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## Towards more resilient economies: the role of well-functioning economic structures

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**Abstract**

Economic resilience is essential to better withstand adverse shocks and reduce the economic costs associated with them. We propose different measures of resilience and empirically gauge how countries differ in their shock absorption capacity conditioning on the quality of their economic structures. The paper finds robust evidence that sound labour and product markets, framework conditions and political institutions increase the resilience towards adverse shocks and reduce the incidence of crisis more generally. In the presence of a common shock, a country with weaker economic structures can on average suffer up to twice the output loss in a given year compared to the country at frontier of institutional parameters. In a similar fashion, the likelihood of a severe economic crisis is reduced significantly if a country exhibits most flexible and adaptable institutions. The above exercises can be used to establish a governance process towards more resilient economic structures (as e.g. suggested for the euro area in the so-called Five Presidents' Report).

JEL classification: E32, L50, J21.

Keywords: economic resilience, common shocks, economic structures, institutions.

***Non-technical summary***

*Economic resilience is essential to better withstand adverse shocks and reduce the economic costs associated with them. The limited economic resilience is often related to weak national economic structures. In particular, rigidities in labour markets, limited competition in product markets, framework conditions which impede the entrance of new firms and complicate daily business of existing firms, as well the quality of government services (e.g. rule of law, absence of corruption) are often argued to be the main obstacles to a higher shock absorption capacity. The main objective of this study is to present a broad analytical framework to measure the resilience of euro area countries, with a focus on the importance of the quality of national economic structures. Based on these insights, we then propose a method for establishing a policy monitoring process, which draws both on structural indicators and observable macroeconomic variables.*

*Resilience is here understood as the capacity to minimise output losses after an adverse shock has hit the economy. Empirically, we identify resilience in two different ways. First, we gauge the degree of resilience by identifying the reaction to common shocks, in turn, employing different shock identification methods. Second, we look at the incidence of crises, measured as a pronounced fall in GDP. In both cases, we show how countries' resilience depends on the quality of its economic structures.*

*Economic structures are measured by a wide set of institutional indicators that capture how the different markets (labour and product) work, how framework conditions are set (e.g. efficiency of the judicial system, strength of the regulatory environment, amount of administrative burdens) and how the government interacts with the economy (i.e. efficiency of public sector and tax administration, state rights).*

*We find robust evidence that strong and flexible institutions increase the resilience towards adverse shocks. For a common shock, a country with less efficient economic structures can on average suffer up to twice the output loss in a given year compared to the case where the country is at frontier of institutional parameters. In a similar fashion, other empirical results show that the likelihood of a severe economic crisis is significantly reduced if a country exhibits most flexible and adaptable institutions.*

*We use these empirical results to draw policy conclusions, in particular in light of the current debate on strengthening economic governance in the euro area. Juncker et al (2015) call in the Five Presidents' Report for a "convergence process towards more resilient economic structures". In this context, the above exercise can be used to inform policy makers on which structural variables should be targeted to increase country resilience and how these variables should be reconciled with developments in observable macroeconomic data.*

## 1. Motivation and literature overview

The importance of economic resilience has been underlined by the euro area financial and sovereign debt crisis. It has shown that flexible economies inside a monetary union are more resilient to negative shocks than rigid economies. The cost of high rigidities can be well understood when comparing the adjustment in a more flexible country like Ireland with other (former) programme countries. In Ireland, the adjustment of relative wages and prices came immediately after the 2008-09 recession, i.e. it had occurred before Ireland entered in the financial assistance programme in late 2010. As a result, an export-driven recovery started already in 2011, while the unemployment rate started to decline in 2012. This is very different to what happened in Greece, Portugal and Spain where the nominal adjustment has started many years after the recession, forcing the adjustment via a sharp increase in unemployment. These case studies suggest that well-functioning national economic structures are essential to economic resilience in all countries.

Even more so, resilience is not only in the interest of national economies, given possible spill-over effects to neighbouring countries. Limited resilience in particular has the potential to negatively affect the smooth functioning of a monetary union as a whole, as again the euro area financial and sovereign debt crisis has shown. Negative shocks propagate more rapidly inside the Union through strong trade and financial linkages, the confidence channel, the common external exchange rate and the single monetary policy. Nominal and real rigidities in turn can amplify and increase the persistence of spill-over effects, as rigidities affect the ability of a country to adjust to shocks.

In this paper, we understand resilience as the capacity of a country to withstand significant adverse shocks by minimising the impact on economic activity. We assume that well-functioning economic structures and sound political institutions increase the shock absorption capacity of a given country. We measure resilience in two different ways. First, we measure it directly by looking at common shocks and the immediate country-specific reaction to them. Second, we measure it indirectly, by focussing on the likelihood that a country enters in periods of particularly strong declines in output. For both approaches we condition on the quality of the national economic structures with a view to explain differences in resilience.

The literature linking economic structures to economic resilience is relatively scarce. The role of high-quality basic political institutions (such as the rule of law or the political stability) for a better shock absorption has for example been studied by Acemoglu et al (2003) and Rodrick (1999). Acemoglu et al find that countries with weak institutions suffer substantially more volatility as measured by the standard deviation of per capital output. Rodrik (1999), in turn, notes that external shocks on growth are larger the greater the latent social conflicts in an economy and the weaker its institutions of conflict management.

Other papers have focussed only on the importance of well-functioning product and labour markets for economic resilience. Canavo et al (2011) rely on common GDP shocks, filtered by time series methods. They look at sectoral data across European countries and find that a high level of product market regulation makes industries less resilient to adverse shocks. They show that the different

capacity to absorb shocks within industrial sub-sectors seems to a large extent be explained by how far product market reforms have advanced. Duval and Vogel (2008) conduct a similar analysis, however, focussing on the persistence of shocks in the output gap. Their simulations indicate that rigid labour and product markets lengthen the time it takes for output to return to potential following a shock and increase the cumulative output loss incurred over the period. Blanchard and Wolfers (2000) focus on the role of labour market institutions in the wake of common shocks. They find that the interaction between shocks and institutions is crucial to explain the heterogeneous evolution of unemployment across EU countries. Biroli et al (2010) also look at economic resilience through the lenses of the competitiveness channel across euro area countries. They find that excessive regulations in product and labour markets appear to make inflation differentials more persistent in the face of a common shock. This implies that in a monetary union where the nominal exchange rate channel as mode of adjustment is no longer available, the working of the competitiveness channel is impeded by highly regulated labour and product market structures, thereby preventing an automatic smoothing of shocks at country level.

In addition to the empirical literature, the crisis has prompted an increased policy focus on the need to determine factors improving economic resilience. The OECD recently started a work stream to better understand economic resilience.[1] Surveillance across OECD countries is meant to be strengthened by identifying vulnerabilities to shocks and crises early on so as to reduce their likelihood and economic cost. In this vein, the OECD team proposes a large set of mainly macro and financial vulnerability indicators (see Röhn et al 2015) which could be used as an early warning tool (Hermansen and Röhn 2015).

Also at EU level there is an increased focus on improving resilience. The EU and specifically the euro area economic governance framework so far seems not sufficiently equipped to enforce a more effective reform path towards more resilient structures. It is against this background that the report "Completing Europe's Economic and Monetary Union" authored by the 'Five Presidents' (Juncker et al 2015) explicitly calls for a binding convergence process towards more resilient economic structures.

This paper adds to the existing literature by employing different definitions of resilience (including combining alternative shock identification methods), using a broad range of indicators to identify the well-functioning of economic structures (covering the efficiency of labour and product market policies as well as framework conditions of doing business and the interaction between the government and the economy), utilising a large panel dataset of OECD countries over nearly 35 years, and by suggesting how the identified structural variables could be read in conjunction with related macro variables, facilitating the monitoring towards more resilient economic structures.

Section 2 will elaborate on the concept of economic structures and establish a link to the shock absorption capacity of a country, before Section 3 will establish empirical evidence for this

[1] http://www.oecd.org/economy/growth/economic-resilience.htm

relationship. Subsequently, Section 4, building on the empirical findings of the previous section, proposes how the identified structural variables could be related to observable macro variables, which together could inform national (and euro area) policy makers about progress on converging towards similarly resilient economic structures.

## 2. Economic structures and resilience: concepts and indicators used

We argue that the quality of economic structures impact the shock absorption capacity of a country. Economic structures are defined as a broad set of institutional indicators that capture how labour and product markets work as well how framework conditions are set, including the quality of government or how the government interacts with the economy at large.

In market economies, regulations try to prevent market failure and therefore play a significant role in determining economic structures. If a market does not function well, such as in cases of natural monopoly in network industries, it might be beneficial to regulate the market. However, too much regulation could create the wrong incentives for investors, firms and employees, so that labour or capital is not used where it is most efficient from a welfare perspective. Such excessive regulation (often an expression of unjustified protection) could among others eventually hinder a swift response to adverse shocks.

Labour market regulations affect the rate of job creation and destruction, productivity, wages as well as the extent of social benefits and employment protection. Such regulations could be important to safeguard workers or to encourage productivity growth (through training and the development of firm-specific skills). By contrast, excessive regulation impedes the timely adjustment of firms and employees to economic shocks by discouraging hiring and favouring the employed over the unemployed.

Measuring efficiency of labour markets is difficult given the various policies at work and the need to balance regulations carefully. In this paper, several commonly used indicators of labour market regulations (from the OECD, the Global Competitiveness Index, Heritage and Fraser institutes) are compared. They capture de jure aspects, i.e. the quality of the legislation (e.g. OECD Employment Protection Legislation Index) and also de facto aspects, i.e. how the actual working of the labour market regulations is perceived (the Global Competitiveness Index, the Heritage and Fraser institutes). Moreover, we include expenditure in terms of Active Labour Market Policies and net replacement rates to broaden the set of actual labour market policies. Active labour market policies and net replacement rates are not economic, institutional structures alone, but more expressions of a social safety net. This notwithstanding, the two variables are looked at in the regressions as benchmark for the model approach, as we would assume to see less strong output declines in case a country has strong (automatic) stabilisers. Furthermore, the quality of the education is measured by the share of the population in higher education.

Also excessive product market regulation affects the shock absorption capacity of economies. In order for the economy to weather shocks, it must be possible for prices to adjust quickly and for

production factors to be reallocated between firms and sectors. The price adjustments are essential to ensure a pass through of changes in labour costs to consumer prices. In the event of a decline in labour costs after a negative shock, the competitiveness of an economy can only improve if prices also adjust. Without swift price adjustment, the cost of an adverse shock would fall on the real disposable income of households. Sector-specific policies include, for example, competition policies for network industries (e.g. energy, telecoms or transport), the retail sector and closed professions (e.g. notaries, pharmacies or lawyers).

Framework conditions are tightly linked to product markets. They capture policies that can create favourable broader business conditions to facilitate the entry of new firms and alleviate the administrative burden of existing firms. Moreover, we interpret framework condition also as covering the quality of government services, or more broadly the interaction of the government with the economy as a whole (as for example expressed in the rule of law, the level of corruptions or the governments' effectiveness). While some indicators used are more linked to competition in product markets (e.g. the OECD Product Market Regulation indicators or the Global Competitiveness Institute index for goods market efficiency) other variables are mainly covering framework conditions (e.g. the World Governance or Fraser Economic Freedom Indicators). A third group of indicators (such as the Doing Business Indicators or the headline Global Competitiveness Index) captures both product market competition and framework conditions more broadly.

## 3. Operationalising resilient economic structures

Economic resilience in this paper is measured in two alternative ways. Sections 3.1 defines resilience as output reaction to common shocks. Naturally also other macro variables (e.g. unemployment) or more micro-based data could be studied. For this empirical exercise, however, GDP serves as a well-measurable and intuitive summary indicator for how shocks affect the overall economy. Section 3.2, in turn, is abstracting from the origin of the shock and simply looks at large crisis episodes across OECD countries to understand whether well-functioning economic structures can reduce the likelihood of such events to occur.

### 3.1 The reaction to common shocks: what role for institutions?

#### 3.1.1 Empirical approach: identifying common shocks

Empirically, we gauge the resilience as the estimated correlations between a country's output change and a common shock while conditioning on the strength of the country's institution. A small number implies low correlation between common shocks and the respective country-specific economic growth in the given period. In line with the literature, common shocks are chosen to allow a comparison of output reaction depending on different institutional set-ups among countries. This study will focus on unobserved shocks applying two different concepts.

First, in the spirit of Canova et al. (2011), we extract common shocks through a structural model using aggregate euro area data, as we assume that they largely capture all common disturbances

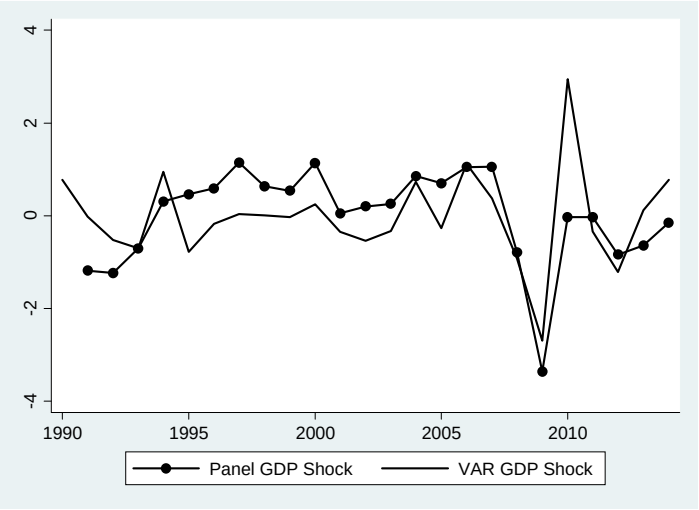
which affect EU countries. One way to establish comparable shocks from aggregate data is to consider euro area aggregate GDP shocks. We employ a VAR approach to extract such shocks from other common shocks. Annual aggregate euro area data covering the period 1986 to 2014 include GDP at constant prices, HICP or CPI as price proxies, a short-term interest rate variable (three month Euribor) and M3. The VAR was estimated in levels,[2] with the number of lags determined by the Akaike and BIC criterion. The four-variable VAR takes the form:

$$(1)\quad X_t = A(L)X_{t-i} + e_t \text{ , where}$$

$$X_t = \begin{bmatrix} y_t \\ p_t \\ r_t \\ m_t \end{bmatrix} \text{ and } e_t = \begin{bmatrix} e_{yt} \\ e_{pt} \\ e_{rt} \\ e_{mt} \end{bmatrix}$$

The residuals are obtained using Choleski decomposition. Having GDP ($y_t$ with $t$ being the time index) first implies that the un-forecastable part of GDP is due to only pure GDP shocks. For prices ($p_t$) the un-forecastable part is due to GDP and price shocks only, and so on. For money ($m_t$) the interpretation of a money demand-type relationship is consistent with ranking money last. The standardised series $e_{yt}$ from the VAR specification is then used as the common (unobserved) shock.

**Chart 1*: Common unobserved GDP shocks***




*Note: Both shocks are standardised, with zero mean and unit standard deviation.*

As a second, alternative approach to proxy common shocks, we make use of common patterns across time in country-specific output series in the spirit of Blanchard and Wolfers (2000). Here a panel model, including all OECD countries for the period 1990 to 2014, is estimated with the simple form

$$(2)\quad y_{it} = \alpha + \beta_i D_i + \gamma_t D_t + e_{it}$$

where $y_{it}$ is the country-specific output growth, $D_i$ are country and $D_t$ time dummies. The coefficient of the time dummies capture common reactions across countries, assuming that idiosyncratic

[2] Note that for the purpose of extracting VAR shocks a model, the stationarity properties of the variables are not relevant since the estimates of VAR coefficients will be consistent even when unit roots are present (see Canova, 2007)

disturbances are captures by the country specific variables. This standardised variable from the panel approach is then used as an alternative way to proxy common shocks.

Chart 1 compares both common shocks, indicating a very similar behaviour, which is confirmed by the results (as shown in Section 3.1.3) which are broadly robust to either of the two approaches. Overall, looking at the Chart, the structural approach depicts a little less variation around the zero mean, probably mainly due to the exclusion of other than pure GDP shocks.

### 3.1.2 Measuring the importance of well-functioning economic structures

The role of economic structures for greater economic resilience is measured by interacting common shocks with various proxies for labour and product market characteristics as well framework conditions. A fixed effects panel model of the following form is employed:

$$(3)\quad y_{it} = \alpha + \beta S_t + \gamma X_{it} + \delta S_t X_{it} + D_i + e_{it}$$

In equation (3) the country-specific (i) and time-varying (t) real GDP growth series ($y_{it}$) are regressed on the common shock ($S_t$), the respective structural variable ($X_{it}$) and their interaction term ($S_t X_{it}$), as well country fixed effects ($D_i$). For the purpose of this exercise, we are particularly interested in the marginal effect of an institutional specification in the case of a common shock, expressed by $\delta$. However, the total effect will then be captured by also looking at shock coefficient ($\beta$) itself:

$$(4)\quad \theta = \beta S_t + \delta S_t X_{it}.$$

By looking at equation (4) we will be able to compare e.g. how differently flexible labour markets across countries impact the shock absorption capacity of an economy in case of a common shock. We would expect to see a negative coefficient $\delta$ for institutional variables, assuming that a higher value of the variable indicates more flexible institutions. In this case, a country would be less affected by common shocks, i.e. be more resilient, if institutions are less rigid.

As noted above, this study focusses on common and abstracts from country-specific shocks. However, for completeness it is important to note that even if countries do not react significantly to common shocks, i.e. they are seen as more resilient, they are still susceptible to its own country-specific shocks.

### 3.1.3 Data and empirical results

We employ various measures for labour market as well as product market policies and framework conditions, as defined in more detail in Section 2. The dataset spans across all OECD countries[3] from 1990 to 2014. However, data availability varies across structural variables.

[3] Croatia, Romania and Bulgaria have been dropped due to too many gaps across institutional variables.

Overall, regression results confirm the ability of strong economic structures to cushion the effect of common shocks on economic growth. Table 1 (VAR approach to extract shocks) and Table 2 (Panel approach to extract shocks) cover individual regression results for a set of labour market, product market and framework condition variables. Indicators of labour market flexibility (i.e. OECD EPL, Heritage or GCI flexibility indicator) exhibit significant coefficients, with signs being in line with expectations. Take for example the GCI (or Heritage) labour market flexibility indicator: The negative coefficient indicates that the higher the value for this index, i.e. the more flexible a labour market, the smaller is the output loss in the face of a common GDP shock.

The sign for the OECD EPL index is also in line with expectations as the index is scaled conversely, where a lower value indicates higher flexibility and thereby a positive coefficient suggests that the more flexible labour market institutions are the smaller is the country-specific output loss in the presence of a negative global shock.

***Table 1: The role of economic structures for common shocks (VAR method)***

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| shock | 1.313*** | 1.208*** | 1.107*** | 1.237*** | 1.195*** | 1.309*** | 1.229*** | 1.192*** | 0.301** | 1.245*** | 1.221*** |
| | (0.116) | (0.104) | (0.097) | (0.109) | (0.097) | (0.108) | (0.113) | (0.111) | (0.124) | (0.108) | (0.102) |
| ***Labour market institutions*** | | | | | | | | | | | |
| ALMP*shock | -0.139* | | | | | | | | | | |
| | (0.077) | | | | | | | | | | |
| NRR*shock | | -0.192* | | | | | | | | | |
| | | (0.102) | | | | | | | | | |
| OECD EPL*shock | | | 0.151* | | | | | | | | |
| | | | (0.088) | | | | | | | | |
| GCI LM flexibility*shock | | | | -0.149* | | | | | | | |
| | | | | (0.077) | | | | | | | |
| Heritage LM flexibility*shock | | | | | -0.226** | | | | | | |
| | | | | | (0.098) | | | | | | |
| HighEdu*shock | | | | | | -0.232** | | | | | |
| | | | | | | (0.086) | | | | | |
| ***Product market institutions & framework conditions*** | | | | | | | | | | | |
| GCI PM efficiency*shock | | | | | | | -0.057 | | | | |
| | | | | | | | (0.101) | | | | |
| Economic Freedom*shock | | | | | | | | -0.067 | | | |
| | | | | | | | | (0.195) | | | |
| Doing Business*shock | | | | | | | | | -0.151* | | |
| | | | | | | | | | (0.078) | | |
| WGI*shock | | | | | | | | | | -0.191* | |
| | | | | | | | | | | (0.111) | |
| GCI*shock | | | | | | | | | | | -0.086 |
| | | | | | | | | | | | (0.095) |
| Constant | 2.333*** | 2.037*** | 2.379*** | 1.440*** | 1.741*** | 2.329*** | 1.429*** | 2.577*** | 1.491*** | 2.413*** | 1.438*** |
| | (0.011) | (0.014) | (0.011) | (0.006) | (0.016) | (0.004) | (0.008) | (0.035) | (0.065) | (0.041) | (0.005) |
| County fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| r2 | 0.265 | 0.252 | 0.188 | 0.316 | 0.283 | 0.358 | 0.355 | 0.228 | 0.097 | 0.270 | 0.402 |
| N | 458 | 418 | 664 | 315 | 350 | 527 | 315 | 490 | 173 | 525 | 315 |

*Note: * p<0.1 ** p<0.05 *** p<0.01. Robust standard errors in brackets.*
*Table surpresses regression results of institutional variables, as not the focus of this analysis. ALMP: Active Labour Market Policy Expenditure; NRR: Net replacement rate (unemployment benefits compared to last salary); EPL: OECD Employment Protection Legislation index; GCI LM: Labour market flexibility indicator of the Global Comeptitivness Institute; Hertigage LM flexibility: Labour Market flexibility indicator of the Heritage Economic Freedom index; HighEdu: percent of population with tertiary education; GCI: Overall competitivness indicator of the Global Competitiveness Institute; Economic Freedom: Economic Freedom Indicator of the Fraser institute; Doing Business: Overall World Bank Doing Business indicator; WGI: World Bank Governance Indicators.*

Product market competition indicators and variables measuring framework conditions are likewise significant (although varying a bit more depending on the shock definition applied). For all variables used in this category a higher values implies more flexible institutions, competition and business friendly conditions. In turn, the negative sign implies less contraction in the face of a shock in case of strong institutional characteristics. The OECD PMR indicator turned out insignificant.

Also the education parameter yields the presumed results, as an economy with more educated people seems to be less affected by shocks. Expenditures for active labour market policies and net replacement rates have the expected (automatic) stabilisation function. The more a country spends the lower the contemporaneous effect of a shock.

**Table 2*: The role of economic structures for common shocks (Panel method)***

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| shock | 2.042*** | 2.068*** | 1.671*** | 2.096*** | 2.069*** | 2.039*** | 2.057*** | 2.059*** | 2.144*** | 2.024*** | 1.963*** |
| | (0.216) | (0.198) | (0.140) | (0.212) | (0.200) | (0.184) | (0.208) | (0.186) | (0.338) | (0.195) | (0.177) |
| ***Labour market institutions*** | | | | | | | | | | | |
| ALMP*shock | 0.229 | | | | | | | | | | |
| | (0.213) | | | | | | | | | | |
| NRR*shock | | -0.415** | | | | | | | | | |
| | | (0.197) | | | | | | | | | |
| OECD EPL*shock | | | 0.086 | | | | | | | | |
| | | | (0.126) | | | | | | | | |
| GCI LM flexibility*shock | | | | -0.139 | | | | | | | |
| | | | | (0.126) | | | | | | | |
| Heritage LM flexibility*shock | | | | | -0.422** | | | | | | |
| | | | | | (0.161) | | | | | | |
| HighEdu*shock | | | | | | -0.229* | | | | | |
| | | | | | | (0.118) | | | | | |
| ***Product market institutions & framework conditions*** | | | | | | | | | | | |
| GCI PM efficiency*shock | | | | | | | -0.370* | | | | |
| | | | | | | | (0.196) | | | | |
| Economic Freedom*shock | | | | | | | | -0.496* | | | |
| | | | | | | | | (0.245) | | | |
| Doing Business*shock | | | | | | | | | -0.709** | | |
| | | | | | | | | | (0.348) | | |
| WGI*shock | | | | | | | | | | -0.348* | |
| | | | | | | | | | | (0.174) | |
| GCI*shock | | | | | | | | | | | -0.426** |
| | | | | | | | | | | | (0.176) |
| Constant | 2.074*** | 2.239*** | 2.286*** | 2.339*** | 2.351*** | 2.270*** | 2.363*** | 2.310*** | 2.344*** | 2.265*** | 2.305*** |
| | (0.015) | (0.035) | (0.007) | (0.091) | (0.065) | (0.029) | (0.098) | (0.020) | (0.122) | (0.024) | (0.078) |
| County fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| r2 | 0.569 | 0.577 | 0.402 | 0.575 | 0.596 | 0.546 | 0.592 | 0.537 | 0.207 | 0.567 | 0.620 |
| N | 458 | 418 | 664 | 315 | 350 | 527 | 315 | 490 | 173 | 525 | 315 |

*Note: * p<0.1 ** p<0.05 *** p<0.01. Robust standard errors in brackets.*
*Table surpresses regression results of institutional variables, as not the focus of this analysis. ALMP: Active Labour Market Policy Expenditure; NRR: Net replacement rate (unemployment benefits compared to last salary); EPL: OECD Employment Protection Legislation index; GCI LM: Labour market flexibility indicator of the Global Comeptitivness Institute; Hertigage LM flexibility: Labour Market flexibility indicator of the Heritage Economic Freedom index; HighEdu: percent of population with tertiary education; GCI: Overall competitivness indicator of the Global Competitiveness Institute; Economic Freedom: Economic Freedom Indicator of the Fraser institute; Doing Business: Overall World Bank Doing Business indicator; WGI: World Bank Governance Indicators.*

The tendency for policy settings in different domains to be highly correlated (e.g. countries with rigid labour markets often also display limit competition in product markets) generates multicollinearity and therefore prevents the estimation of equation with the full set of policies and institutions (Bénassy-Quéré et al 2007).

As this study is mainly interested in the impact of institutions in the presence of common shocks, i.e. the resilience of an economy, both tables do not show the regression results for $\gamma$, i.e. the effect of institutional characteristics for growth prospects, which conceptually would be approached differently (see e.g. Masuch et al 2016). The intercept exhibits a coefficient in line with expectations.[4]

In particular when looking at longer-time averages of output, an issue of endogeneity could arise as higher growth could also create a better environment for reforms towards higher quality institutions (Hall and Jones, 1999, and Blanchard and Wolfers, 2000). First, as we only look at GDP growth in one year and second as the institutional variables are very slow moving, this possible issue is not likely biasing our results. This notwithstanding, we control for the possibility of endogeneity by estimating the same regression with lagged explanatory institutional variables. Results are robust to this change.

**Table 3*: Implied impact of shock with differently sound economic structures***

*(a) VAR shock*

| | (1) Implied range of effect of shock | (2) |
|---|---|---|
| ***Labour market institutions*** | | |
| ALMP*shock | -0.48 | -1.46 |
| NRR*shock | -0.72 | -1.46 |
| OECD EPL*shock | -0.74 | -1.61 |
| GCI LM flexibility*shock | -0.88 | -1.53 |
| Heritage LM flexibility*shock | -0.70 | -1.66 |
| HighEdu*shock | -0.66 | -1.87 |
| ***Product market institutions & framework conditions*** | | |
| GCI PM efficiency*shock | *-1.12* | *-1.36* |
| Economic Freedom*shock | *-1.05* | *-1.59* |
| Doing Business*shock | 0.01 | -0.63 |
| WGI*shock | -0.95 | -1.82 |
| GCI*shock | *-1.05* | *-1.41* |

*(b) Panel Shock*

| | (1) Implied range of effect of shock | (2) |
|---|---|---|
| ***Labour market institutions*** | | |
| ALMP*shock | *-1.81* | *-3.41* |
| NRR*shock | -1.01 | -2.61 |
| OECD EPL*shock | *-1.46* | *-1.96* |
| GCI LM flexibility*shock | *-1.77* | *-2.36* |
| Heritage LM flexibility*shock | -1.14 | -2.94 |
| HighEdu*shock | -1.40 | -2.59 |
| ***Product market institutions & framework conditions*** | | |
| GCI PM efficiency*shock | -1.37 | -2.90 |
| Economic Freedom*shock | -0.99 | -4.98 |
| Doing Business*shock | -0.67 | -3.66 |
| WGI*shock | -1.48 | -3.07 |
| GCI*shock | -1.14 | -2.88 |

*Notes: The range is estimated by taking equation (4), assuming a one SD negative common shock, and taking the minimum and maximum institutional value across countries. Gray and italic range imply not significant interaction coefficients.*

For the same shock, weaker institutions can on average imply up to twice as high output loss in a given year compared to country with frontier institutional characteristics. Table 3 shows the effect of a given shock for the lowest and highest value of the respective institution. The way to read this table is the following: take three countries with the highest, the average and the lowest value for GCI labour market flexibility. Now assume a common (one standard deviation) shock which reduces

[4] Given that both shocks and institutions have been standardised, i.e. exhibit zero mean and unit standard deviation, the intercept is roughly depicting average GDP growth in case of no particular common shock and average institutions. Across all specifications the intercept is with an average of 2.1 close to the overall real GDP growth rate across euro area countries (2.3%).

output by about one percentage point for the country with average labour market flexibility. In Table 3 (a), the country with the highest labour market rigidities will experience a -1.53 percentage point reduction in contemporaneous output, while the country with the most resilient labour market will only see GDP deteriorate by -0.88 percentage points.

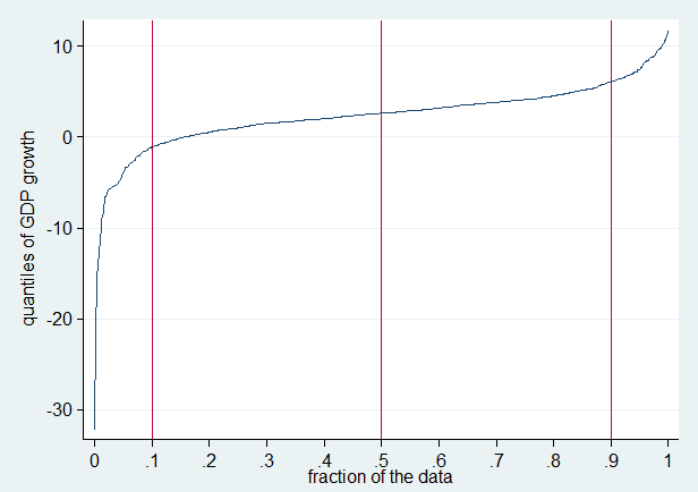
We also applied various additional robustness checks for the shock identification process. First, alternative to capturing common GDP shocks via the two methods above, we derive the common patterns of country-specific output series by means of Principal Component Analysis (PCA). This approach is conceptionally similar to the panel approach described above. Results using a PCA based shock identification are very robust (see Annex A).

Another mean of robustness check is to think of external shocks which apply to countries in a similar fashion. As a proxy for this event, we take world GDP (controlling for the countries own share in it). Again, results presented in Table 1 and Table 2 (in Section 3.1.3) are overall robust to these changes (Annex B).

### 3.2 Do well-functioning economic structures reduce the probability of crises?

Another way of operationalising resilience is to abstract from the origin of the crisis (e.g. common or country-specific shocks), but to look at extreme GDP events in general and aim to establish the role for strong economic structures to reduce such instances. We take the distribution of GDP growth across all OECD countries from 1990 to 2014 (see Chart 2) and define the 10th percentile of the distribution as crisis events, which includes median GDP growth of -4%. We estimate a probit regression model of the following form

**Chart 2***: OECD countries' GDP growth distribution (1990-2014)*




$$\Pr(y = 1|x) = \Theta(\beta_t X_{it}) \quad (5)$$

where $\Theta$ indicates the cumulative standard normal probability distribution function, $\beta$ is a Kx1 vector of parameters, *x* is a NxK matrix of explanatory variables. The independent variable has been defined above. The exogenous variables are again the different measures of institutional quality and a set of control variables, i.e. total government expenditure and nominal short term interest rates.

The findings confirm the results derived in Section 3.1: more efficient economic structures make a country more resilient towards crisis events. Table 4 presents the results of the probit model at margins of the respective weakest and strongest institutional outcome. In a nutshell, the results show that the probability of a severe reduction in GDP will be significantly lower (on average estimates suggest by 20%) if a country has the most efficient compared to a country with the least efficient economic structures.

**Table 4*: Strength of economic structures reduces probability of crisis***

| | ***Probability of GDP slump*** | |
|---|---|---|
| | *strongest institution* | *weakest institution* |
| ***Labour market institutions*** | | |
| OECD EPL | 8% | 13% |
| | (0.03) *** | (0.05) *** |
| GCI LM flexibility | 7% | 20% |
| | (0.03) ** | (0.05) *** |
| Heritage LM flexibility | 5% | 21% |
| | (0.02) ** | (0.06) *** |
| HighEdu | 5% | 14% |
| | (0.02) ** | (0.05) *** |
| ***Product market institutions & framework conditions*** | | |
| GCI PM efficiency | 6% | 26% |
| | (0.03) ** | (0.07) *** |
| Economic Freedom | 3% | 70% |
| | (0.02) ** | (0.2) *** |
| Doing Business | 0.01 | 21% |
| | (0.01) | (0.09) ** |
| WGI | 6% | 19% |
| | (0.02) *** | (0.07) *** |
| GCI | 5% | 27% |
| | (0.02) ** | (0.07) *** |

*Note: * p<0.1 ** p<0.05 *** p<0.01. Robust standard errors in brackets. For variables definition, see Table 1 and 2. The table depicts the results of a probit model (see text for detailed equation), in which the probability of crisis is depicted depending of differently strong institutions (while the control variables are assumed to be average)*

Both labour and product market indicators are overall significant therefore attaching an important weight to flexible characteristics of an economy with a view to increase its resilience. The estimate for the Fraser institute Economic Freedom indicator is particularly noteworthy, given its deviation in terms of magnitude from the other results. While overall most labour and product market (or framework conditions) indicators suggest a crisis probability of somewhat above 20% for the country with the most rigid economic structures, the country with the weakest Economic Freedom indicator are set to even have a probability of 70%. This significant outlier could be reasoned with the specifically broad coverage of this indicator. It includes indicators of basic government quality (e.g. property rights, legal system), the efficiency of labour and product markets, trade and investment barriers and financial openness. Being at the bottom of the league in all these indicators reflects indeed a particularly concerning situation for the economy at larger, which not mirrored when only focussing e.g. on the employment protection legislation indicator.

Similar as in the previous section, the possibility of endogeneity is controlled for by lagging the explanatory institutional variables. Results are robust to this change.

Moreover, the Economic Freedom index has a great weight associated to the enforceability of contracts and property rights, which appears very important to decrease the likelihood of being affected by a strong crisis. Looking at the distribution of countries for this indicator, it appears to be

particularly weak in some of the Baltic countries, Greece and in some low income OECD countries. The result in Table 4 therefore appears consistent with that of Acemoglu (2003) as referred to in Section 2.

## 4. Policy implications: a process towards more resilient economies

The variables measuring the quality of economic structures identified above can be used to monitor country-specific progress towards more resilient structures comparing countries to their peers.

The need for such a monitoring process has just been identified in particular for the euro area countries. In the current debate on strengthening the governance framework of the euro area, such a call has for example been made in the Five Presidents' Report (Juncker et al 2015), which suggests to initialise a "convergence process towards more resilient economic structures".

The empirical results derived in Section 3 suggest that the applied indicators serve as a good proxy for the well-functioning of national markets. This notwithstanding, it is important to recall that most of them face possible measurement issues. First, and more generally, certain economic structures (such as the ones pertaining to labour and product market) are multifaceted and often not easily or not at all quantifiable. Second, given that often indicators are based on perceptions, they might be affected by cyclical influences, e.g. in time of crisis the perception about the working of certain institutions could be worse than in good times. And third, the sample size and composition of the surveyed matters as well as its changes through time.

In the light of these caveats, it seems appropriate to reconcile these variables with objective measurable outcome variables. Thus, we suggest a simplistic empirical model to identify observable macro-economic variables able to provide a good cross-check for the qualitative institutional indicators. These two types of variables could then serve for the creation of a policy scoreboard which measures distance to frontier for euro area or OECD countries more generally.

For the identification of quantitative macro data which can be empirically associated to the qualitative institutional indicators, we employ simple panel regressions of the following form

$$(6)\quad y_{it} = \alpha + \beta_i D_i + \gamma_t D_t + \delta X_{it} + e_{it}.$$

Equation (6) suggests that we assume that certain macro variables ($y_{it}$) exist which can be partially explained by the structural variable ($X_{it}$) which we identified in previous sections. Moreover, each panel regression includes country ($D_i$) and time ($D_t$) fixed effects which should broadly capture other factors determining the macro variables in addition to the policy or structural variables. Given that this exercise is not the focus of the paper the regressions are conducted in a relatively simplistic fashion, without conducting a battery of robustness checks. Against this background, the empirical results in Table 5 should be taken with caution and not be regarded as more than providing a rough link between the two types of indicators.

**Table 5*: Identifying macro variables to cross check institutional proxies***

| *category* | ***Institutional proxy*** *[independent variable]* | ⇨ | ***related macro variable for cross-check*** *[dependent variable]* |
|---|---|---|---|
| **Labour market flexibility** | *EPL* | **0.329**** | Unit labour costs |
| | *Heritage /GCI sub-indices* | **-0.152**** | Unit labour costs, non-tradable sectors |
| | | **0.099**** | Employment rate |
| | | **-0.174**** | Unemployment rate, lowskilled workers |
| **Educational attainment** | *Tertiary education* | **0.062*** | Participation rate |
| **Goods/services market flexibility** | *DoingBusiness/GCI* | **0.901*** | Investment growth |
| | | **0.392**** | Birth rate of new firms |
| **Framework costs** | *WGI* | **0.831**** | TFP growth |
| | *Economic Freedom* | **0.270**** | Birth rate of new firms |

*Notes: Relating institutional variables to macro variables is done by means of separate panel estimations regressing the change of macro variables on change of instiutional proxies with country and time fixed effects. All variables are standardised. Stars indicate significance at * p<0.1, ** p<0.05, *** p<0.01*

Table 5 shows that there is a tendency that with higher employment protection legislation, or lower flexibility of labour market institutions at large, labour cost tends to rise. The more difficult it becomes to shift labour across firms, sectors, and time (e.g. to renegotiate wages in difficult economic times), the more downward wage rigidity exist, in turn, leading (all else equal) to higher labour cost. As seen in many peripheral countries during the euro area sovereign debt crisis, these rigidities tended in fact to cause some upward pressure on unit labour costs, in particular on the non-tradable sectors, which are less exposed to international competition. Also the unemployment rate, in particular of low-skilled workers, reacts strongly to rigidities in labour markets, which often benefit incumbent workers, in expense of the (often more low skilled) unemployed.

For the quality of educational attainments, in particular of the tertiary sector (which was the focus in this study), the participation rate seems a reasonable fit. While this observable variable is clearly determined by many factors, the quality of the education system is a particularly important driver as it increases the employability of workers more generally.

For product market competition, the entry of new firms is an essential criterion. The birth rate of new firms is in this respect a good indicator variable, as confirmed by the significant coefficient in the regression. More conducive overall framework conditions should also lead to better climate for innovation and productivity. The Total Factor Productivity growth appears as a good proxy for this in this regard. Moreover, firms' investment inclination, everything else equal, should also increase if the business environment is more favourable.

The results of the previous sections together with the empirical results suggest related observable macro data could be used by policy makers to setup a policy scoreboard, which would establishes an overall picture of resilience for countries across all different structural variables as well as their distance from frontier**.** Such a type of scoreboards could facilitate the monitoring of policy progress by looking at qualitative institutional variables in the first place, but cross-checked by assessing developments of observable macro-economic variables.

## 5. Conclusions

The financial and sovereign debt crisis has exposed the limited economic resilience of several OECD and specifically most euro area economies. The limited economic resilience is often related to weak national economic structures.[5] In particular, rigidities in labour markets, limited competition in product markets, framework conditions which impede the entrance of new firms and complicate daily business of existing firms, as well the quality of government services (e.g. rule of law, absence of corruption) are often argued to be the main obstacles to a higher shock absorption capacity.

This paper contributes to the literature by establishing a range of empirical measures of resilience. First, we isolate common GDP shocks across countries using VAR and panel models. Second, we abstract from the origin of the shock and just filter severe crises events, by selecting the $10^{th}$ percentile of the GDP distribution of a sample of OECD countries over 35 years. We then estimate whether the reaction to shocks and the likelihood of entering into a severe recession depends on the quality of national economic structures. Economic structures are measured by a wide set of institutional indicators that capture the above mentioned dimensions. Furthermore, we take the evidence gathered on structural variables and link them to observable macro variables. We suggest that such a combination of structural and macro variables could serve as basis for a policy scoreboard which monitors the progress towards higher resilience in countries.

Overall, we find robust evidence that strong and flexible institutions increase the resilience towards adverse shocks. For a common shock across countries, a country with weaker economic structures can on average suffer up to twice the output loss in a given year compared to the case where the country is at frontier of institutional parameters. In a similar fashion, other empirical results show that the likelihood of a severe economic crisis is significantly reduced if a country exhibits most flexible and adaptable institutions.

The identified structural variables are then related to observable macro data. We find reasonable macro data, which could enhance and double-check the reading of the institutional data. While this exercise is simplistic and exemplary in terms of macro variables' coverage, it overall shows how the monitoring process towards similarly resilient structures could be set-up as for example suggested in the 'Five Presidents' Report' (Juncker et al 2015).

Looking forward, the work could be enhanced in various ways. In particular, a more granular analysis on an economy's capacity to withstand shocks depending on the strength of its institutions could be envisaged. This could take many routes. It could, for example, further break down labour market policy indicators to see which (combination of) policies helps most to increase resilience. Alternatively, a sectoral analysis could be used to establish which more sectoral institutional indicators have predictive power of more resilient sector performances across euro area countries.

[5] See Juncker et al (2015) call in the Five Presidents' Report for a "convergence process towards more resilient economic structures", not least as a precondition for a euro area fiscal stabilisation function. See also for example Draghi (2015).

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## Annex A

### *Table 6: The role of economic structures for common shocks (PCA method)*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| shock | 2.073*** | 2.113*** | 1.741*** | 2.112*** | 2.101*** | 2.000*** | 2.065*** | 2.056*** | 1.733*** | 2.005*** | 1.980*** |
| | (0.205) | (0.198) | (0.139) | (0.209) | (0.199) | (0.162) | (0.204) | (0.179) | (0.310) | (0.188) | (0.175) |
| ***Labour market institutions*** | | | | | | | | | | | |
| ALMP*shock | 0.238 | | | | | | | | | | |
| | (0.223) | | | | | | | | | | |
| NRR*shock | | -0.412** | | | | | | | | | |
| | | (0.196) | | | | | | | | | |
| OECD EPL*shock | | | 0.104 | | | | | | | | |
| | | | (0.125) | | | | | | | | |
| GCI LM flexibility*shock | | | | -0.159 | | | | | | | |
| | | | | (0.126) | | | | | | | |
| Heritage LM flexibility*shock | | | | | -0.431** | | | | | | |
| | | | | | (0.162) | | | | | | |
| HighEdu*shock | | | | | | -0.174 | | | | | |
| | | | | | | (0.107) | | | | | |
| ***Product market institutions & framework conditions*** | | | | | | | | | | | |
| GCI PM efficiency*shock | | | | | | | -0.356* | | | | |
| | | | | | | | (0.194) | | | | |
| Economic Freedom*shock | | | | | | | | -0.462* | | | |
| | | | | | | | | (0.232) | | | |
| Doing Business*shock | | | | | | | | | -0.594** | | |
| | | | | | | | | | (0.287) | | |
| WGI*shock | | | | | | | | | | -0.318* | |
| | | | | | | | | | | (0.165) | |
| GCI*shock | | | | | | | | | | | -0.413** |
| | | | | | | | | | | | (0.173) |
| Constant | 2.152*** | 2.488*** | 2.290*** | 2.502*** | 2.543*** | 2.417*** | 2.516*** | 2.486*** | 2.301*** | 2.441*** | 2.458*** |
| | (0.006) | (0.057) | (0.007) | (0.105) | (0.081) | (0.031) | (0.109) | (0.015) | (0.130) | (0.027) | (0.090) |
| County fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| r2 | 0.585 | 0.573 | 0.421 | 0.572 | 0.594 | 0.535 | 0.588 | 0.533 | 0.204 | 0.560 | 0.619 |
| N | 458 | 418 | 664 | 315 | 350 | 527 | 315 | 490 | 173 | 525 | 315 |

*Note: * p<0.1 ** p<0.05 *** p<0.01. Robust standard errors in brackets.*

*Table surpresses regression results of institutional variables, as not the focus of this analysis. ALMP: Active Labour Market Policy Expenditure; NRR: Net replacement rate (unemployment benefits compared to last salary); EPL: OECD Employment Protection Legislation index; GCI LM: Labour market flexibility indicator of the Global Comeptitivness Institute; Hertigage LM flexibility: Labour Market flexibility indicator of the Heritage Economic Freedom index; HighEdu: percent of population with tertiary education; GCI: Overall competitivness indicator of the Global Competitiveness Institute; Economic Freedom: Economic Freedom Indicator of the Fraser institute; Doing Business: Overall World Bank Doing Business indicator; WGI: World Bank Governance Indicators.*

## Annex B

### *Table 7: The role of economic structures for common shocks (World GDP method)*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| shock | 1.749*** | 1.897*** | 1.389*** | 2.147*** | 2.186*** | 1.749*** | 2.080*** | 1.843*** | 0.725** | 1.753*** | 2.030*** |
| | (0.267) | (0.229) | (0.172) | (0.226) | (0.218) | (0.219) | (0.225) | (0.205) | (0.343) | (0.195) | (0.201) |
| ***Labour market institutions*** | | | | | | | | | | | |
| ALMP*shock | 0.048 | | | | | | | | | | |
| | (0.161) | | | | | | | | | | |
| NRR*shock | | -0.293 | | | | | | | | | |
| | | (0.221) | | | | | | | | | |
| OECD EPL*shock | | | 0.263* | | | | | | | | |
| | | | (0.129) | | | | | | | | |
| GCI LM flexibility*shock | | | | -0.232* | | | | | | | |
| | | | | (0.124) | | | | | | | |
| Heritage LM flexibility*shock | | | | | -0.519*** | | | | | | |
| | | | | | (0.172) | | | | | | |
| HighEdu*shock | | | | | | -0.041 | | | | | |
| | | | | | | (0.159) | | | | | |
| ***Product market institutions & framework conditions*** | | | | | | | | | | | |
| GCI PM efficiency*shock | | | | | | | -0.301 | | | | |
| | | | | | | | (0.227) | | | | |
| Economic Freedom*shock | | | | | | | | -0.147 | | | |
| | | | | | | | | (0.263) | | | |
| Doing Business*shock | | | | | | | | | -0.047 | | |
| | | | | | | | | | (0.333) | | |
| WGI*shock | | | | | | | | | | -0.186 | |
| | | | | | | | | | | (0.162) | |
| GCI*shock | | | | | | | | | | | -0.356* |
| | | | | | | | | | | | (0.205) |
| Constant | 2.211*** | 1.869*** | 2.238*** | 1.483*** | 1.600*** | 2.236*** | 1.482*** | 2.240*** | 1.541*** | 2.191*** | 1.471*** |
| | (0.004) | (0.007) | (0.013) | (0.015) | (0.018) | (0.018) | (0.010) | (0.028) | (0.070) | (0.034) | (0.014) |
| County fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| r2 | 0.337 | 0.411 | 0.259 | 0.504 | 0.525 | 0.434 | 0.524 | 0.358 | 0.077 | 0.392 | 0.561 |
| N | 458 | 418 | 664 | 315 | 350 | 527 | 315 | 490 | 173 | 525 | 315 |

*Note: * p<0.1 ** p<0.05 *** p<0.01. Robust standard errors in brackets.*

*Table surpresses regression results of institutional variables, as not the focus of this analysis. ALMP: Active Labour Market Policy Expenditure; NRR: Net replacement rate (unemployment benefits compared to last salary); EPL: OECD Employment Protection Legislation index; GCI LM: Labour market flexibility indicator of the Global Comeptitivness Institute; Hertigage LM flexibility: Labour Market flexibility indicator of the Heritage Economic Freedom index; HighEdu: percent of population with tertiary education; GCI: Overall competitivness indicator of the Global Competitiveness Institute; Economic Freedom: Economic Freedom Indicator of the Fraser institute; Doing Business: Overall World Bank Doing Business indicator; WGI: World Bank Governance Indicators.*

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