment our estimates of the yearly joint impacts (β_t^{var}) of country management quality and industry specific shock intensity (Appendix Table Panel C). Finally, the sub-section 4.4 discuss the sensitivity of our estimation results to various robustness test.

4.1. Direct economic impacts of the Great Recession

Chart 4 shows the yearly evolution of the estimated direct impacts of the Great Recession on our five variables of interest, which means that a 2008 crisis production loss of 1% in an USA industry results on average in year (t) in an overall change from 2007 to year (t) of α_t^{var}% for our five variables in the same industry of the non-USA countries.

Chart 4: Evolution over the period 2009-2015 of the direct impacts of the 2008 crisis USA industry production shocks (α_t)



Note: For legibility issues, the chart does not show the confidence intervals of each curve, but they are available upon request from the authors.

The estimated value of the direct impact is negative and strongly persistent on value-added and employment. For labor productivity, it appears negative in the first year 2009, and nil afterwards, which reflects an employment adjustment one year slower that the value-added adjustment. The estimated impact on the real wage per employee is negative in 2009 and 2010, and not significantly different from zero after. The estimated impact on the labor share is positive in 2009, and declines continuously afterwards to become significantly negative after 2013.

4.2. Direct impacts of management quality on the adjustment to the Great Recession

Chart 5 consists of five graphs of the yearly evolution of the estimated direct impacts of country management quality, with their confidence intervals, for one of our five variables of interest, showing that a management quality indicator (MQ_c) equal to (x) in country (c) in year

(t) results, on average, in an overall change of ($\theta_t^{par} * x\%$), from 2007 to year (t) in each industry of country *c,* for the considered variable of interest.

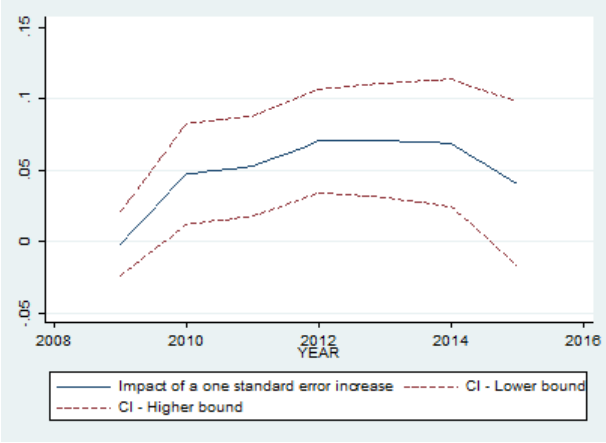
Management quality has a direct positive impact on value-added and employment, this impact being nevertheless non-significantly different from zero for value-added in 2009 and 2015. Consequently, there is almost no significant impact on productivity, except a negative one in 2009. The direct impact of management quality is negative on real wage, nevertheless non-significantly in 2010 and 2015; and the one on labor share is nil in the first years and becomes significantly positive from 2012.

One interpretation of these results is that the direct impact of management quality moves the trade-off between employment and the real wage. Higher management quality preserves employment at the expense of real wages, which are declining, with positive impacts on labor shares in the medium run. Positive impacts on employment are matched with positive impacts on output levels. Thus, productive performance does not appear to be directly impacted by management quality.

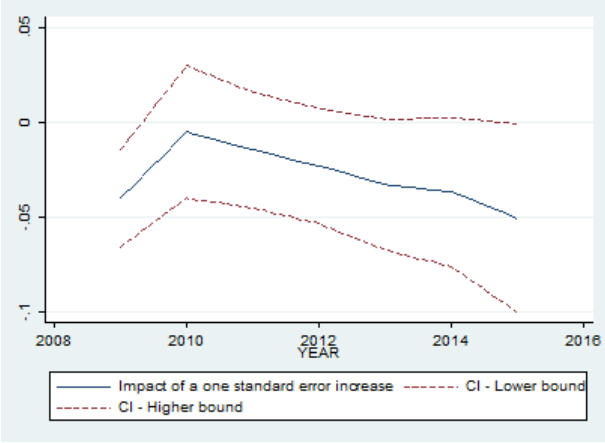
Overall, the detrimental direct impacts of the Great Recession on employment have been attenuated in countries with good managerial practices, which have leveraged wage moderation to cushion direct effects of shocks on employment.

Chart 5: Evolution over the period 2009-2015 of the direct impacts of country management quality (θ_t)

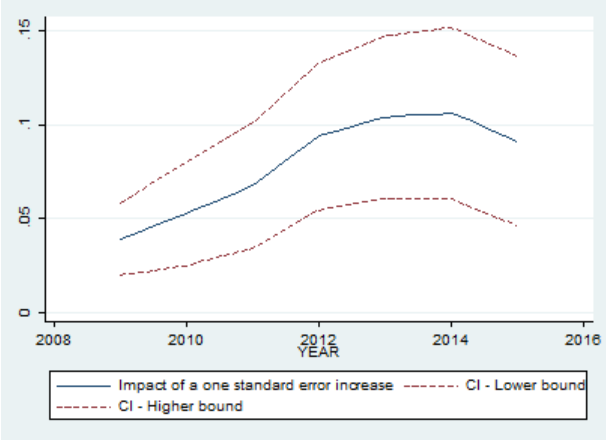
A – Valued-added



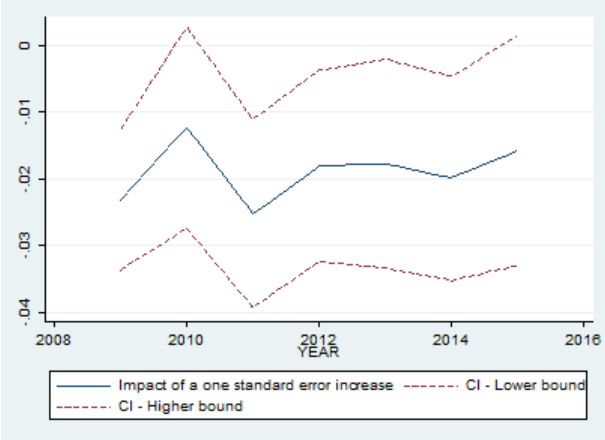
C – Labor productivity



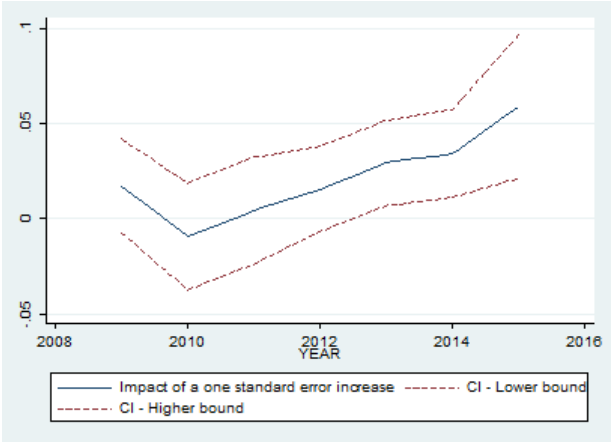
B – Employment



D – Wage per worker



E – Labor share



For each variable of interest, higher and lower bounds correspond to the estimated value of the coefficient plus and minus two estimated standard errors.

4.3. Joint impacts of management quality and economic shocks on the adjustment to the Great Recession

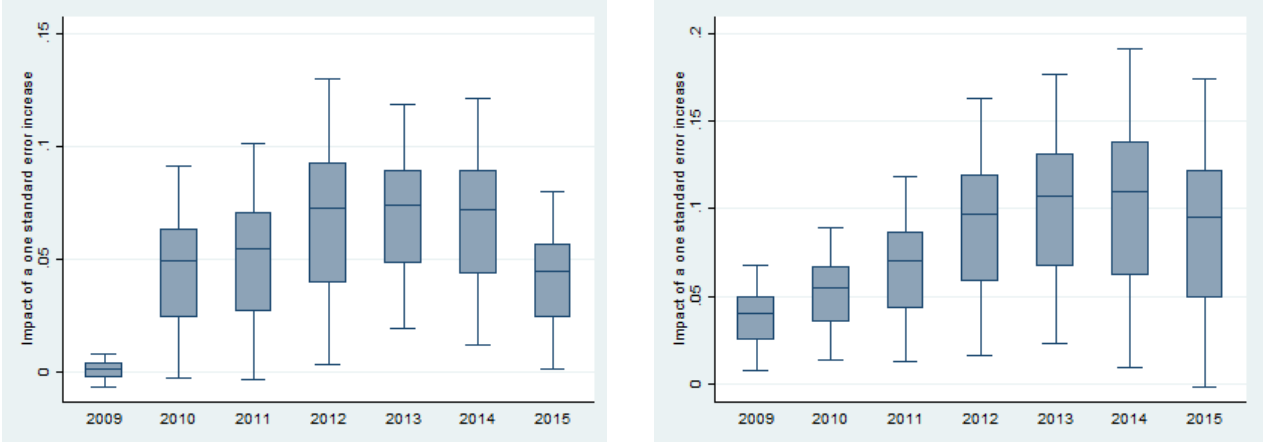
Remembering that we measure country management quality by their values before the 2008 crisis and the economic shocks by size of the shock per industry in the USA in 2008. An increase of the management quality indicator (MQ_c) equal to (x%) in country (c) in year (t) for a given shock of SH_i in an USA industry i corresponds on average to an overall change of $\left[\theta_t^{var} + (\beta_t^{var} * SH_i)\right] * x\%$ from 2007 to year (t) for our five variables in the same industry of the non-USA countries.

The parameters β_t of joint impacts of management quality and economic shocks are significantly positive for value-added and employment. The implication is that the impacts of managerial practices are higher in industries more exposed to the shocks of the Great Recession than in the industries less exposed. As for the country-average effect presented in the previous section, we found no significant effect of the interaction term on labour productivity, reflecting that the value-added and employment effects cancel each other out[18]Chart 6 presents these estimation results in terms of two box plots showing what are the impacts of one standard error increase of country management quality on value-added and employment changes in the years (2009, 2010, …, 2015) compared to 2007 for industries where the specific shocks are ranging from no shock to most important shocks. The management effects appear to be considerable and depend strongly on the size of the shock. Indeed, the impact of one standard error increase of the management quality on the employment change in 2015 compared to 2007 would be -0.1% in industries where the shock was nil, +5.0% for the first quartile of shock, +9.3% for the median shock, +12.3% for the third quartile of shock and +17.9% for the most important shock.

[18] There is no significant effect of the interaction term on wages. However, estimates at the labour market level rather than the sector level would be more relevant for wages, which could explain this result. Finally, as there are no significant effects on productivity or wages, there is also no effect on the labour share.

Chart 6: Joint impact of management quality and economic shocks ($\theta_t + \beta_t . shock_i^{US}$)

A – Valued-added **B – Employment**



Note to box plots A and B: From our estimated results, the impact of one standard error increase of the management quality on the value-added change in 2015 compared to 2007 would be 0.1% in industries where the shock was nil, 2.6% for the first quartile of shock, +4.3% for the median shock, +5.7% for the third quartile of shock and +8.2% for the most important shock.

4.4. Sensitivity analysis

In this Sub-section, we investigate the sensitivity of our estimation results. We first check the robustness of the results to the estimation sample, then to the set of fixed effects and to the estimation method of standard errors.[19] Finally, we dig deeper on the issue of potential endogeneity bias by providing Instrumental Variable (IV) estimates.

Several of our estimation assumptions have an impact on our estimation sample. As we need a balanced panel to compare the yearly results, Sweden is excluded from our main estimation sample (Swedish data are available only until 2013). As we measure the economic shock at the industry level with the corresponding 2008 USA production losses, the USA is also excluded from the main estimation sample to avoid endogeneity issues. However, our analysis shows that the estimation results are robust to the inclusion of both Sweden and the USA in the estimation sample.

[19] The corresponding results are available upon request from the authors.

At the same time, the main estimation sample includes Spain although for this country management quality data were not available before the 2008 crisis. The use of post 2008 management quality data for this country may lead to an endogeneity bias if management quality was affected by the crisis. Nonetheless, our estimation results are basically unchanged when we exclude Spain from our study sample.[20]

Finally, our management quality indicator is based on Bloom et al. (2012)'s manufacturing firm survey, but our estimation sample includes also non-manufacturing sectors. When restricting our study sample to manufacturing industries only, we find that the size and significance of the estimates for the direct yearly impacts of country management quality (θ_t) do not change, but the interaction with the industry specific shocks (β_t) loses significance. This loss of significance for the joint effect may be related to the weak variability of the industry-specific shocks in the manufacturing sector. Indeed, Chart 1 shows that an important part of the industry shock variability comes from the difference between manufacturing and non-manufacturing industries.

Country or industry fixed effects are not introduced in our main specification to be able to estimate all the direct effect parameters (α_t and θ_t). Indeed, our management quality indicator is measured at the country level and the industry shock variable is measured at the industry level. However, when we introduce country and industry fixed effects (dropping the variables having the same dimension) we find that the size and significance of the estimates of the joint effect coefficients (β_t) - allowing to test whether the MQ impact is growing with the size of the shock - are basically unchanged.

Our main estimation results are based on heteroscedasticity-consistent standard errors (see Appendix Table A), using the Huber-White approach. In the sensitivity analysis, we investigate the robustness of our results to various other measures of the standard errors. First, the Huber-White standard errors are consistent under some assumptions, but our sample is relatively small, so we check and confirm that the statistical significance of our results is unchanged if we use standard errors with no correction at all. Then we use the Newey-West standard errors to deal with heteroscedasticity and autocorrelation of the residuals and we use country-clustered standard errors, as our measure of management quality is country-specific. In both cases, the statistical significance of our results is unchanged. Finally, we also use a non-

[20] Our estimation results are also robust to the exclusion of any country or industry from the estimation sample.

parametric bootstrap approach to measure the standard errors. In this case as well our results are confirmed.

In order to avoid potential endogeneity bias, we use management quality data prior to the 2008 crisis and we exclude the USA from our main estimation sample, reflecting our choice to measure industry shocks in all countries by those in the USA. This approach deals with reverse causality. Potential omission bias for management quality is dealt with in different ways. First, as already mentioned, the estimation of the joint effect allows to test whether the management quality impact depends of the industry exposure to the shock, as in Rajan and Zingales' (1997) difference-in-difference approach. Second, we introduce several control variables possibly related to managerial quality: the OECD Employment Protection Legislation indicator (which measures the flexibility of hiring and firing procedures), various OECD Product Market Regulation indicators (which measure the intensity of competitive pressures) and the average education level in the country. We find no significant impact of these variables on the adjustment to the 2008 crisis (so we do not develop further these results in our paper) and, more importantly, the estimated impact of managerial quality is robust to their inclusion as control variables.

Finally, we use an IV approach to deal with potential biases coming from both omitted variables and measurement error. Indeed, the 2008 USA production loss is a proxy of the shock experienced in all country x industry and our management quality indicator is at best an imperfect measure of management quality after the crisis. Because of this, our estimates could under-estimate the size of the true parameters.

We use the IV estimator to deal with the potential endogeneity of our management quality indicator. The implementation of 'good' management practices often required trust among workers and between workers and managers. Therefore, we use two measures of trust from the World Value Survey as instruments for management quality. These measures are based on the answer to the questions "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" and "Do you think most people try to take advantage of you?". These measures and the corresponding estimation results are detailed in Appendix B. According to the weak instrument test (Cragg-Donald minimum eigenvalue) and the overidentification test, we reject the weak-instrument hypothesis but not the exogeneity hypothesis.. The results for the value-added equation are very close to the main estimates and the only notable difference for the employment equations is that the effect of the interaction term became insignificant one year earlier. Regarding the other variables, the IV estimation results are generally close to the main OLS estimation results, but with two interesting

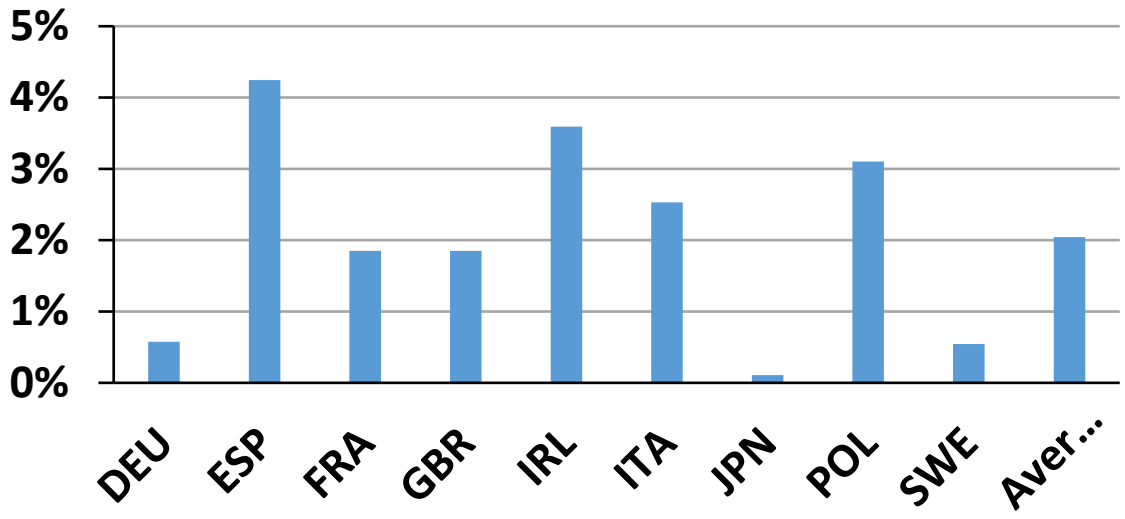
differences: (i) the significant negative direct impact of management quality on wages is stronger; and (ii) a negative direct impact of management quality on labor productivity become statistically significant. These results suggest even more strongly than the main estimates that good managers maintain the employment level after a crisis thanks to wage moderation, but they add that this employment protection is obtained by sacrificing labor productivity in the short-run. However, it is important to note that this labor productivity sacrifice has no significant impact on the labor share (and so on the unit labor cost), as it is fully compensated by wage moderation.

To account for country x industry specific shocks, while at the same time avoiding endogeneity, we instrument the domestic 2008 industry production loss with the USA production loss in the same industry. Indeed, as shown in section 3.1, the USA industry production loss is strongly related to the domestic industry production loss. The corresponding estimation results are provided in Appendix C. The statistical significance of the estimates is unchanged and the direct as well as joint effect of the industry shock (α_t and θ_t) are higher, though the increase is relatively small.

5. Country simulations

Using our estimation results, we have run country simulations to assess the potentially positive impacts on employment of a higher quality of management during the Great Recession and the subsequent recovery. We focus on employment as a major policy variable of interest, and also because the estimated impacts on employment of management quality and economic shocks, as well as their interactions, are statistically very significant and robustly so in our regressions. In the simulation we benchmark the production loss between 2007 and 2009 for USA whole economy (rather than USA industry-level) to guesstimate directly the aggregate employment country effects. We also benchmark management quality on the USA level, which is the highest among the eight countries in our main study sample. Thus, cross-country differences in the simulated employment gains of moving management quality to USA levels in 2008 are driven by the initial country-specific gaps in management quality relative to the USA. Chart 7 presents these simulation results for the year 2015, six years after the start of the Great Recession.

Chart 7: Simulated impact on employment in 2015 of moving pre-crisis management quality to USA level assuming USA level economic shocks



Note: The bars show the percentage gain in employment in 2015 relative to actual employment levels experienced by each country if they had faced the same aggregate production loss as in the USA and had moved their median management quality to USA levels in 2007.

According to our estimates, raising management quality to USA levels in 2007 would have improved the aggregate level of employment by 4.2% in Spain in 2015. Unsurprisingly, almost no improvement would have been observed in Japan, where quality of management was very close to USA levels in 2007. The other countries are in intermediate situations: with large improvements by more than 3% in Ireland and Poland; average improvements by about 2% in France and Great Britain; and small improvements by.[21]

Extrapolating from these results, the long-term impact of Covid-19 on value-added and employment would depend not only on the importance of the pandemic (the size of the shock) but also on the current quality of management. Thus, Japan could suffer less than the other countries from these two factors (softer shock and higher quality of the management), while Spain could suffer more (harder shock and lower quality of the management) than the other countries.

[21] In Appendix D, for the sake of completeness, we give a chart similar to Chart 7 showing the simulated impact on employment in 2015 of moving pre-crisis management quality to USA level, but without also assuming the USA level economic.

6. Conclusions

There is an extensive economic literature on the effects of managerial talent on firm-level outcomes, but research has been scant on how these translate into macroeconomic aggregates. Moreover, research has focused mostly on medium to long-run effects, with little attention to how managerial talent shapes economic resilience over the cycle and during economic crises. Yet managerial talent is related to important institutional features such as the competitive market environment, labor market flexibility, education systems and cultural and historical heritage, which have been shown to contribute to economic resilience.

This paper takes a first step towards looking at the link between prevailing managerial practices in a country and its ability to weather serious economic shocks, possibly lessening persistent effects on labor utilization and, therefore, productive potential. Taking a dynamic estimation approach, we focus on the macroeconomic impact of managerial practices on employment and production in a sample of OECD countries over the Great Recession, measuring resilience by the ability of countries to limit industry level employment damages and production losses. We show that countries that, on average, enjoyed a higher quality of management have been able to do better regarding employment and production than other countries. Interestingly, there is also evidence that this outcome was reached thanks to country ability to moderate real wage growth and has also resulted in better overall outcomes in terms of labor shares.

Our results, which are robust to several sensitivity tests, could have implications that go beyond the Great Recession by informing analysts and policy-makers on the likely comparative resilience of OECD economies to the Covid-19 crisis, and on the importance of raising the level of managerial abilities in view of possible future shocks. Clearly, the causes, intensity and features of the Great Recession are crucially different than those of the Covid-19 crisis. Moreover, the policies implemented to protect jobs and firms during the height of the Covid-19 pandemic and considered in the context of the recovery plans differ also substantially from those implemented in the aftermath of the Great Recession, as well as across countries. For these reasons, the effect of management quality on macroeconomic outcomes could be quantitatively different in the context of the Covid-19 pandemics and subsequent recovery. Yet, we would expect them, to be qualitatively similar and act through comparable channels.

While we consider our results informative and potentially insightful, we are also aware of their limitations and that we have just scraped the surface of a promising research agenda.

Specifically, our approach to identification goes some way towards establishing potentially causal links, but given the aggregate level of the analysis and the inherent limits in the data (as well our treatment of them) more research will be needed to confirm our findings. Also, while our sample covers countries with large differences in managerial abilities and macroeconomic outcomes during the Great Recession, extending the country coverage to non-OECD countries would be useful (once the data are available) to enhance our identification strategy. Moreover, covering a longer period that includes shocks of a different nature, e.g. both demand and supply driven, could also increase the external validity of our results. In the same spirit, it would be interesting to check whether managerial abilities also affect macroeconomic outcomes during expansionary periods. Finally, in our paper we have unveiled a link between managerial practices and macroeconomic outcomes, but it would be desirable to go a step beyond and consider how this link is shaped by prevailing institutional settings (e.g. in labor and product markets). We leave these interesting issues for future research.

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Appendix A: Main Estimates

Table A: Main estimates

Note: the explanatory variables are centred

	(1)	(2)	(3)	(4)	(5)
Dependent variable	**Value-added**	**Employment**	**Wage per worker**	**Labor Productivity**	**Labor Share**
Panel A: Impact of the industry specific USA shock (α_t) in					
2009	-0.629	-0.355	-0.130	-0.274	0.307
	[0.0666]	[0.0534]	[0.0353]	[0.0781]	[0.0676]
2010	-0.461	-0.457	-0.177	-0.00381	0.0632
	[0.0743]	[0.0777]	[0.0634]	[0.0880]	[0.0781]
2011	-0.489	-0.544	0.00613	0.0558	0.0443
	[0.0952]	[0.0975]	[0.0534]	[0.109]	[0.0835]
2012	-0.585	-0.636	-0.0236	0.0510	-0.0116
	[0.111]	[0.108]	[0.0506]	[0.118]	[0.0824]
2013	-0.618	-0.698	-0.0182	0.0798	-0.112
	[0.129]	[0.117]	[0.0535]	[0.128]	[0.0979]
2014	-0.661	-0.772	-0.0418	0.111	-0.205
	[0.146]	[0.133]	[0.0542]	[0.143]	[0.0988]
2015	-0.713	-0.783	-0.0758	0.0703	-0.298
	[0.166]	[0.136]	[0.0619]	[0.156]	[0.116]
Panel B: Country management quality impact (θ_t) in:					
2009	-0.00889	0.187	-0.114	-0.196	0.0856
	[0.0555]	[0.0479]	[0.0259]	[0.0641]	[0.0607]
2010	0.230	0.255	-0.0639	-0.0248	-0.0423
	[0.0887]	[0.0695]	[0.0365]	[0.0891]	[0.0692]
2011	0.256	0.325	-0.123	-0.0691	0.0244
	[0.0875]	[0.0831]	[0.0349]	[0.0778]	[0.0692]
2012	0.342	0.453	-0.0873	-0.111	0.0817
	[0.0907]	[0.0975]	[0.0357]	[0.0781]	[0.0555]
2013	0.346	0.504	-0.0872	-0.158	0.148
	[0.100]	[0.107]	[0.0390]	[0.0880]	[0.0560]
2014	0.336	0.513	-0.0980	-0.177	0.173
	[0.112]	[0.114]	[0.0384]	[0.100]	[0.0581]
2015	0.194	0.439	-0.0784	-0.245	0.295
	[0.144]	[0.113]	[0.0433]	[0.127]	[0.0955]
Panel C: Joint impacts of management quality and economic shocks (β_t): in:					
2009	0.263	1.370	-0.258	-1.107	0.0331
	[0.449]	[0.352]	[0.203]	[0.529]	[0.455]
2010	1.337	1.649	0.482	-0.312	-0.976
	[0.487]	[0.554]	[0.421]	[0.650]	[0.546]
2011	1.443	2.338	-0.508	-0.895	-0.696
	[0.716]	[0.697]	[0.324]	[0.764]	[0.612]
2012	1.934	3.004	-0.562	-1.071	-0.767
	[0.775]	[0.780]	[0.304]	[0.784]	[0.542]
2013	1.519	3.090	-0.250	-1.571	-0.324
	[0.918]	[0.841]	[0.316]	[0.827]	[0.572]
2014	1.712	3.458	-0.302	-1.746	-0.368
	[1.044]	[0.929]	[0.304]	[0.914]	[0.561]
2015	1.519	3.316	-0.0362	-1.797	-0.133
	[1.163]	[0.941]	[0.381]	[1.029]	[0.682]
Observations	791	791	791	791	791
R-squared	0.239	0.384	0.167	0.142	0.147

Robust standard errors in brackets;
Year fixed effects are included in all estimated specifications, but not the control variables
(results including the control variables are available upon request from the authors)

Appendix B: Trust and management quality

Table B shows the estimation results when using two variables measuring Trust as instruments for the management quality. These variables of trust come from the 2005-2009 World Value Survey and are built on the answers to the following questions:

- "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" (called 'Trust 1' thereafter)
- "Do you think most people try to take advantage of you?" (with a 10 point scale, called 'Trust 2')

For each country, we measure the percent of people answering "Most people can be trusted" to the first question and the average value of the answers to the second question. These variables are available for eight of our ten countries (the number of people interviewed is between parenthesis): France (1001), Germany (2064), Italy (1012), Japan (1096), Spain (1200), Sweden (1003), United Kingdom (1041) and USA (1249). Chart B shows the relationship between these two Trust variables and our management quality indicator.

Chart B: Relation between Trust and Management Quality

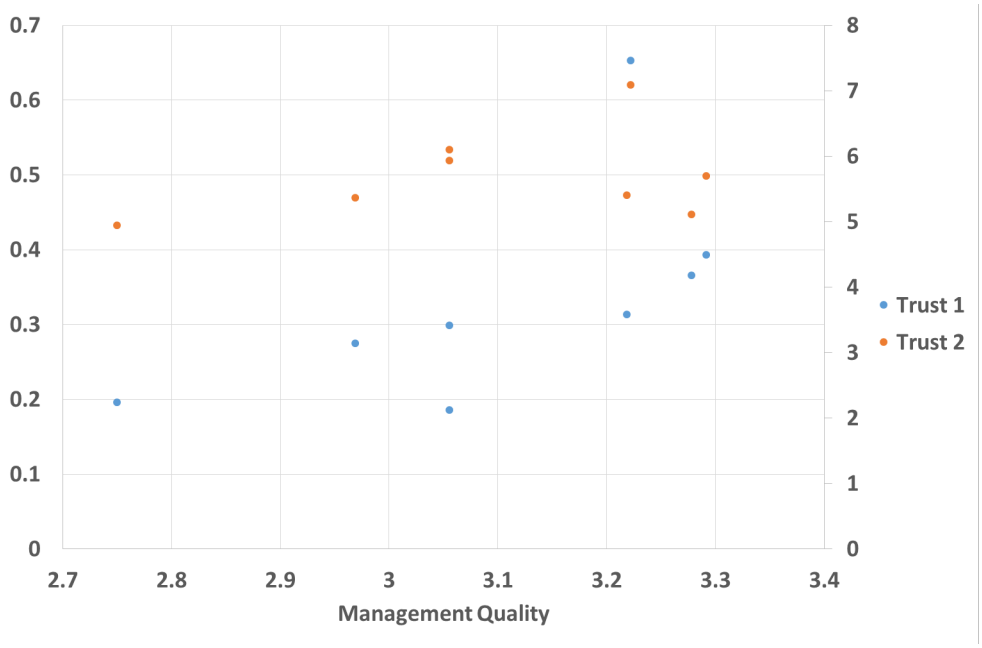


Table B: IV estimates using the Trust variables as instruments for the Management Quality

Dependent variable	(1) Value-added	(2) Employment	(3) Wage per worker	(4) Labor Productivity	(5) Labor Share
Panel A: Impact of the industry specific USA shock (α_t) in:					
2009	-0.586	-0.252	-0.139	-0.334	0.249
	[0.0706]	[0.0446]	[0.0377]	[0.101]	[0.0706]
2010	-0.368	-0.323	-0.0936	-0.0457	-0.0649
	[0.0620]	[0.0532]	[0.0343]	[0.0788]	[0.0202]
2011	-0.337	-0.349	-0.0432	0.0127	-0.0892
	[0.0546]	[0.0633]	[0.0313]	[0.0673]	[0.0638]
2012	-0.389	-0.373	-0.0638	-0.0159	-0.118
	[0.0835]	[0.0740]	[0.0273]	[0.0760]	[0.0428]
2013	-0.414	-0.417	-0.0199	0.00363	-0.205
	[0.0855]	[0.0851]	[0.0341]	[0.0798]	[0.0589]
2014	-0.410	-0.438	-0.0383	0.0278	-0.295
	[0.116]	[0.0954]	[0.0206]	[0.0922]	[0.0514]
2015	-0.476	-0.475	-0.0310	-0.000800	-0.368
	[0.130]	[0.0930]	[0.0591]	[0.127]	[0.0579]
Panel B: Country management quality impact (θ_t) in:					
2009	-0.123	0.146	-0.122	-0.269	0.126
	[0.0321]	[0.0439]	[0.0149]	[0.0350]	[0.0508]
2010	0.0386	0.205	-0.121	-0.167	0.0122
	[0.0329]	[0.0350]	[0.0210]	[0.0199]	[0.0724]
2011	0.127	0.295	-0.119	-0.168	0.0511
	[0.106]	[0.0581]	[0.0324]	[0.0585]	[0.0843]
2012	0.210	0.447	-0.127	-0.236	0.0696
	[0.107]	[0.0973]	[0.0473]	[0.0567]	[0.124]
2013	0.271	0.559	-0.110	-0.288	0.0932
	[0.106]	[0.112]	[0.0375]	[0.0645]	[0.150]
2014	0.332	0.585	-0.118	-0.253	0.0861
	[0.0966]	[0.103]	[0.0371]	[0.0572]	[0.180]
2015	0.280	0.537	-0.152	-0.257	0.0301
	[0.0843]	[0.0921]	[0.0360]	[0.0734]	[0.174]
Panel C: Joint impacts of management quality and economic shocks (β_t) in:					
2009	0.137	1.266	-0.403	-1.129	1.391
	[0.403]	[0.168]	[0.120]	[0.446]	[0.626]
2010	1.627	1.440	-0.165	0.188	-0.255
	[0.549]	[0.192]	[0.155]	[0.559]	[0.0801]
2011	0.974	1.777	-0.187	-0.803	0.0378
	[0.571]	[0.270]	[0.214]	[0.501]	[0.366]
2012	1.442	2.326	-0.436	-0.884	-0.216
	[0.748]	[0.394]	[0.197]	[0.531]	[0.344]
2013	0.641	2.331	-0.218	-1.690	0.0943
	[0.820]	[0.492]	[0.221]	[0.555]	[0.341]
2014	0.586	2.469	-0.458	-1.883	0.0341
	[1.009]	[0.538]	[0.158]	[0.723]	[0.256]
2015	0.421	2.385	-0.0586	-1.964	0.444
	[1.060]	[0.518]	[0.451]	[0.894]	[0.371]
Observations	651	651	651	651	651
R-squared	0.306	0.443	0.263	0.165	0.182

Robust standard errors in brackets;
Year fixed effects are included in all estimated specifications

Appendix C: Using domestic industry shocks

Table C shows the estimation results when using domestic industry shocks instead of USA industry shocks. To deal with the endogeneity issue it implies, we use the Instrumental Variable estimator, with the 2008 USA industry production loss as an instrument.

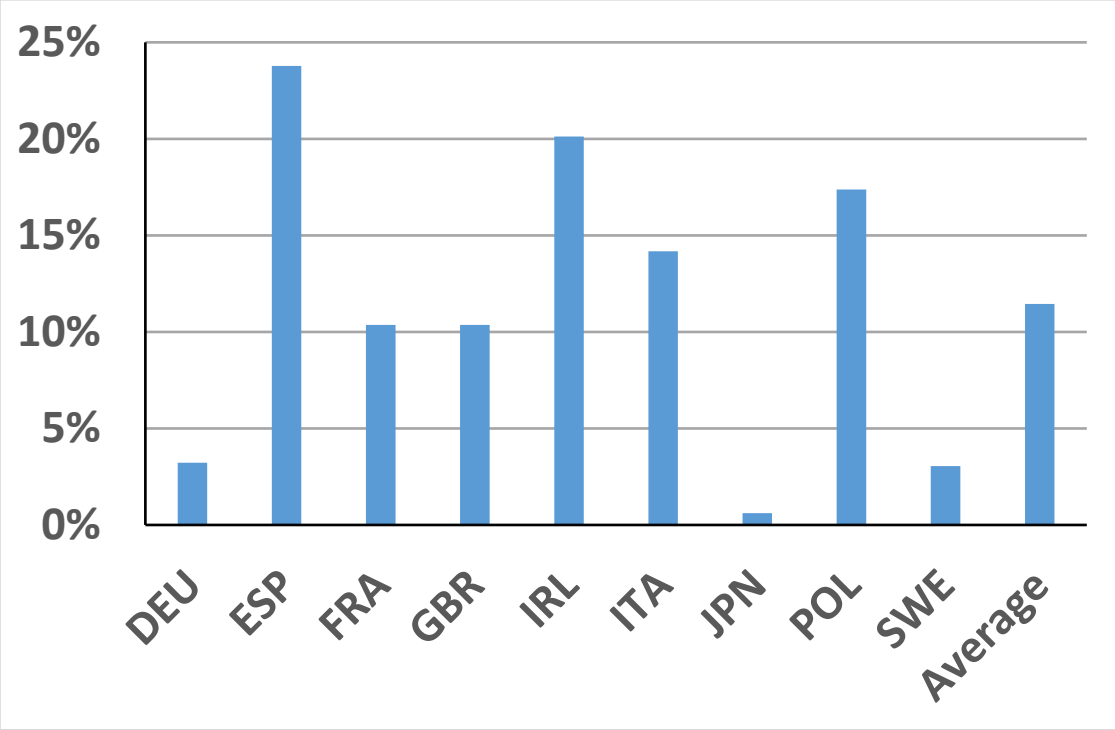
Table C: IV estimates using domestic industry shocks instead of USA industry shock
Note: the explanatory variables are centred

	(1)	(2)	(3)	(4)	(5)
Dependent variable	**Value-added**	**Employment**	**Wage per worker**	**Labor Productivity**	**Labor Share**
Panel A: Impact of the predicted industry country shock (α_t) in:					
2015	-0.823	-0.793	-0.101	-0.0306	-0.397
	[0.207]	[0.180]	[0.0698]	[0.221]	[0.140]
Panel B: Country management quality impact (θ_t) in:					
2015	0.229	0.516	-0.0793	-0.287	0.292
	[0.145]	[0.116]	[0.0433]	[0.119]	[0.0910]
Panel C: Joint impacts of management quality and economic shocks (β_t) in:					
2015	1.974	4.308	-0.0470	-2.334	-0.173
	[1.511]	[1.222]	[0.494]	[1.337]	[0.886]
Observations	113	113	113	113	113
R-squared	0.147	0.505	0.457	0.194	0.161

Robust standard errors in brackets

Appendix D: Alternative policy simulation on employment in 2015

Chart D: Simulated impact on employment in 2015 of moving pre-crisis management quality to USA level, but assuming the average sample country production shock rather than the production USA aggregate production shock



Note: The bars show the percentage gain in employment in 2015 relative to actual employment levels experienced by each country if they had faced the same aggregate production loss as in the USA and had moved their median management quality to USA levels in 2007.