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External shocks and labor market reforms in autocracies and democracies: evidence from oil price windfalls*

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Abstract

We examine the relationship between oil price windfalls and labor market regulation empirically through panel regressions in a sample of 83 countries spanning the 1970-2014 period. We find that oil price windfall gains lead to a deregulation of the labor market in autocracies but have no effects in democracies. Windfall losses instead cause a substantial deregulation in democracies but have no effects in autocracies. We then consider possible transmission channels. Democracies appear to redistribute the rents stemming from a positive windfall by increasing government expenditures. Rent extraction and economic efficiency considerations are both plausible drivers of the deregulation following windfall gains in autocracies, as expenditures are not raised, while GDP and employment gradually increase after positive windfalls. The deregulation following windfall losses in democracies is instead consistent with the crisis-induced-reform hypothesis, as the windfall loss induce a sharp deterioration of the current account and budget balances.

JEL codes: F16; J41; O13; P11; P16; Q02

Keywords: oil price; windfalls; labor market; deregulation; political institutions

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1. INTRODUCTION

The effects that natural resources and external shocks have on economic growth and institutions is an important topic in development economics. In this paper, we contribute to the literature by examining specifically the effects that oil price windfalls have on labor market institutions. To the best of our knowledge, we are the first to do so.

A major hurdle that had prevented progress in the past on answering the question of how natural resources affect labor market institutions is the availability of data on the latter for a large set of countries and years. To this end, we use a novel dataset on employment protection legislation from Ciminelli and Furceri (forthcoming). This dataset measures the extent of the restrictions faced by employers when they want to terminate an indefinite employment contract. Our measure of oil price windfalls is an oil export price index, which we construct following conventional practice as the interaction between a country's average GDP share of oil exports and the annual growth rate of the international oil price (see, e.g., Arezki and Brueckner, 2012). Excluding from the sample major oil exporters such as Russia and Saudi Arabia, we are able to estimate plausibly causal effects of oil price windfalls on employment protection regulation.

We start considering reduced form estimates. Our main finding is that the effect of oil price windfalls on employment protection legislation depends on political institutions. Oil price windfall gains lead to a significant deregulation of the labor market in autocracies while they do not have any significant effect in democracies. On the other hand, oil price windfall losses lead to a deregulation of the labor market in democracies but have no effects in autocracies. These empirical results are persistent over the medium term and are robust to a variety of model specifications and estimation techniques that are standard in the literature. Moreover, the difference between the effects of positive and negative oil price windfalls are statistically significant. Quantitatively, the effects that oil price windfalls have on labor market institutions are important, particularly in democracies. A 1-standard-deviation positive windfall induce a deregulation reform worth about a sixth of the median reform in autocracies, while a 1-standard-deviation negative windfall induce a deregulation reform roughly equal to the median reform in democracies.

In a second step, we explore potential transmission channels that might drive our results. Oil is a capital-intensive commodity. According to standard international trade theory (i.e., the Stolper-Samuelson effect), when markets are perfectly competitive an increase in the international oil price should increase the rental rate relative to wages, and more so, the larger is the GDP share

of oil exports. However, when labor markets are not perfectly competitive, e.g., due to labor market regulation, the predictions from theory are not straightforward. One possible explanation of our results is that, in autocracies, well-connected capitalist insiders lobby the regime following oil price windfalls to liberalize the labor market in order to reduce workers' bargaining power, thereby keeping wage pressures in check and appropriating a larger share of the rent.

At the same time, one of the main goals of deregulating the labor market is to give employers more flexibility in deciding the optimal allocation of labor, which should increase efficiency and may attract higher investments. Hence, an alternative interpretation is that there are efficiency gains that materialize when there is a deregulation of the labor market. Such an interpretation would be in line with the view that competitive markets achieve the efficient allocation. However, deregulating the labor market can cause employment losses in the short term, as employers can take advantage of the new rules to dismiss the most unproductive workers (Cacciatore and Fiori, 2016). Oil price windfalls may then offer a good window of opportunity for governments to implement a labor market deregulation, as implementing such reforms during a boom might reduce its short-run costs.

However, deregulating the labor market can lead to a lower bargained wage (Ciminelli et al., 2023). Hence, some governments, particularly those in countries in which democratic institutions are stronger, may be reluctant to implement a deregulation reform, even after periods of oil price windfalls, in order not to alienate voters. Deregulation reforms are then delayed until a crisis hits, when they are perceived to be strictly necessary. According to this crisis-induced-reform hypothesis, democratic countries implement reforms that improve efficiency for the society overall but that may have (high) short-term costs during crises, when voters understand that there may be few alternatives to reform (Tommasi and Velasco, 1996; Drazen and Grilli, 1993). Insofar as oil price windfall losses induce a crisis, they may be conducive to a deregulation reform.

We test these potential transmission channels by expanding the analysis on the effects of oil price windfalls to different dependent variables. These additional estimations suggest that political economy and efficiency considerations might both be important in explaining the result that autocratic regimes deregulate the labor market following positive windfalls. We find that positive windfalls generate important rents, and that the magnitude of the labor market deregulation is larger in more autocratic regimes. Taken together, these results reinforce the hypothesis that well-connected capitalists lobby for deregulation to appropriate a larger share of

the rents generated by the windfall (or at least prevent that workers successfully bargain for a higher wage). This political economy interpretation is broadly in line with view that there are synergies between economic and political institutions (see e.g. Acemoglu and Robinson, 2012); and that there is significant rent extraction by capitalists in autocracies but not in democracies (Brueckner, 2017).

At the same time, we also find that tax revenues and the primary balance increase on impact, while GDP and the employment rate increase gradually, after a positive windfall. This gradual increase of employment and GDP might be the result of the labor market deregulation implemented in response to the windfall. Given these dynamics, we cannot rule out that governments in autocratic regimes understand that positive windfalls provide a good opportunity to liberalize the labor market, thus stimulating employment and improving overall economic efficiency in the medium term, while minimizing short-term costs. While governments in democratic governments might also be aware of the fact that passing a structural reform in good times can minimize its short-run costs, they might still be unwilling to pass such reform if it is ostracized by a majority of voters.

Indeed, political economy considerations appear to be very important in explaining the response of the labor market regulation index to oil price windfalls in democracies. As in autocracies, in democracies both oil rents and tax revenues increase on impact following positive windfalls. But, differently from autocracies, government expenditures gradually increase after positive windfalls, suggesting that democratic governments use the higher tax revenues stemming from the windfall to redistribute parts of the oil rents to the wider population. Turning to negative windfalls, we find that these sharply deteriorate the current account and budget balances. The fact that democratic countries implement labor market deregulation after an oil price windfall loss that significantly deteriorates public finances as well as the country's external position supports the crisis-induced-reform hypothesis, according to which the political economy of structural reforms in democratic countries is such that reforms are delayed until a crisis hits.

Our paper mainly contributes to the literature on the macroeconomic effects of natural resources and to that examining the drivers of economic reforms. In the 1990s, the mainstream view was that natural resources, in particular oil wealth, is not beneficial for a country's economic development. Early empirical studies, mostly based on cross-country regressions and case studies, uncovered a negative relationship between natural resource dependence and economic growth

(e.g., Sachs and Warner, 1995 and 1999). There were also arguments made and empirical evidence provided, mostly in form of cross-country regressions and case studies, that natural resource dependence is positively correlated with corruption, weak state capacity, and the likelihood that countries are ruled by autocrats (e.g., Gelb, 1990, Karl, 1997, Ross, 2001).

In the 2000s and 2010s the mainstream view that natural resources are a curse changed somewhat. Alexeev and Conrad (2009) showed that when the dependent variable is the level of GDP per capita, as a measure of long-run living standards, as opposed to transitional growth, there is no evidence of a resource curse. Brunnschweiler and Bulte (2008) showed that natural resource abundance, as opposed to natural resource dependence, is not significantly associated with a higher risk of civil conflict and slower economic growth. Brueckner and Ciccone (2010) documented that commodity price windfalls are, on average, associated with faster GDP growth in sub-Saharan Africa. A number of subsequent empirical studies, using VARs and dynamic panel regressions uncovered that in the short run commodity price windfalls have positive effects on GDP growth (e.g., Brueckner et al., 2012, Collier and Goderis, 2012, Araujo et al. 2016, Fernandez et al., 2020)

There exist only a few papers providing evidence that the effects of natural resources significantly depend on institutions. Melhum et al. (2006) argued theoretically and provided empirical evidence that the cross-country positive effect of natural resources on GDP growth is increasing in institutional quality. Arezki and Brueckner (2012) documented that commodity price windfalls lead to a significant reduction of external debt in democracies, while no significant effect is present in autocracies.

Our paper is also related to the literature studying crises as drivers of reforms in democratic countries. The early literature theorized that economic or financial crises can break the deadlock over reforms that enhance welfare in the medium term but have short-term costs and could not be adopted otherwise (Drazen and Grilli, 1993; Tommasi and Velasco, 1996; Rodrik, 1996). At the same time, the evidence from the empirical literature is mixed. Early studies found broad support for this crisis-induced-reform hypothesis (Nelson, 1990; Grindle and Thomas, 1991; Haggard and Kaufman, 1992; Haggard and Webb, 1994, Williamson and Haggard 1994). Later studies confirmed the hypothesis only for certain reforms (Drazen and Easterly, 2001; Lora and Olivera 2004; Agnello et al., 2015), while Abiad and Modi (2005) found mixed evidence for financial reforms. For labor market reforms in particular, Duval et al. (2021) found that periods of high

unemployment and recessions substantially increase the probability of an employment protection deregulation reform.

The remainder of the paper is organized as follows. In Section 2 we describe the data that we used in our empirical analysis. Section 3 sets out the econometric models. Section 4 presents the main results, while Section 5 discusses the transmission channels. Section 6 concludes.

2. DATASET

Our sample includes 83 countries and spans the 1970-2014 period. The panel is unbalanced, with each country's time coverage dictated by the availability of the labor market regulation and oil windfall data. The median sample start year across countries is 1970, while the average is 1975. All countries are covered until the end of the time sample (2014).

Of the countries covered, 10 were always autocracies, 34 were always democracies and 39 switched from autocracy to democracy or vice versa at least once during the sample. To distinguish between autocracies and democracies we rely on the Regime Authority Characteristics and Transition dataset assembled by the Center for Systemic Peace (Marshall et al., 2004). In particular, we use the polity2 variable, which scores country-time observations on a -10 to +10 scale, with more positive (negative) numbers denoting more democratic (autocratic) regimes. For the purpose of our analysis, we divide the sample based on whether the polity2 variable is above/below 0. Table A1 in the Appendix lists all countries covered.

A. Employment protection legislation data

We source data on employment protection legislation (EPL) from Ciminelli and Furceri (forthcoming), who themselves build on Alesina et al. (2023). The latter put together a database of major reforms in six structural policy areas, including the labor market. Relative to Alesina et al. (2023), Ciminelli and Furceri (forthcoming) expand the country and time coverage. The database quantifies the restrictions faced by employers when terminating an indefinite employment contract and is positive in nature in the sense that it captures impediments to dismissals, without taking a stance on why they are put in place.

The database focuses on five broad areas of EPL: (i) valid grounds, meaning the reasons that are considered as legitimate for termination, (ii) administrative requirements to be complied with before termination, (iii) monetary costs, such as notice periods as well as severance and redundancy payments, (iv) redress measures, meaning reparations to be made to the employee when termination is considered to be illegitimate *ex-post*, and (v) additional requirements in case of collective dismissals. For each of these areas, several variables capturing different aspects of regulation are constructed. Area indicators are then assembled as averages across such variables. Finally, an overall EPL index is derived as the average of the area indicators.

The database is constructed based on official laws and economy-wide collective agreements. It covers regulation applying to micro, small, medium and large firms separately. This is important because EPL is often size-dependent, in the sense that different provisions apply to firms with different numbers of workers. For our analysis, we rely on the index measuring EPL in medium-sized firms (150 workers).¹ Another advantage is the comprehensive coverage. The database covers 96 countries, including the most economically important ones. The time sample considered varies by country, with some countries being covered since the early 1900s. The large cross-country and time coverage of this database is what makes it superior to other existing ones for the purpose of our study.

In what follows, we take a first look at the EPL index used in the analysis. The index ranges between 0 and 100, with higher values denoting more restrictions. In Figure 1, we start by plotting its interquartile range and the median value, separately across autocracies (Panel A) and democracies (Panel B). While EPL increased throughout the period considered, this increase was particularly marked during the 1970s, while it slowed down in the second part of the sample. There are no significant differences between autocracies and democracies, with the median being around 23 (out of a 0-100 scale) in both groups.

In Figure 2, we look at the frequency of reforms and conclude that reforms are fairly rare events – they happen less than once every 10 years, on average. Reforms, particularly those that increase regulation (tightening reforms), are more frequent in democracies than autocracies. Table 1 presents some descriptive statistics on the size of reforms. Reforms, both easing and tightening

¹ The authors also consider heterogeneities in EPL applying to blue- and white-collar workers as well as to workers with different lengths of service. We use the index obtained as the average across blue and white collar as well as workers with different tenures.

ones, are typically almost twice as large in autocracies as in democracies. We also note that there is a large dispersion in the size of reforms. The mean reform is worth about 15% (7.5%) of the median value of the index in autocracies (democracies). But some countries also experienced particularly large reforms, worth more than 100% the median value of the index, implying drastic changes in EPL.

B. Windfalls data

Our main focus is on windfalls that arise from variations in international commodity prices. For that purpose, we use an international commodity price index where the international commodity prices are geometrically weighted with countries' average GDP shares of the export values of the commodities, see e.g. Arezki and Brueckner (2012). We use the GDP share – and not the export share – because we want to use cross-country variation in the economic importance of the resource as measured relative to the total value added in the economy, not just the economic importance of the resource as measured relative to exports.

For the baseline analysis, we consider oil price windfalls. Oil price windfalls are the change in the log of the international oil price between year t and $t-1$ times a country's average GDP share of oil exports during the sample period. For some extensions, we also present results for other price windfalls, including for agricultural commodities. Finally, for a robustness check, we use the oil discoveries variable constructed by Cotet and Tsui (2013). We clean windfall data censoring extreme outliers, defined as observations above the 99.9th percentile and below the 0.1st percentile of the windfall distributions. For the case of oil price windfalls, this amounts to censoring observations more than ten standard deviations above and five standard deviations below the mean.

Table 2 presents descriptive statistics of the oil price windfall variable, separately for autocracies and democracies. Oil price windfalls were almost three times larger in autocracies than democracies on average in the sample considered, owing to the larger share of oil exports in GDP in autocracies.

C. Other data

To investigate the transmission channels driving the effects of oil price windfalls on employment protection regulation, we collect additional variables. From the IMF World Economic Outlook, we source data on (i) real GDP per capita in local currency units, (ii) the current account balance

as a share of GDP, and (iii) GDP per capita in PPP units. From the IMF Modern Public Finance Database, we source information about (i) tax revenues, (ii) government primary expenditures, and (iii) the primary balance (all as shares of GDP). From the Penn World Tables, we source the employment to population ratio. Data on the GDP share of oil rents (defined as the value of oil production minus the cost of production) are from the World Development Indicators.

3. ECONOMETRIC SPECIFICATIONS

A. Random and fixed effects models

As a start, we consider a first-difference specification in which we regress the change in the EPL index onto the change in the international oil price index. This allows us to establish a relationship between oil price windfalls and reforms to EPL. We start by estimating a random effects model through generalized least squares (GLS) regressions. We then also consider a fixed effects model, which we estimate through ordinary least squares (OLS). The specifications that we estimate are as follows:

$$\Delta EPL_{i,t} = \alpha + \sum_{k=0}^1 \beta_k \Delta Oil_{i,t-k} + \tau_t + \varepsilon_{i,t} \quad (1)$$

$$\Delta EPL_{i,t} = \alpha + \sum_{k=0}^1 \beta_k \Delta Oil_{i,t-k} + \tau_t + \gamma_i + \varepsilon_{i,t} \quad (2)$$

where Δ is the first-difference operator, $EPL_{i,t}$ is the EPL index, α is a constant term, $Oil_{i,t}$ is the log of the international oil price in year t times country's i average GDP share of oil exports over the sample, τ_t and γ_i respectively denote country and year fixed effects, and $\varepsilon_{i,t}$ is the error term, assumed to be uncorrelated with the regressor and clustered at the country-level. The β_k s are the coefficients of interest and measure the contemporaneous ($k = 0$) and lagged effect ($k = 1$) of oil price windfalls onto changes in EPL. To ease interpretation of the results, we standardize the oil price windfalls variable by its standard deviation so that the β_k coefficients measure the response to a 1-standard deviation windfall.

The identifying assumption is that oil price windfalls are exogenous to labor market regulation. Most oil exporting countries are price takers on the international commodity market.

Russia and Saudi Arabia, historically the world's two largest oil exporters, are excluded from our sample. Further, the country-specific oil price index is constructed using time-invariant oil export shares. Conditional on country and time fixed effects, the variation in the oil price index – international oil price times a country's average GDP share of oil exports – is thus plausibly exogenous to labor market regulation.

As noted, oil price windfalls tend to be considerably larger in autocracies than democracies, while reforms tend to be more frequent in democracies than autocracies (see descriptive statistics reported in Tables 1 and 2). Given this background and the multiple channels that might drive the effects of oil price windfalls on EPL, we perform the estimation separately for the samples of autocracies and democracies.

B. Local projections

The specifications in Equations (1) and (2) focus on the short-term impact of oil price windfalls onto EPL reforms. To shed more light on the dynamics and persistence of the effects, we employ the local projection method. This method was pioneered by Jordà (2005) and has been widely used thereafter (Auerbach and Gorodnichenko, 2012; Jordà and Taylor, 2016; Romer and Romer, 2017; Ramey and Zubairy, 2018, among many others). Plagborg-Møller and Wolf (2021) show that local projections and VARs estimate the same impulse responses. Montiel et al. (2021) show that lag-augmented local projections yield standard errors that are asymptotically valid.

In practice, the local projection method entails estimating the response of the dependent variable at period $t+k$ to the shock at time t directly. We consider a 5-year period, including the year of the shock and the four following ones. Therefore, for each $k = 0, \dots, 4$, we estimate the following specification:

$$EPL_{i,t+k} - EPL_{i,t-1} = \gamma_i + \tau_t + \beta_k^A \Delta Oil_{i,t}^A + \beta_k^D \Delta Oil_{i,t}^D + \sum_{j=1}^k (\delta_{k,j}^A \Delta Oil_{i,t+j}^A + \delta_{k,j}^D \Delta Oil_{i,t+j}^D) + \sum_{l=1}^2 (\rho_{k,l}^A \Delta Oil_{i,t-l}^A + \rho_{k,l}^D \Delta Oil_{i,t-l}^D) + \vartheta_k Y_{t-1} + \varepsilon_{i,t} \quad (3)$$

where $\Delta Oil_{i,t}^A$ ($\Delta Oil_{i,t}^D$) denote positive oil price windfalls in autocracies (democracies), constructed as $\Delta Oil_{i,t} * A_{i,t}$ ($\Delta Oil_{i,t} * (1 - A_{i,t})$) with $A_{i,t}$ being a dummy variable taking value equal to 1

when the polity2 score is below 0; Y_t is the log of per capita GDP in PPP, included to control for the stage of development, and the rest of the notation is as in Equation (2).

The variables in the summation term are forward shocks á la Teulings and Zubanov (2014), included to take into account of oil price windfalls that occur within the $t + k$ horizon, but that are not captured by the main explanatory variable ($\Delta Oil_{i,t}$), and whose omission may bias the results. The equation is made dynamically complete by including two lags of the windfall variables. The model includes country and time fixed effects, and the estimation is carried out through OLS.²

We estimate the model on the full sample of autocracies and democracies, allowing for different effects of oil price windfalls in these two groups of regimes, rather than splitting the sample in two. This is in order to maximize the number of observations in each country. The results would be very similar if we were to split the sample in two. The coefficients of interest are the β_k^A s and β_k^D s. They capture the effect of oil price windfalls at time t on the cumulative change in EPL during the $t + k$ horizon in, respectively, autocracies and democracies. The results are presented in the form of impulse response functions (IRFs), i.e. we plot the estimated coefficients β_k^A and β_k^D and their respective 90% confidence bands.

In a next step, we leverage on the flexibility of the local projections method to analyze the effects of positive and negative oil price windfalls separately, given that these may have different effects on EPL. We estimate the following regression specification:

$$\begin{aligned} EPL_{i,t+k} - EPL_{i,t-1} = & \gamma_i + \tau_t + \beta_k^{A,P} \Delta Oil_{i,t}^{A,P} + \beta_k^{A,N} \Delta Oil_{i,t}^{A,N} + \beta_k^{D,P} \Delta Oil_{i,t}^{D,P} + \beta_k^{D,N} \Delta Oil_{i,t}^{D,N} + \\ & + \sum_{j=1}^k (\delta_{k,j}^{A,P} \Delta Oil_{i,t+j}^{A,P} + \delta_{k,j}^{A,N} \Delta Oil_{i,t+j}^{A,N} + \delta_{k,j}^{D,P} \Delta Oil_{i,t+j}^{D,P} + \delta_{k,j}^{D,N} \Delta Oil_{i,t+j}^{D,N}) + \\ & + \sum_{l=1}^2 (\rho_{k,l}^{A,P} \Delta Oil_{i,t-l}^{A,P} + \rho_{k,l}^{A,N} \Delta Oil_{i,t-l}^{A,N} + \rho_{k,l}^{D,P} \Delta Oil_{i,t-l}^{D,P} + \rho_{k,l}^{D,N} \Delta Oil_{i,t-l}^{D,N}) + \vartheta_k Y_{t-1} + \varepsilon_{i,t} \quad (4) \end{aligned}$$

where $\Delta Oil_{i,t}^{A,P}$ and $\Delta Oil_{i,t}^{D,P}$ denote positive windfalls (i.e., gains) in autocracies and democracies, respectively, constructed by interacting the $\Delta Oil_{i,t}^A$ and $\Delta Oil_{i,t}^D$ variables from Equation (3) with a dummy variable taking value equal to 1 for positive changes in the oil price index. $\Delta Oil_{i,t}^{A,N}$ and $\Delta Oil_{i,t}^{D,N}$ denote negative windfalls (i.e., losses) in autocracies and democracies, respectively,

² We also considered a random effects local projection model through GLS. The results using the two approaches are very similar.

constructed by interacting the $\Delta Oil_{i,t}^A$ and $\Delta Oil_{i,t}^D$ variables from Equation (3) with a dummy variable taking value equal to 0 for negative changes in the oil price index. The coefficients $\beta_k^{A,P}$ and $\beta_k^{D,P}$ measure the cumulative effect of positive oil price windfalls (i.e. gains) at time t on EPL reforms over horizon $t + k$ in autocracies and democracies, respectively. The coefficients $\beta_k^{A,N}$ and $\beta_k^{D,N}$ measure the cumulative effect of negative oil price windfalls (i.e. losses) at time t on EPL reforms over horizon $t + k$ in autocracies and democracies, respectively.

4. BASELINE RESULTS

A. Short-run effects

Table 3 presents the baseline results, obtained estimating Equations (1) and (2). The results are reported in Panels A and B, respectively for the sample of autocracies and democracies. Columns (1) and (2) show results from a specification including only the contemporaneous value of the oil price windfall variable. The estimates in columns (1) and (2) are obtained by estimating random and fixed effects models, respectively. Columns (3) and (4) report results when we model oil price windfalls to affect EPL with a one-year lag. Columns (5) and (6) show estimates when including both the contemporaneous and the lagged value of the oil price windfall variable in the model. The reported coefficients are normalized to show the effect of a one standard deviation oil price windfall (calculated on the unrestricted sample of autocracies and democracies, equal to about 1.5). Equations (1) and (2) assume that positive and negative oil price windfalls have symmetric effects. For simplicity, we discuss the results referring to positive windfalls. Further below, we allow for asymmetric effects depending on the sign of the windfall.

We estimate negative coefficients for oil price windfalls in autocracies, while the coefficients estimated for democracies are not statistically significant. The coefficients estimated for the contemporaneous oil price windfall variable and its one-year lag in autocracies are about -0.2 and -0.1 respectively. Both these coefficients are statistically significant at either the 95% or 99% confidence level and are broadly consistent across the different specifications and regression models considered.

The fact that the two coefficients have the same sign and are both significant suggests that either the cumulative effect of oil price windfalls on labor market regulation increases over time and that some of the reform action happens with a lag. Quantitatively, the estimated coefficient of -0.2 on year t oil price windfalls can be interpreted as follows: a 1-standard-deviation oil price windfall leads to a reduction in the EPL index of around 0.2 units, which is equivalent to around 0.1 standard deviations of the one-period change of the EPL index.

B. Medium-run effects

In the baseline analysis, we uncovered a negative, short-run, effect of oil price windfalls on the EPL index in autocracies. Next, to analyze the persistence and dynamics of this effect, we use the local projections methods. Through the local projections method, we trace out the response of EPL reforms to oil price windfalls over a 5-year horizon (including the year of the shock plus the four following ones). Figure 3 depicts the cumulative impulse response function (IRF) of EPL reforms to a one standard deviation increase in the oil price index. The IRF is derived estimating Equation (3). Panel A reports results for autocracies (β_k^A coefficients), while Panel B shows results for democracies (β_k^D coefficients). Blue solid lines are point estimates, while dashed red lines denote 90% confidence bands.

The IRFs in Figure 3 indicate that the effects of oil price windfalls on EPL reforms are persistent, and even increase, over time. In autocracies, the effects are concentrated at impact and one year following the shock. The cumulated effect one year after the shock is about -0.3 (significantly different from zero at the 99% confidence level). The effect slightly decreases for the rest of the horizon and becomes statistically insignificant in the medium term. Turning to democracies, we confirm that oil price windfalls do not have any effects on EPL in the short run, but we instead estimate a positive coefficient in the long run. The coefficient that we estimate for the 5-year horizon is equal to about 0.4 and statistically significant at the 90% confidence level.

We draw two conclusions from this analysis. First, the effects of oil price windfalls on labor market regulation take time to fully materialize. Second, the cumulative effects over 5 years have the opposite sign in autocracies and democracies, suggesting that different channels might be at play over the medium term.

C. Effects of positive and negative windfalls

The analysis carried out so far has assumed that positive and negative oil price changes (windfall gains and losses) have symmetric effects on the EPL index. In what follows, we estimate Equation (4) to explore whether positive and negative changes in the oil price index have differential effects. Figure 4 shows the new IRFs. Panels A1 and A2 respectively report the effects of positive and negative windfalls in autocracies ($\beta_k^{A,P}$ and $\beta_k^{A,N}$ coefficients), while Panels B1 and B2 refer to democracies ($\beta_k^{D,P}$ and $\beta_k^{D,N}$ coefficients). To ease interpretation, the IRFs reported in Panels A2 and B2 are constructed using the negative value of the $\beta_k^{A,N}$ and $\beta_k^{D,N}$ coefficients.

The new results indicate that the effects of oil price windfalls estimated from the restricted model in Equation (3) are entirely driven by positive changes in the oil price index in autocracies. That is, oil price windfall gains cause autocratic regimes to implement employment protection deregulation reforms (Panel A1), while a reduction in oil revenues due to a negative price growth does not have any effect (Panel A2). The effect of positive windfalls is large, statistically significant, and increases throughout the horizon considered. A 1-standard-deviation positive shock induces a reduction of the EPL index worth about 0.6 over a five-year horizon (statistically significant at the 99% confidence level). To put this in context, among autocracies the median easing reform over a five-year period is equal to 3.6.

The picture is completely reversed for the case of democracies. Positive windfalls do not have any effects, while negative ones lead to an easing of labor market regulation. This reforming action materializes only gradually. A 1-standard-deviation negative windfall is estimated to induce a reduction of the EPL index of about 0.2 on impact. This effect gradually increases over all the horizon considered, to reach about 1.3 four years after the shock (statistically significant at the 95% confidence level). This amounts to an important reform in the context of democratic countries, just below the median easing reform implemented over a five-year period.

This analysis suggests that positive and negative windfalls have different effects on EPL and that these differential effects differ among autocracies and democracies. We corroborate this asymmetry result by plotting in Figure 5 the difference between the effect of a positive windfall and that of a negative windfall over each year of the horizon considered, using the coefficients estimated from Equation (4). We find that, except at impact, the coefficients estimated for positive

and negative windfalls are statistically different from each other at least at the 90% confidence level for both autocracies and democracies.

In the next section, we explore potential channels that could explain the differential effects that we estimate. Before that, however, we perform some additional estimations to verify the robustness of our results.

Robustness checks and alternative specifications

We assess the sensitivity of our results to several different specifications. First, we check that our results are not driven by individual countries and estimate the medium-run effect obtained from the local projections specification allowing for asymmetric effects between positive and negative windfalls (Equation (4), with $k=4$) dropping one country at a time. Figure 6 shows a scatterplot depicting the new estimates, with the y- and x-axis respectively reporting point estimates and p-values. These are close to the full sample baseline and confirm that our results are not driven by individual countries. We also check that our results are robust to (i) controlling for lagged changes of the EPL index, (ii) using a random effects rather than a fixed effects model, and (iii) estimate the coefficients for autocracies and democracies through two different regressions (splitting the sample in two). The results from these alternative specifications are very close to our baseline (available upon request).

Next, we test whether we obtain similar results if we used a variable measuring the extent of oil discoveries, developed by Cotet and Tsui (2013), rather than the oil price windfall variable as explanatory variable. The results for oil discoveries are fairly similar to those that we obtain for positive oil price windfalls (Figure 7). Oil discoveries induce a large deregulation of EPL in autocracies whereas they do not have any effects in democracies. Somewhat differently from positive oil price windfalls, the effect of oil discoveries in autocracies is immediate and tends to fade out over time.

We also test whether dividing the sample between (i) advanced economies and (ii) emerging markets and developing economies, rather than between autocracies and democracies, give similar results to our baseline, given that the group of democracies contains almost all advanced economies and therefore there is some overlap between the two. We estimate a negative effect of both positive and negative windfalls in emerging and developing countries (Figure 8). However, these effects are rather small and not statistically significant in the case of negative

windfalls. For the sample of advanced economies, the response to negative windfalls is similar to the case of democracies, but it is less precisely estimated and weaker. These results suggest that political institutions matter more than economic development in determining the effect of oil price windfalls on labor market regulation.

We next explore whether the effects of oil price windfalls change discretely across autocracies and democracies or whether there is a more linear relationship between the degree of autocracy/democracy and windfalls. We are able to do so by leveraging on the polity2 variable. The polity2 variable varies between -10 and 10. More negative (positive) polity2 scores denote stronger autocratic (democratic) institutions.

Figure 9 reports medium-run estimates of the asymmetric effects of oil price windfalls in the sample of autocratic and democratic countries as a function of the polity2 variable. These estimates are obtained by estimating an alternative specification of Equation (4), for $k=4$, which includes on the right-hand side of the estimating equation: (i) the positive and negative oil price windfall variables, (ii) the lagged polity2 score, and (iii) the interaction between the oil price windfall variables and the lagged polity2 score. Forward and lagged values of oil price windfalls are also interacted with the polity2 score. The main result is that the negative effect of positive oil price windfalls in autocracies are larger the more the polity2 variable takes negative values, while the negative response to negative windfalls in democracies is larger the more the polity2 variable takes positive values.

In so-called hereditary monarchies (polity2=10), positive windfalls lead to a significant easing of EPL, worth about -1 of the EPL index. The effect for a polity2 score close to 0 is less than half as large and not statistically significant. In regimes that are democratic just on the surface (polity2 score close to 0) the response to negative windfalls is not statistically significant, while in the strongest democratic regimes (polity2=10) the response to a 1-standard deviation negative windfall is about -1.4 index points four years after the windfall and highly statistically significant. We also find that, among autocratic regimes, the less the regime is autocratic the more it responds to a negative windfall by deregulating the labor market (similar to the response of democratic countries). However, the estimated responses to negative windfalls for autocratic countries are not statistically significant for any polity2 score.

These results suggest that political economy considerations may be important in driving the responses to oil price windfalls, in both autocracies and democracies. The more a regime is

autocratic, the more the capitalist elite is likely to be closely associated with the government and lobby to liberalize the labor market following positive oil price windfalls in order to appropriate the oil rents. At the same time, the more a government is democratic, the more it will find it politically unappealing to deregulate the labor markets in normal times, thus postponing deregulation in times of crisis. We explore political economy considerations as potential drivers of our results more thoroughly further below.

We close this analysis by considering the response of employment protection legislation to other types of windfalls. In particular, we focus on agricultural commodities, which typically generate less rents. Using the dataset assembled Bazzi and Blattman (2014), who collect price data for 65 commodities and export data for major countries in Africa, the Middle East, Asia and Latin America, we construct two variables, measuring windfalls for the production of annual and perennial agricultural commodities.³ Next we estimate alternative specifications of Equation (4), in which we replace our baseline oil price windfall variables with these alternative variables. Figure 10 presents new estimates for the effect of annual agricultural commodity windfalls on employment protection legislation. The effects are null. Effects of perennial agricultural windfalls are also null (available upon request).

5. CHANNELS

The analysis conducted so far has shown that autocratic regimes reduce the level of labor market regulation following oil price windfall gains, while democratic governments reduce labor regulation following oil price windfall losses. We find no effects from windfall losses in autocracies nor from windfall gains in democracies. In this section we explore some potential transmission channels driving these results.

We focus on two sets of non-mutually exclusive explanations, related to political economy and efficiency considerations. One of the main goals of deregulating the labor market is to give employers more flexibility in deciding the optimal allocation of labor. In this sense, deregulation improves labor market efficiency and may attract higher investments, including from foreign investors. However, there are some caveats. First, deregulating the labor market can cause

³ These variables exclude price makers.

employment losses in the short term, as employers can take advantage of the new rules to dismiss the most unproductive workers (Cacciatore and Fiori, 2016). Second, by reducing workers' bargaining power, labor market deregulation reduces the wage (Ciminelli et al., 2023).⁴ Third, and possibly in part due to the effects just described, deregulating the labor market is unpopular (Alesina et al., 2023). Because of these reasons, some governments, particularly those in countries in which democratic institutions are stronger, may be reluctant to implement deregulation reforms and delay them until when they are perceived to be strictly necessary.

Analyzing the effect of oil price windfalls on labor market reforms adds another layer of complexity. If oil price windfall gains induce an expansion of economic activity, they may offer a good window of opportunity to implement a labor market reform, as such reforms tend to have less short-run costs if done during good economic times.⁵ On top of this, political economy considerations may also be relevant. Workers in the oil and related sectors may try to extract a share of the higher surplus after a windfall gain by demanding higher wages. In response, well-connected capitalists may lobby the government to decrease labor market regulation in order to reduce workers' bargaining power and keep wage pressures in check.

The successful action of capitalist insiders and efficiency considerations (deregulation reforms may carry less short-time costs if implemented during good economic times) may thus be two plausible drivers of the negative effect of oil price windfall gains on labor market regulation in autocracies. In democratic countries, however, political economy considerations are likely to work in the other direction, as governments are focused on being reelected and prefer avoiding

⁴ There exist several mechanisms through which a reduction in EPL decreases the surplus of the workers. The earlier macroeconomics literature assumes EPL to have a direct effect on bargaining power (Blanchard et al., 1997; Blanchard and Giavazzi, 2003). Hence, easing EPL lowers workers' bargaining power and results in workers capturing a lower share of the match surplus. Alternatively, EPL can be thought as a wasteful firing cost in a standard Diamond-Mortensen-Pissarides setting (Mortensen and Pissarides, 1994). When wages are re(negotiated), the firm gives workers a wage premium for saving on firing costs today but penalizes them for having to pay firing costs in the future (see, for instance, Cacciatore and Fiori, 2016). That penalty is the discounted value of future firing costs, which is less than the current value due to time preferences. Hence, EPL increases the worker's share of the match surplus and, in turn, a reform easing EPL decreases it. EPL is also well-known to reduce job turnover (Bentolila et al., 1990; Pissarides, 2000), which in turn weakens the ability of workers to extract the surplus from a match (Cahuc et al., 2006). Ciminelli et al. (2023) analyze the effect of EPL reforms on the wage level and the labor share and find that EPL deregulation unambiguously lowers the wage and lowers the labor share when labor and capital are relative complement.

⁵ A labor market deregulation reform implemented during good economic times may lead employers to expand the labor input knowing that they will have more flexibility to reduce it in the future shall business needs change. See Duval et al. (2020).

passing a reform that would put downward pressure on wages. This would explain why we do not observe a deregulation following a positive windfall gain.

Turning to oil price windfall losses, we find that these cause deregulation in democracies while they do not have any effects in autocracies. As discussed above, because of the short-run employment costs and the detrimental effects on wages, democratic governments may be reluctant to liberalize the labor market unless this is perceived to be strictly necessary. Tommasi and Velasco (1996) and Drazen and Grilli (1993) theorize that crises offer a window of opportunity for governments in democratic countries to implement reforms that improve efficiency for the society overall but that may have (high) short-term costs. Duval et al. (2021) find strong empirical support for this crisis-induced-reform hypothesis as a driver of employment protection deregulation reforms in a panel of democratic countries. Insofar as oil price windfall losses induce a reduction in economic activity, they may offer a good window of opportunity to implement deregulation reform.

We test the channels just discussed by expanding our analysis on the effects of oil price windfalls to GDP, the current account balance, the employment rate and oil rents, as well as tax revenues, government expenditures and the budget balance. We estimate the responses of these additional outcome variables by replacing the variable $EPL_{i,t}$ in Equation (4) with, in turn, 100 times the log of real per capita GDP, oil rents (defined as the value of oil production minus cost production costs) as a share of GDP, the employment-to-population ratio, the current account balance, tax revenues, primary government expenditures and the primary budget balance (these last four are all measured as a share of GDP).

By examining the response of GDP, employment, the primary balance and the current account we can shed some light on the importance of efficiency considerations to explain deregulation reforms in autocracies following windfall gains as well as on the validity of the crisis-induced-reform hypothesis to explain deregulation reforms in democracies following windfall losses. By considering the response of oil rents, tax revenues and government expenditures, we can instead elaborate on the importance of political economy considerations.

Table 4 summarize the new results by showing the effect of oil price windfalls on the additional dependent variables at impact, two and four years after the windfalls. Appendix Figures A1-A7 show full-horizon impulse responses. We discuss the results in detail further below. In short, these suggest that political economy and efficiency considerations might both be important

in explaining the result that autocratic regimes deregulate the labor market following positive windfalls. On the other hand, political economy considerations appear to be main driver of the response of labor market regulation following oil price windfalls in democracies.

Positive windfalls do boost oil rents, which might lead well-connected capitalists in autocracies to lobby for deregulation to keep wage pressures in check and appropriate a larger share of the rents. But GDP and the employment rate, which exhibit muted responses on impact, gradually increase over the rest of the horizon considered, suggesting that deregulating the labor market after positive windfalls is effective in stimulating employment and improving overall economic efficiency in the medium term, while minimizing short-term costs. Tax revenues increase sharply on impact and keep increasing up to two years after the windfall, which also leads to an important short-term improvement of the budget balance.

These results suggest that economic efficiency considerations might have some bearing in the decision of autocratic regimes to liberalize the labor market following positive windfalls. Another possibility is that the prime goal of deregulating is to keep wage pressures in check, and that this deregulation then has the secondary effect of increasing employment and GDP. Unfortunately, we are unable to shed further light on which is the dominant channel.

Turning to democratic countries, our results suggest that political economy considerations may be important in driving the (lack of a) response of the labor market regulation index to oil price windfalls. First, we find that government expenditures increase after positive windfalls, but with a lag, suggesting that democratic governments use the higher tax revenues stemming from the windfall (which instead materialize on impact) to redistribute parts of the oil rents more widely to the population. Hence, not only do democratic governments give up the efficiency benefits that instead materialize in autocracies following the liberalization of the labor market after positive windfalls, they also redistribute the higher oil rents by increasing expenditures. Second, although we do not find that negative windfalls lead to an economic recession, they sharply deteriorate the current account and budget balances. This lends support to the crisis-induced-reform hypothesis, according to which the political economy of structural reforms in democratic countries is such that reforms are delayed until a crisis hits. The Appendix discusses the full set of the new estimates in detail.

6. CONCLUSION

The role of natural resources in shaping institutions is an important topic in development economics. In this paper, we focused on oil and took a first tack in analyzing the effects of oil price windfalls on labor market regulation. Basic international trade theory suggests that for an oil-exporting country with perfectly competitive factor markets, an increase in the international oil price leads to an increase in the rental rate relative to wages. However, if markets are not competitive, in particular, if there is significant employment protection legislation, workers have bargaining power to bid up their wage.

Combining a novel database of employment protection legislation with information on plausibly exogenous oil price windfalls, we found that the effects of oil price windfalls on labor market institutions are different between autocracies and democracies. Among the former, oil price windfall gains lead to a weakening of employment protection. This effect is persistent over the medium-term. On the other hand, oil price windfall gains have no effects on labor market regulation in democratic countries. At the same time, oil price windfall losses lead to substantial job protection deregulation in democracies, while they do not have any effect in autocracies.

We considered two sets of explanations, one based on political economy and the other on efficiency considerations, as potential drivers of our results. One explanation is that governments in autocratic regimes recognize that there are efficiency gains that materialize when there is a deregulation of the labor market. Such an interpretation would be in line with the view that competitive markets achieve the efficient allocation. Given that deregulating the labor market can cause employment losses in the short term, oil price windfalls may offer a good window of opportunity for governments to implement labor market deregulation, as implementing such reforms during good economic times might reduce its short-run costs.

The other set of explanations is based on political economy considerations. On the one hand, after an oil price windfall, capital owners may lobby the government to loosen up labor market regulation in order to weaken the bargaining power of workers and appropriate a larger share of the rents stemming from the higher oil price. Given that in autocracies elections either do not take place or do not carry a real threat to the ruling elite, such lobbying activities may be successful. In democratic countries, instead, governing parties face reelection and therefore need to consider how much a weakening of labor market institutions would dampen their reelection

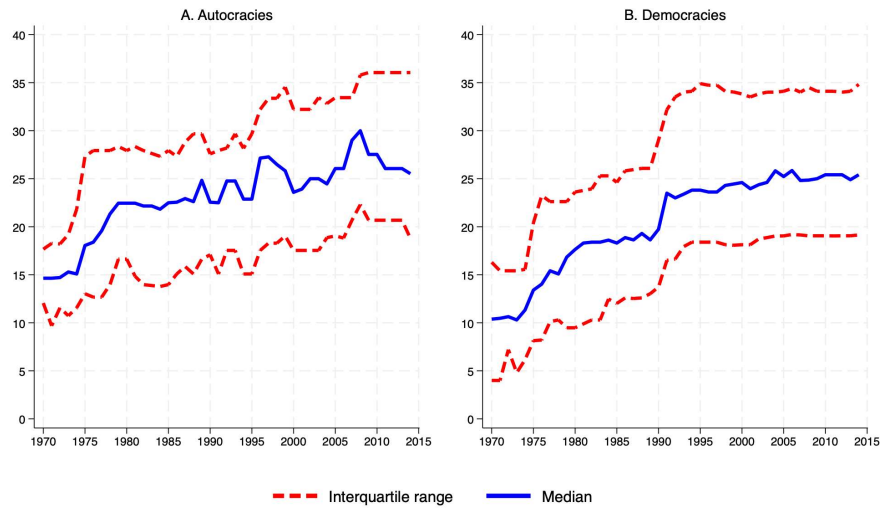
prospects. Reforms are then delayed until they are perceived to be a last-resort option, that is when a crisis hits.

To shed light on this potential transmission channels, we went beyond employment protection and explored the effect of oil price windfalls on a range of other outcome variables. Positive oil price windfalls generate important rents. In democracies, tax revenues go up after the windfall and governments increase expenditures, possibly to redistribute parts of these rents to the wider population. In autocracies, instead, there is no rent redistribution through higher expenditures, but we find that GDP and the employment rate both increase in the medium term after a positive windfall, which is not the case in democracies. These results suggest that, while the response of democracies to a positive windfall seems to be rent redistribution, efficiency and rent extraction can both explain the deregulation of the labor market following positive windfalls in autocracies. On the other hand, the crisis-induced-reform hypothesis appears to be a valid explanation for the deregulation of the labor market following windfall losses in democracies, as we find negative oil price windfalls to sharply deteriorate the current account and the budget balance in these countries.

Employment protection legislation is just one aspect of labor market institutions. We focused on it for the sake of identification purposes, but the point is more general. Future research should go beyond employment protection and assess the role of natural resources on other institutions affecting the distribution of income between labor and capital.

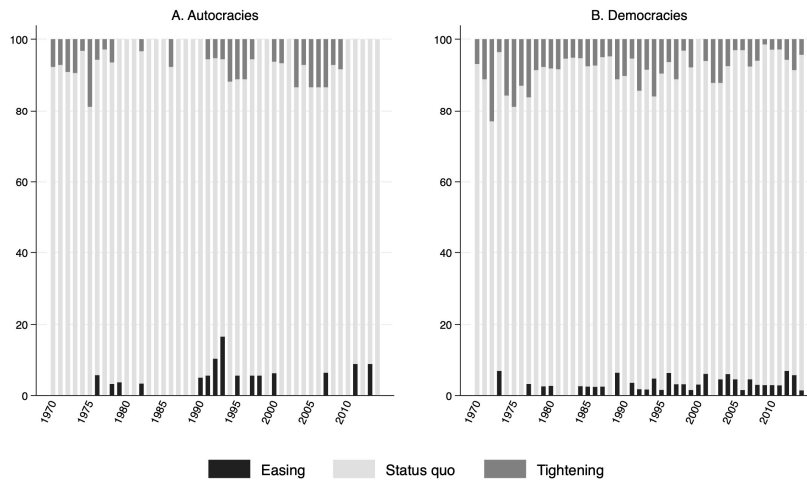
FIGURES

Figure 1. Evolution of employment protection legislation over time



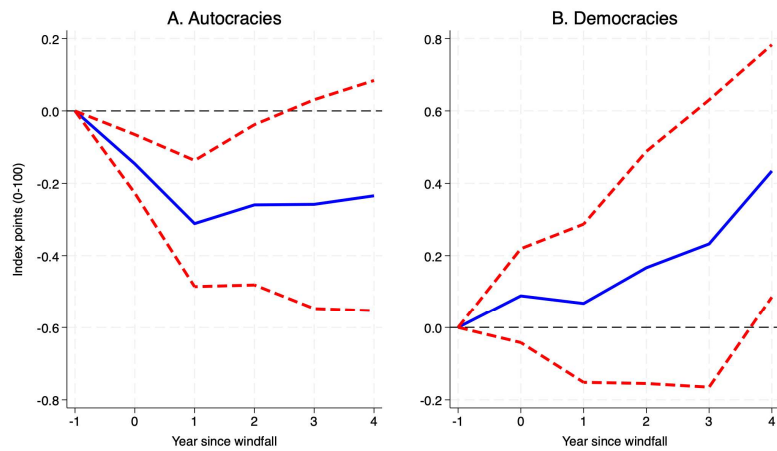
Notes: median and interquartile range of the employment protection legislation index of Ciminelli and Furceri (forthcoming) for the samples of autocratic and democratic countries over the time sample considered in this paper. The index ranges from 0 to 1, with higher values indicating higher employment protection.

Figure 2. Frequency of reforms over time, as % of total observations



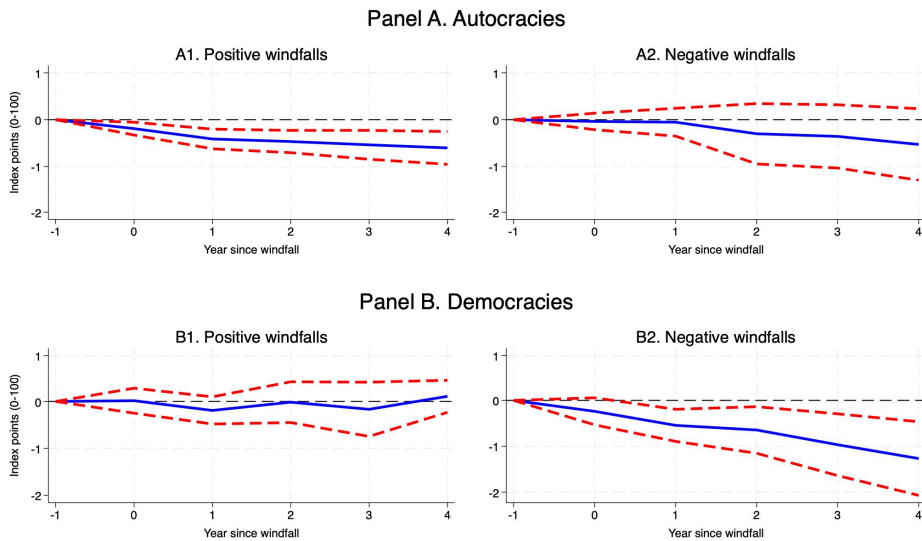
Notes: frequency (in %) of negative changes (easing), no changes (status quo) and positive changes (tightening) of the employment protection legislation index of Ciminelli and Furceri (forthcoming) for the sample of autocratic and democratic countries and for each year of the analysis. Higher values of the index indicate higher employment protection.

Figure 3. Dynamic effects of oil price windfalls on the employment protection legislation index



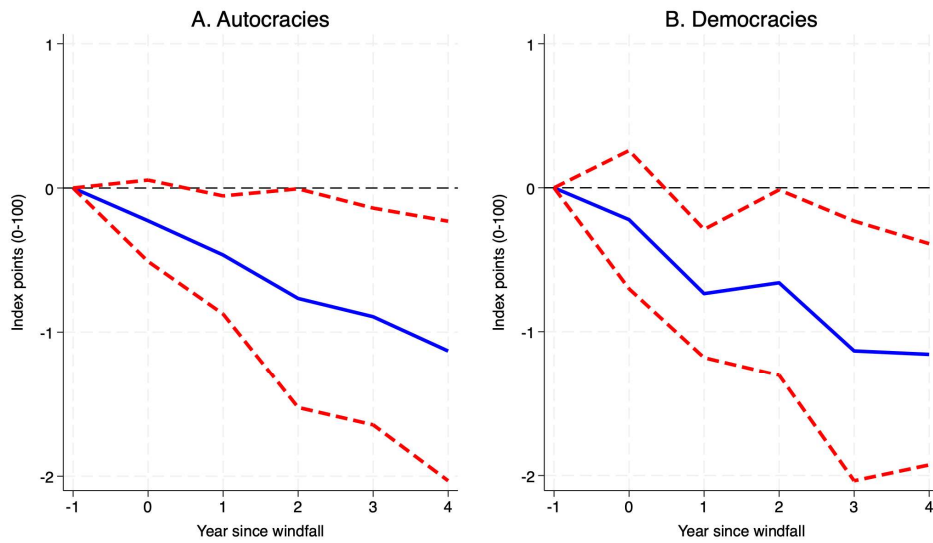
Notes: effect of a 1-standard deviation oil price windfall on the employment protection legislation index over a 5-year horizon in autocracies (Panel A) and democracies (Panel B). X-axes denote the horizon of the effect, with 0 indicating the year of the windfall, while Y-axes denote the magnitude of the effect. Blue solid lines report the point estimates, while red dashed lines are 90% confidence bands. Estimates are obtained plotting the β_k^A (Panel A) and β_k^D (Panel B) coefficients and their standard errors estimated from Equation (3).

Figure 4. Asymmetric effects of oil price windfalls on the employment protection legislation index



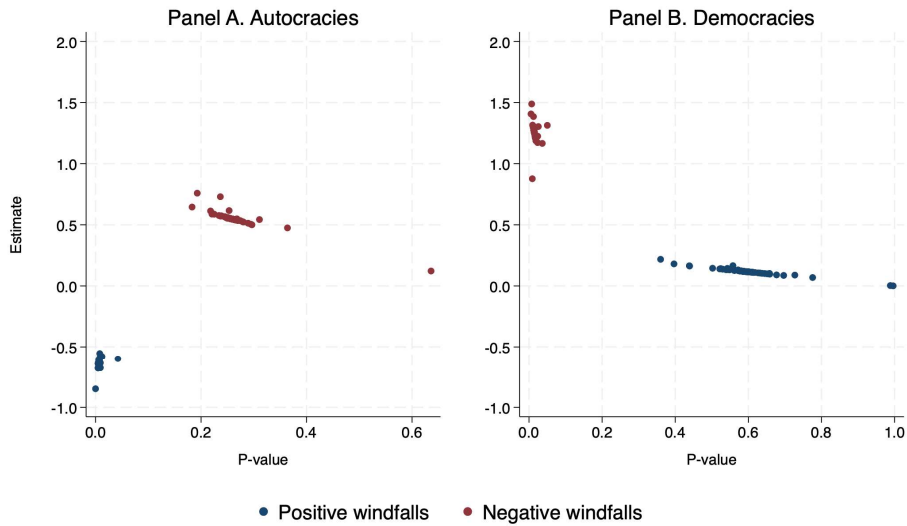
Notes: effect of a 1-standard deviation negative and positive oil price windfalls on the employment protection legislation index over a 5-year horizon in autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from Equation (4). See notes to Figure 3.

Figure 5. Differential effects of positive and negative oil price windfalls



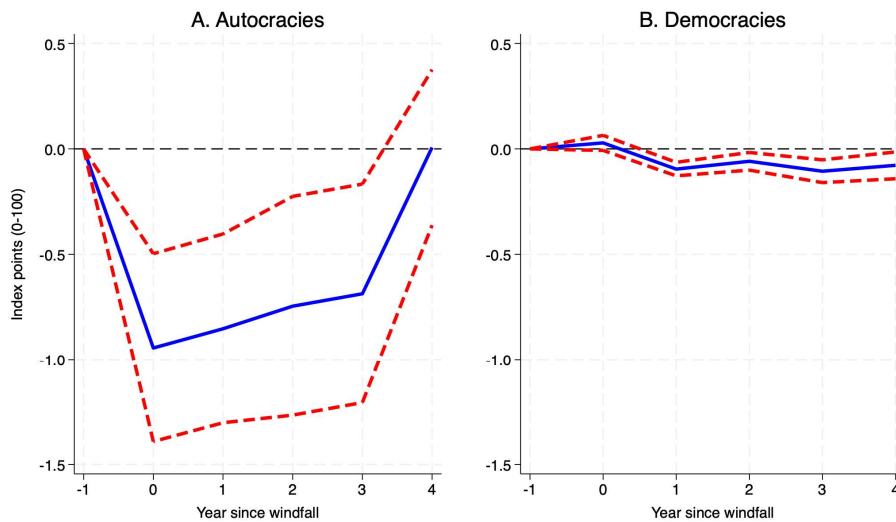
Notes: difference between the coefficients estimated for the effect of positive and negative windfalls on the employment protection legislation index over a 5-year horizon in autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P} - \beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P} - \beta_k^{D,N}$ (Panel B) combinations of the coefficients estimated from Equation (4). See notes to Figure 3.

Figure 6. Robustness check on country sample



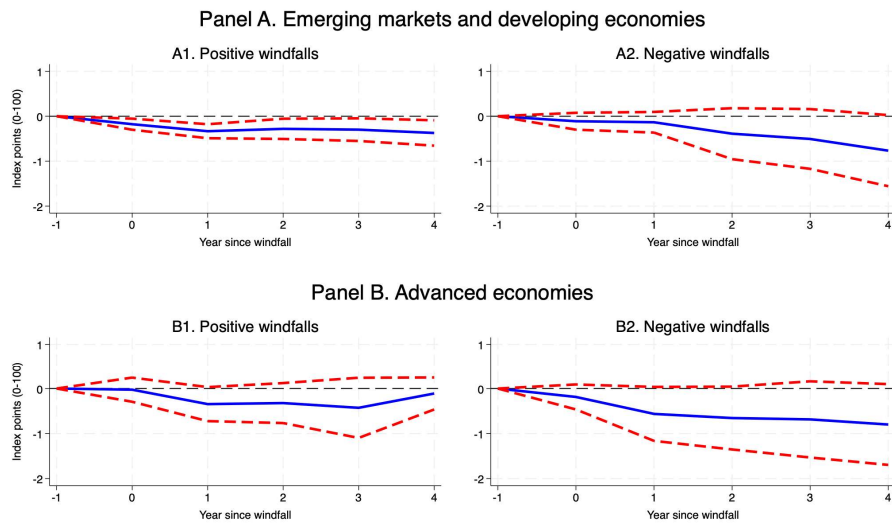
Notes: point estimates (y-axes) and p-values (x-axes) of the medium-term effect of positive and negative oil price windfalls on the employment protection legislation index obtained from a robustness check exercise in which each country is excluded from the sample once at a time. The estimating equation is Equation (4) with $k=4$. Blue (red) dots report estimates of the $\beta_k^{A,P}$ ($\beta_k^{A,N}$) (Panel A) and $\beta_k^{D,P}$ ($\beta_k^{D,N}$) (Panel B) coefficients.

Figure 7. Effects of new oil discoveries on employment protection legislation



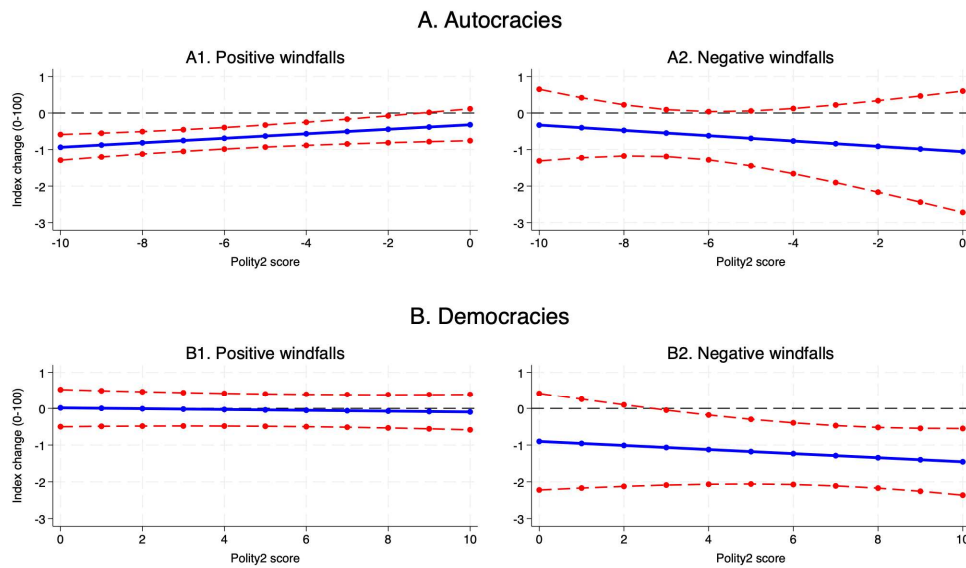
Notes: effect of a 1-standard deviation new oil discovery on the employment protection legislation index over a 5-year horizon in autocracies and democracies. Estimates are obtained β_k^A (Panel A) and β_k^D (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (3) in which the oil price windfall variable is replaced by the oil discovery variable of Cotet and Tsui (2013). See notes to Figure 3.

Figure 8. Effects of oil price windfalls on employment protection legislation – by income level



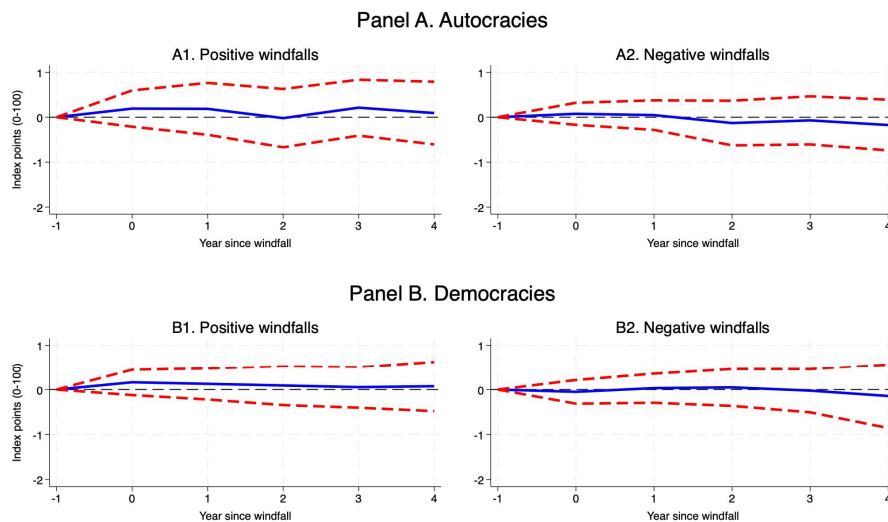
Notes: the figure plots the dynamic effect of a 1-standard deviation oil price windfall on the employment protection legislation index over a 5-year horizon on the sample of emerging markets and developing economies (EMDEs, Panel A) and advanced economies (AEs, Panel B). Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the superscripts *A* and *D* denote EMDEs and AEs respectively. See notes to Figure 3.

Figure 9. Medium-term effects of oil price windfalls on employment protection legislation depending on the level of autocracy/democracy (interaction model)



Notes: 5-year effects of a 1-standard deviation positive and negative oil price windfalls on the employment protection legislation index depending on the score of the Polity2 variable in autocracies and democracies. Y-axes report the magnitude of the effects. X-axes report the Polity2 score. Estimates are obtained from taking a linear combination of coefficients estimated from an extended specification of Equation (4) including the oil price windfall variables $\Delta Oil_{i,t}^{A,P}$, $\Delta Oil_{i,t}^{D,P}$, $\Delta Oil_{i,t}^{A,N}$ and $\Delta Oil_{i,t}^{D,N}$, the lagged Polity2 variable and their interactions. Blue dots are point estimates. Red dots are 90% confidence bands obtained through Huber robust standard errors clustered at the country level.

Figure 10. Effects of agricultural commodities price windfalls on employment protection legislation



Notes: effects of a 1-standard deviation positive and negative agricultural commodities price windfalls on the employment protection legislation index over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the oil price windfall variables are replaced variables denoting annual agricultural commodity price windfalls, assembled in Bazzi and Blattman (2014). See notes to Figure 3.

TABLES

Table 1. Descriptive statistics of employment protection legislation index

	A. AUTOCRACIES					B. DEMOCRACIES				
	Obs.	Median	S.d.	Min	Max	Obs.	Median	S.d.	Min	Max
Index	974	21.82	10.70	2.17	58.17	2327	23.25	11.48	2	58.15
Tightening	46	3.97	7.80	0.01	30.61	171	2.04	6.19	.01	39.13
Easing	19	-3.70	6.73	-22.31	-0.20	65	-1.48	3.84	-23.33	-0.02

Notes: the table reports descriptive statistics of the employment protection legislation index of Ciminelli and Furceri (forthcoming) for the two samples of autocracies (polity2 score below 0, Panel A) and democracies (polity2 score above 0, Panel B). The row denoted by Index shows statistics for the level of the index. Rows denoted by easing and tightening report statistics for, respectively, negative and positive changes of the index. The index ranges on a scale from 0 to 100, with higher values indicating more employment protection.

Table 2. Descriptive statistics of oil price windfalls

	A. AUTOCRACIES					B. DEMOCRACIES				
	Obs.	Median	S.d.	Min	Max	Obs.	Median	S.d.	Min	Max
Positive	594	0.12	1.41	0	13.74	1378	0.10	.83	0	12.77
Negative	410	-0.06	1.00	-6.99	0	952	0.04	.55	-7.62	0

Notes: the table reports descriptive statistics of oil price windfalls for the two samples of autocracies (polity2 score below 0, Panel A) and democracies (polity2 score above 0, Panel B).

Table 3. Effect of oil price windfalls on changes in employment protection legislation

A. AUTOCRACIES						
	(1)	(2)	(3)	(4)	(5)	(6)
Oil windfall	-0.20*** (0.08)	-0.23** (0.09)			-0.17** (0.07)	-0.20*** (0.07)
Oil windfall, lag 1			-0.10** (0.04)	-0.10*** (0.04)	-0.10*** (0.04)	-0.11*** (0.04)
Observations	915	915	884	884	878	878
R-squared	0.08	0.08	0.06	0.06	0.07	0.08
Model	RE	FE	RE	FE	RE	FE
B. DEMOCRACIES						
	(1)	(2)	(3)	(4)	(5)	(6)
Oil windfall	0.08 (0.06)	0.05 (0.06)			0.08 (0.06)	0.04 (0.07)
Oil windfall, lag 1			-0.01 (0.04)	-0.04 (0.04)	-0.01 (0.04)	-0.04 (0.04)
Observations	2,278	2,278	2,243	2,243	2,243	2,243
R-squared	0.05	0.05	0.05	0.05	0.05	0.05
Model	RE	FE	RE	FE	RE	FE

Notes: estimates of the contemporaneous and lagged effects of oil price windfalls on changes of the employment protection legislation index, obtained estimating a random effects (Equation 1) and a fixed effects model (Equation 2) for the sample of autocratic countries (polity2 score below 0, Panel A) and democratic countries (polity2 score above 0, Panel B). All specifications include time fixed effects. *, **, *** denote statistical significance at the, respectively, 90%, 95% and 99% confidence level. Standard errors (shown in parentheses) are Huber robust and clustered at the country level.

Table 4. Effects of positive and negative oil price windfalls on various dependent variables

	(1) EPL	(2) Rents	(3) CA	(4) GDP	(5) Employment	(6) Revenues	(7) Expenditures	(8) Budget
Impact responses								
Aut +	-0.19** (0.09)	0.79** (0.31)	0.62** (0.30)	0.01 (0.23)	0.09 (0.09)	0.37*** (0.12)	-0.16 (0.20)	0.55** (0.22)
Aut -	-0.04 (0.11)	-0.42** (0.17)	-0.49** (0.22)	-0.42* (0.22)	0.05 (0.07)	-0.52*** (0.13)	0.43*** (0.11)	-0.94*** (0.18)
Dem +	0.02 (0.17)	0.74*** (0.26)	0.46*** (0.16)	-0.05 (0.13)	0.00 (0.11)	0.34** (0.14)	0.16 (0.12)	0.21* (0.11)
Dem -	-0.24 (0.18)	-0.87*** (0.14)	-1.51*** (0.51)	-0.09 (0.38)	0.07 (0.12)	-0.58** (0.26)	0.43** (0.21)	-1.01*** (0.25)
Obs	2,886	2,724	2,912	2,989	1,755	2,361	2,319	2,319
Adj. R ²	0.025	0.366	0.086	0.136	0.052	0.066	0.071	0.149
3-year responses								
Aut +	-0.47*** (0.15)	0.34** (0.13)	0.32 (0.35)	0.63 (0.53)	0.33*** (0.12)	0.45** (0.21)	0.19 (0.26)	0.32** (0.13)
Aut -	-0.30 (0.40)	0.03 (0.28)	-0.08 (0.21)	-0.27 (0.34)	0.18 (0.17)	0.97 (0.70)	1.24** (0.60)	-0.26 (0.33)
Dem +	-0.01 (0.27)	0.42*** (0.14)	0.08 (0.19)	0.36 (0.33)	0.09 (0.11)	0.41*** (0.14)	0.48** (0.22)	-0.06 (0.14)
Dem -	-0.65** (0.32)	-0.63*** (0.17)	-1.22*** (0.33)	0.02 (0.53)	0.14 (0.20)	-0.34 (0.33)	0.58 (0.37)	-0.93*** (0.25)
Obs.	2,804	2,645	2,829	2,906	1,674	2,285	2,240	2,240
Adj. R ²	0.044	0.350	0.089	0.173	0.055	0.045	0.106	0.207
5-year responses								
Aut +	-0.60*** (0.22)	0.36** (0.16)	-0.05 (0.39)	1.38** (0.66)	0.54*** (0.14)	0.03 (0.33)	-0.12 (0.29)	0.16 (0.40)
Aut -	-0.53 (0.48)	0.43 (0.29)	-0.77** (0.35)	-0.21 (0.76)	-0.51* (0.28)	0.85 (0.60)	0.95** (0.45)	-0.12 (0.43)
Dem +	0.11 (0.21)	0.45*** (0.12)	-0.34 (0.38)	0.72 (0.67)	0.23 (0.25)	0.36* (0.19)	0.56*** (0.21)	-0.18 (0.23)
Dem -	-1.27** (0.50)	-0.03 (0.16)	-1.44** (0.58)	0.41 (0.65)	-0.08 (0.33)	-0.24 (0.38)	0.61 (0.73)	-0.89 (0.62)
Obs.	2,640	2,487	2,665	2,740	1,512	2,135	2,092	2,092
Adj. R ²	0.056	0.378	0.082	0.218	0.058	0.032	0.099	0.201

Notes: effects of positive (+) and negative (-) oil price windfalls on a range of dependent variables in autocracies (Aut) and democracies (Dem), at impact as well as two and four years after the windfalls. Estimates are obtained estimating Equation (4) for $k=0,2,4$, replacing $EPL_{i,t}$ with (i) oil rents as share of GDP (Column 2), (ii) the current account balance as share of GDP (Column 3), (iii) 100 times the log of real per capita GDP in local currency (Column 4), (iv) the employment-to-population ratio (Column 5), (v) tax revenues as share of GDP (Column 6), (vi) government expenditures as a share of GDP (Column 7), and (vii) the primary balance as a share of GDP (Column 8). *, **, *** denote statistical significance at the, respectively, 90%, 95% and 99% confidence level. Standard errors (shown in parentheses) are Huber robust and clustered at the country level.

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APPENDIX

In this appendix, we discuss the estimated effects of oil price windfalls on the additional dependent variables we consider to investigate the transmission channels behind our main result that (i) positive oil price windfalls cause a labor market deregulation reform in autocracies but have no effect in democracies, and (ii) negative windfalls cause a deregulation reform in democracies but have no effect in autocracies.

We start by examining the response of oil rents (Figure A1). As expected, rents increase following positive windfall gains. The estimated effects are similar across democracies and autocracies. Oil rents increase by about 0.7 percentage points of GDP at impact following a 1-standard deviation oil price windfall gain. The effect gradually decreases over the horizon considered, to stabilize at about 0.4 percentage points four year after the windfall (still statistically significant). These results confirm that oil price windfall gains generate important rents. Turning to the effect of windfall losses, we estimate a pronounced negative response of oil rents in democracies (peak effect at almost -1 percentage point 1 year after a 1-standard deviation windfall loss). In autocracies, instead, a decrease in the oil price index leads to a more marginal decrease in the share of oil rents in GDP, which is entirely reabsorbed in the medium term. This more muted negative response of oil rents to negative windfalls in autocracies is partly explained by the reduction in GDP that accompanies the negative windfall, as we will see below, which mechanically pushes the share of oil rents in GDP up.

Next, we turn to the response of the current account balance (Figure A2), GDP (Figure A3) and the employment rate (Figure A4). Positive oil price windfalls tend to increase the current account balance in both autocracies and democracies (by about 0.5 percentage points of GDP on impact after a 1-standard deviation positive windfall). However, the effects that we estimate for the current account balance are only statistically significant on impact, suggesting that they are an almost mechanical consequence of the terms of trade shock, and in democracies they are even reversed in the medium term. In autocracies, the response of GDP and the employment rate is muted on impact but gradually increases over the rest of the horizon considered, reaching 1.5% (GDP) and 0.5 percentage points (employment rate) 4 years after a 1-standard deviation positive windfall. The responses of the employment rate and GDP to positive windfalls in democracies are instead flat.

Oil price windfall losses in autocracies have some negative, although relatively mild, effects on GDP (about -0.5% at impact) and no effects on the current account balance nor the employment rate. Windfall losses in democracies do not have effects on GDP but have important negative effects on the current account balance. This decreases by almost 1.5 percentage points of GDP on impact (effect statistically significant at the 99% confidence level) and never recovers over the 5-year horizon that we consider. The response of the employment rate to negative windfalls in both autocracies and democracies is muted.

Tax revenues respond broadly as expected (Figure A6). Their impact response to positive windfall gains is positive (tax revenues increase by about 0.4 percentage points of GDP after 1-standard deviation shock), while that to negative windfall is negative (decrease of about 0.5 to 0.6 percentage points), in both autocracies and democracies. These responses may be largely mechanical if oil rents were subject to a higher tax rate than the rest of the economy. Looking at the rest of the horizon considered, the response of tax revenues as a share of GDP following positive windfalls is reabsorbed in autocracies, possibly because of a denominator effect, given that GDP increases, while it stabilizes in democracies. The negative response of revenues to negative windfalls instead is just temporary, and even reversed, in autocracies whereas it is more persistent in democracies.

Turning to government expenditures (Figure A7), their impact response to positive windfalls is null, but expenditures increase as a share of GDP over the rest of the horizon considered in democracies, for which we estimate a 1-standard deviation positive windfall to lead to an increase of about 0.6 percentage points of GDP in government expenditures four years after the windfall (statistically significant at the 99% confidence level). The fact that expenditures react to positive windfalls over the medium term but not on impact is an indication that their responses is not just mechanical but might be due to actual changes in expenditure policies. The impact response of expenditures to negative windfalls is positive in both autocracies and democracies (about 0.4 percentage points). While in autocracies government expenditures this positive response might be due to the reduction in economic activity, in democracies it might be driven by an actual change in government policy. Over the medium-term, expenditures as a share of GDP keep increasing in both autocracies and democracies.

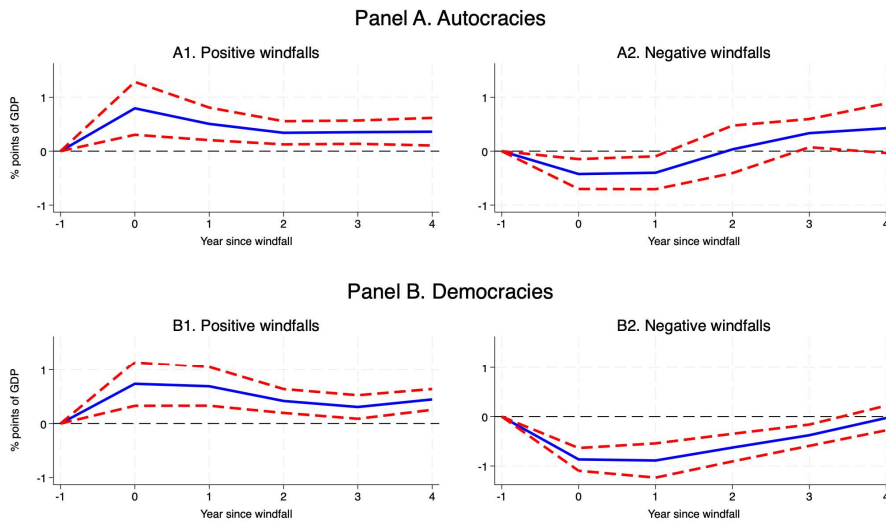
We close the analysis by considering the response of the budget balance (Figure A8). This increases following positive windfalls in both autocracies and democracies, but this response is

sharper and more persistent in autocracies. The response to negative windfalls is instead negative both in autocracies and democracies, but sharper and more persistent in democracies. There, the budget balance deteriorates by more than 1 percentage points of GDP four years after a 1-standard deviation shock.

Table A1. Country coverage

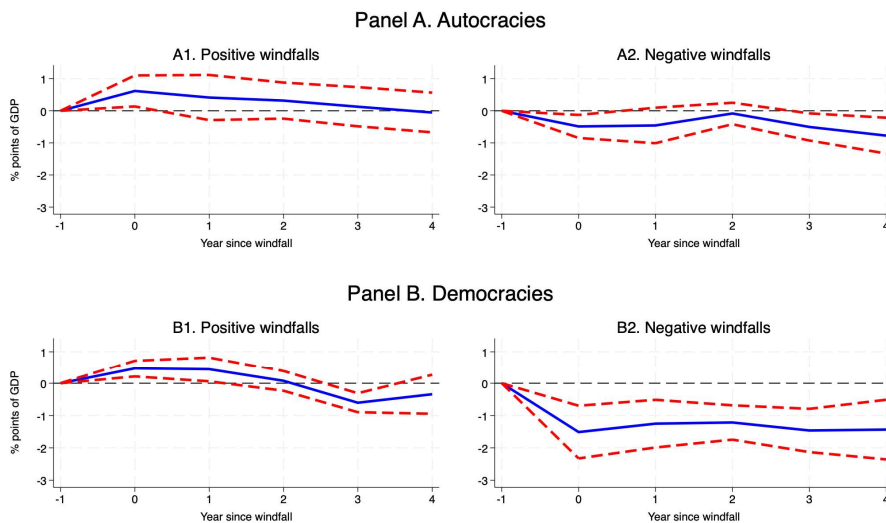
Autocracies	Democracies		Switchers	
Azerbaijan	Australia	India	Albania	Mozambique
China	Austria	Ireland	Argentina	Nigeria
Cameroon	Belgium	Israel	Burkina Faso	Nicaragua
Jordan	Bulgaria	Italy	Bangladesh	Nepal
Kazakhstan	Canada	Jamaica	Belarus	Pakistan
Morocco	Switzerland	Japan	Bolivia	Peru
Singapore	Colombia	Sri Lanka	Brazil	Philippines
Tanzania	Costa Rica	Lithuania	Chile	Poland
Uzbekistan	Czech Republic	Latvia	Dom. Republic	Portugal
Vietnam	Germany	Malaysia	Algeria	Paraguay
	Denmark	Netherlands	Ecuador	Romania
	Estonia	Norway	Spain	Senegal
	Finland	New Zealand	Ethiopia	El Salvador
	France	Sweden	Ghana	Thailand
	United Kingdom	Ukraine	Greece	Tunisia
	Georgia	United States	Guatemala	Turkey
	Hungary	South Africa	Indonesia	Uganda
			Kenya	Uruguay
			Madagascar	Zimbabwe
			Mexico	

Figure A1. Effects of oil price windfalls on oil rents



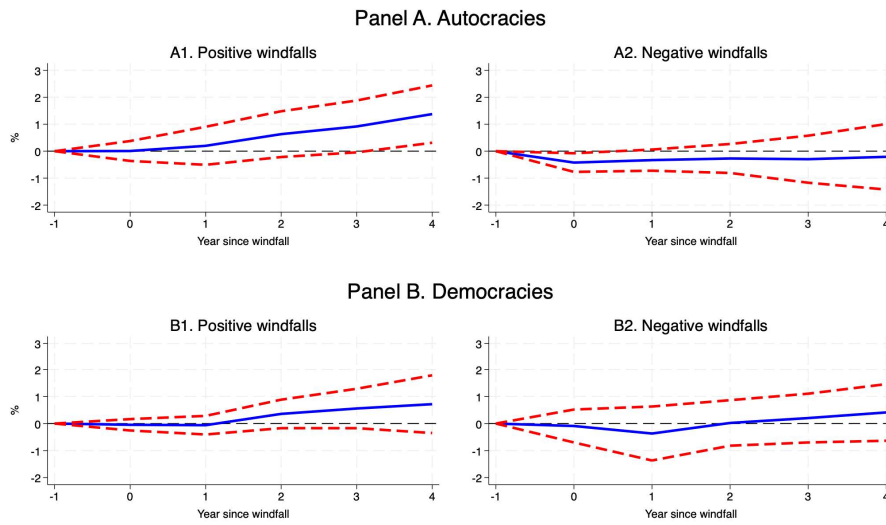
Notes: effects of a 1-standard deviation positive and negative oil price windfalls on oil rents over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the $EPL_{i,t}$ variable is replaced with oil rents as share of GDP. See notes to Figure 3.

Figure A2. Effects of oil price windfalls on the current account balance



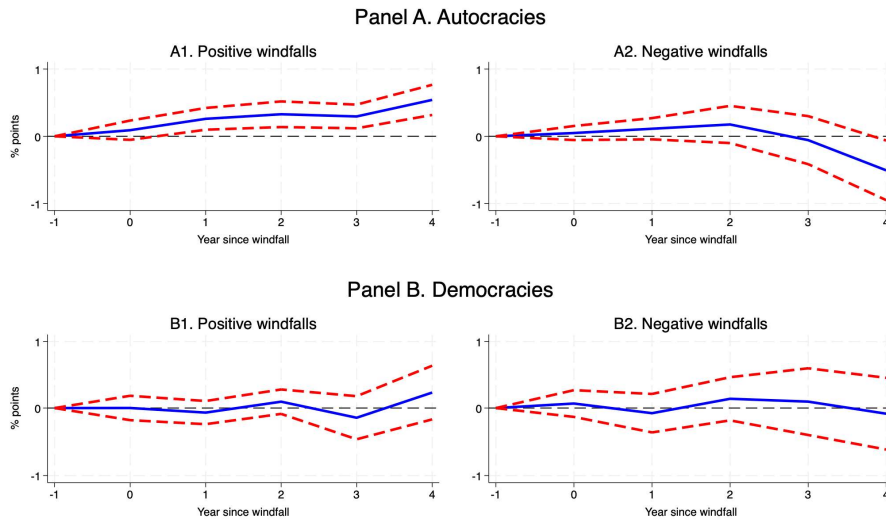
Notes: effects of a 1-standard deviation positive and negative oil price windfalls on the current account balance over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the $EPL_{i,t}$ variable is replaced with the current account balance as share of GDP. See notes to Figure 3.

Figure A3. Effects of oil price windfalls on GDP



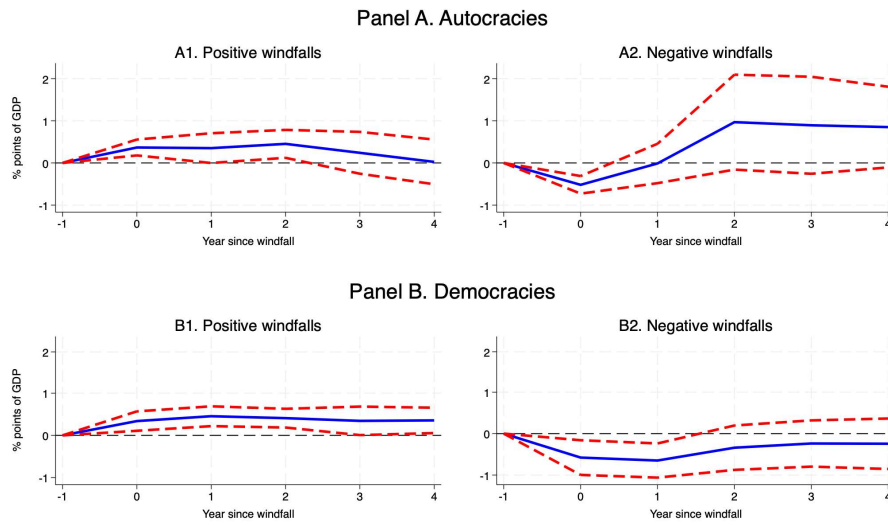
Notes: effects of a 1-standard deviation positive and negative oil price windfalls on GDP growth over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the $EPL_{i,t}$ variable is replaced with 100 times the log of real per capita GDP. See notes to Figure 3.

Figure A4. Effects of oil price windfalls on the employment rate



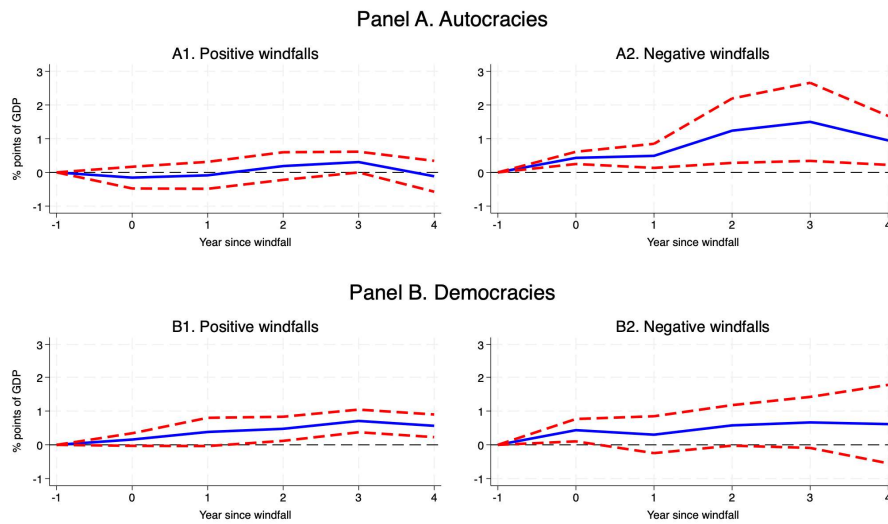
Notes: effects of a 1-standard deviation positive and negative oil price windfalls on the employment rate over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the $EPL_{i,t}$ variable is replaced with the employment to population ratio. See notes to Figure 3.

Figure A5. Effects of oil price windfalls on tax revenues



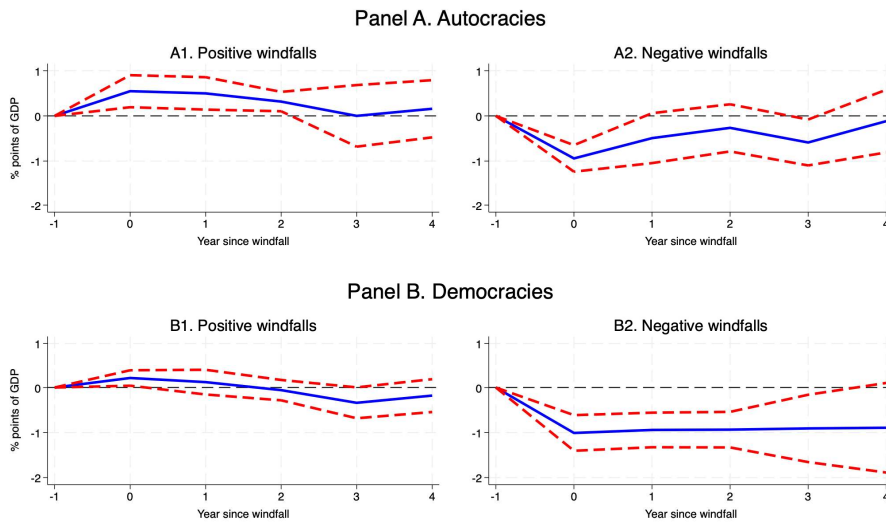
Notes: effects of a 1-standard deviation positive and negative oil price windfalls on government tax revenues over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the $EPL_{i,t}$ variable is replaced with tax revenues as a share of GDP. See notes to Figure 3.

Figure A6. Effects of oil price windfalls on government expenditures



Notes: effects of a 1-standard deviation positive and negative oil price windfalls on government expenditures over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the $EPL_{i,t}$ variable is replaced with primary government expenditures as share of GDP. See notes to Figure 3.

Figure A7. Effects of oil price windfalls on the primary balance



Notes: effects of a 1-standard deviation positive and negative oil price windfalls on the primary balance over a 5-year horizon on the sample of autocracies and democracies. Estimates are obtained plotting the $\beta_k^{A,P}$ and $\beta_k^{A,N}$ (Panel A) and $\beta_k^{D,P}$ and $\beta_k^{D,N}$ (Panel B) coefficients and their standard errors estimated from an alternative specification of Equation (4) in which the $EPL_{i,t}$ variable is replaced with the primary balance as share of GDP. See notes to Figure 3.