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Globalization, robotization and electoral outcomes: Evidence from spatial regressions for Italy*

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Abstract

Criticism of economic globalization and technological progress has gained support in Italy in the last two decades but, due to the differentiated exposure of local communities to this process, political outcomes have varied considerably across the country. By observing the local impact of three global economic phenomena (flows of migrants, foreign competition in international trade, and diffusion of robots) alongside with the patterns of local electoral outcomes potentially associated with discontent, this work analyses from a spatial perspective the economic forces driving the evolution of general elections in 2001, 2008 and 2013 in Italy. The analysis reveals that all these global factors had an impact on political outcomes associated with discontent, albeit in different ways and changing over time. These novel empirical results indicate that these global drivers interacted with elements pertaining to the political supply, such as party federation and scandals. By combining various methodological advances coming from the political geography and the political economy literature, this work attempts to bridge disciplines sharing similar interests but adopting different tools of analysis.

Keywords: local electoral outcomes, local labor markets, immigration, import competition, robotization.

JEL Classification Codes: D72, F14, F60, O33.

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1 Introduction

Criticism of contemporary economic and social trends, particularly those associated with economic globalization and technological progress, has grown in intensity and gained support in Italy as well as in several other countries. The 2018 elections in Italy certified the emergence of parties framing “the people” in a territorial sense (Heinisch et al., 2018), whereby locals and natives are portrayed as threatened by foreign migrants, foreign firms and technological innovations introduced by internationalized companies and multinationals as a means to eschewing extra-profits. As argued by Agnew and Shin (2017), this process started much earlier in Italy, probably right after the demise of the main traditional parties in the early 1990s. Initially, this wave of discontent manifested itself at general elections either in lower turnout rates or in growing shares of votes accruing to far-right parties. More recently, it was conducive to a shift towards populist movements (Kriesi, 2014), and in particular the *sui generis* Five-Star Movement (5SM, hereafter). Although the performance of the 5SM in the 2013 general elections was not sufficiently strong to challenge the centre-left coalition led by the Democratic Party, which had governed (together with a set of centre-right parties) the country after the resignation of Mr Berlusconi in 2011, some observers and politicians claim that the 5SM attracted part of the electorate who would have otherwise abstained from voting (Agnew and Shin, 2017). The 5SM leader, Mr. Beppe Grillo, has repeatedly claimed that the movement reduced abstention on election days and eroded votes previously accruing to extremist parties.¹ Short of data on individual voting preferences and actions, the distribution of the electoral outcomes across Italian regions can be explored to test these intuitions and to improve the understanding of the evolution of Italian politics over the period 2001-2013.

People, even within the same country, differ across areas in their interests and identities, that in turn evolve over time as the result of the interaction between historical legacies and the contingent socio-economic and institutional context (Vandermotten and Medina Lockhart, 2000; Schakel, 2018). Indeed, Shin and Agnew (2007, p. 300) have argued that “[p]olitical change is seldom uniform across a democracy”. With regards to the process of globalization, places are highly differentiated in terms of their exposure to it and, in particular, to three main phenomena shaping the local economy: the higher flows of migrants coming from countries of the Global South, the fiercer foreign competition in international trade, and the diffusion of skill-biased and labor-substituting technological change. At the same time, people in nearby areas may influence each other in a way that can lead to geographical clusters of voting choices. By observing the local impact of the above-mentioned global phenomena alongside with the patterns of local electoral outcomes associated with discontent, this work analyses from a spatial perspective the locally-mediated effect of these global economic drivers on the Italian general elections in 2001, 2008 and 2013. We adopt sub-regional areas that aggregate municipalities in terms of commuting flows as the focus of the analysis falls on labor market-related channels.

¹In an interview to the Time in 2013 (Faris, 2013), Mr. Beppe Grillo was asked whether the forces that pushed the 5SM up could also push up darker forces. To this he replied, “I channel all this rage into this movement of people, who then go and govern. They should be thanking us one by one. If we fail, [Italy] is headed for violence in the streets. But if we crumble, then they come. Everything started in Italy. Fascism was born here. The banks were born here. We invented debt. The mafia, us too. Everything started here. If violence doesn’t start here, it’s because of the movement. If we fail, we’re headed for violence in the street. Half the population can’t take it anymore.”

The adoption of ad-hoc territorial units facilitates the identification of the correlation of interest (Passarelli and Tuorto, 2012), and it ensures that economic (but not political) spillovers across areas are limited. It is worth stressing that this work does not address the overall evolution of the spatial and political realignment in Italy as it does not study changes in absolute votes, nor is it interested in all socio-economic variables affecting voting behavior, most used as mere controls in the estimations.

Anticipating our main findings, the analysis reveals a change over time in the way immigration, Chinese import competition and skill-biased and labor-substituting technological change (in the form of robotization) impact on voters' turnout and on the shares of votes accruing to far-right parties, both typically associated with discontent. In the areas where immigration grew relatively more, for instance, turnout and votes for far-right parties respectively decreased and increased, as expected, only during the period 2001-2008. Possibly due to exogenous changes in the supply of far-right parties in 2013 (namely, the scandals hitting the largest far-right party, the Northern League),² former far-right voters and electors holding anti-immigration preferences exercised their right to vote by shifting towards the 5SM: turnout did not diminish and the newly-born party gained considerably. Moreover, as found by related studies focusing on other countries, the higher the change in the local exposure to Chinese import competition, the larger the improvement in the share of votes accruing to far-right parties during the period 2001-2008. Instead, during the period 2008-2013, neither the far-right parties nor the 5SM gained more where the exposure to China imports increased relatively more, while local turnout tended to decline. Finally, our findings indicate a clear change in the electoral impact of variations in the local exposure to robotization: in 2001-2008 local increases in robotization appear associated with higher changes in voters' turnout and a higher share of votes to far-right parties, whereas in 2008-2013 they were negatively related to local support to 5SM. Taken together, these findings suggest that the adoption of robots had not been perceived by the electorate in a clear negative way. Moreover, the robotization variable might proxy more generally for the evolution of local industrial sophistication rather than for the differentiated diffusion of skill-biased and labor-substituting technological change. It is important to notice that spatial dependence does not seem to affect substantially our results. This finding is probably the consequence of the focus on local labor markets, which by definition represent the units of analysis within which labor market shocks can be absorbed, and suggests that the global drivers matter as far as they impinge on local economic conditions.

Various contributions in the political economy literature have addressed analogous issues to study the evolution of political results in advanced economies. Most of them have focused on the localized impact of a specific global economic driver on different electoral results: immigration on the FPÖ in Austria (Halla et al., 2017) and the right-wing coalition and voters' turnout in Italy from 2001 to 2008 (Barone et al., 2016); globalization on the Northern League in Italy (Beirich and Woods, 2000) and, more recently, Chinese competition on political polarization in the US (Autor et al., 2016), the Front National in France (Malgouyres, 2017), far-right parties in Germany (Dippel et al., 2017), nationalist

²The Northern League can be classified as far-right following Ignazi (2005), who shows that it has shifted from being a regionalist protest party to a movement similar to European extreme-right parties, but still with a strong regionalist profile. Similar considerations are proposed also by Passarelli and Tuorto (2012), Fella and Ruzza (2013) and Passarelli (2013).

and radical-right parties in Western Europe from 1988 to 2008 (Colantone and Stanig, 2018a), and the Brexit vote in the United Kingdom (Colantone and Stanig, 2018b);³ adoption of industrial robots on nationalist and radical-right parties in Western Europe from 1993 to 2016 (Anelli et al., 2018). To the best of our knowledge, however, no other study has tackled the recent electoral results in Italy at a fine level of disaggregation, while considering the impact of all three global economic drivers. Differently from other contributions in the political economy literature, moreover, this work takes seriously the issue of spatial dependence and employs regression methods that properly account for it.

With respect to previous analyses carried out by political scientists and sociologists, this work mainly focuses on the economic determinants of voting behavior and provides a spatial representation of the electoral results in terms of locally-mediated global drivers. With respect to previous contributions in political geography of Italian politics (such as Shin and Agnew, 2011; Shin and Agnew, 2016; Agnew and Shin, 2017; Abbondanza and Bailo, 2017), this paper employs more advanced techniques of empirical analysis, borrowed from the recent applied contributions in the political economy literature (Autor et al., 2016), with a view to addressing omitted-variable bias and reverse causality problems in the estimations.⁴ Moreover, the empirical analysis makes use of local labor markets as units of analysis in order to better control for spatial dependence: this allows for the existence of political spillovers across adjacent areas, while it excludes the case of economic spillovers associated with our global drivers. In doing so, this work takes up the challenge launched by Johnston (2018), who recommends to build bridges between political geography and other disciplines sharing similar interests but adopting different tools of analysis.

The remainder of the paper is organized as follows. Section 2 briefly introduces the three locally-mediated global economic drivers of interest and their possible impact on political outcomes in Italy. Section 3 presents the data and describes the empirical strategy, while Section 4 illustrates and discusses the results. Section 5 concludes.

³The analysis of the outcomes of the UK referendum on Brexit has revealed the presence of clustering of people driven by ideological and economic factors. Indeed, there is evidence that the regions in the UK that have become weaker due to globalization are characterized also by stronger local anti-globalization and anti-EU sentiments, in line with the idea that “places that don’t matter” tend to revolt against the status quo (Rodríguez-Pose, 2018), creating the so-called “geography of discontent”. Interestingly, recent analyses have shown that most regions voting for the Leave option could be hit very hard by the adverse consequences of Brexit (Chen et al., 2018; Crescenzi et al., 2018; Los et al., 2017) and, thus, voted against their own economic interest. McCann (2018) makes sense of this puzzlingly result by observing that the negative consequences of the large exposure to globalization influenced people’s opinions on Brexit (also because of a highly ideological political campaign). This strengthens the importance of learning more about the impact of global drivers on political preferences as it has the potential to feed local political discontent and affect a large number of issues only indirectly associated with globalization.

⁴A number of political geographers addressed the possibility that spatial political polarization is driven by selective migration patterns: partisanship may be a driver of movers’ chosen destinations (Bishop, 2009; Gimpel and Hui, 2015; Rohla et al., 2018) and local amenities may foster in-migration of like-minded people (Scala et al., 2015). This is indeed a potential source of endogeneity that we want to control for rather than explain. Besides falling outside the scope of this paper, this issue would require data on voting patterns in smaller spatial scales than those we have access to.

2 Locally-mediated global economic drivers and political outcomes in Italy

Italy represents an interesting political environment for its dynamic evolution over time and for the geographical diversification of the electoral results across regions.⁵ The remarkable heterogeneity of social and economic conditions and of electoral outcomes across different areas in Italy makes it suitable to investigate empirically how the local electorate has moved in response to the evolution of three important global economic phenomena often considered as causes of discontent: inflows of migrants, competition from developing countries (in particular, China) and robotization. While truly global, the impact of these phenomena has been locally mediated and, in particular, it has been determined by the persistent differences across areas in the underlying structure of the economy.

The first locally-mediated global driver that we consider refers to international migration flows. Albeit to a different extent in different places, migration flows have led to a progressive expansion in the number of foreign-born citizens residing in Italian cities, raising both identity issues and concerns for local labor markets (Barone et al., 2016), in particular among the least-skilled workers.

The second locally-mediated economic driver is the rapid increase in the degree of international competition following the admission of China to the WTO in 2001 and the subsequent expansion of Chinese exports in all advanced countries. This expansion occurred in particular at the expense of regions in advanced economies specialized in traditional (unskilled labor-intensive) manufacturing activities. As shown by Amighini et al. (2011) and Federico (2014), several traditional industries, and thus regions, in Italy have suffered the fiercer competition stemming from the expansion of Chinese companies. While import competition increased over time for the entire country, its effects have been geographically differentiated.⁶

The third economic global driver refers to the widespread adoption of robots in a number of manufacturing and service activities. According to Chiacchio et al. (2018), industrial robot density started growing fast in Italy from the mid-90s and reached 3 robots per thousand workers in 2015 (against less than 2 robots per thousand workers in France and Spain). Again, robotization was certainly widespread but concentrated in those industries and regions where economic prospects were sufficiently positive to justify such investment in high-tech capital goods. While automation can potentially increase workers' productivity and have a positive effect on employment in the long run, it tends to displace workers from performing specific tasks and, thus, to exert pressure on local labor markets in the short run (Chiacchio et al., 2018).

All these global phenomena are likely to impact on local electoral results through multiple channels. But all have the potential to impinge on local labor markets. Cheap foreign-born labor force, competition from China, and robots may, *ceteris paribus*, reduce

⁵On the crisis of traditional political parties in the early 1990s, see Morlino (1996); Newell and Bull (1997); Passarelli and Tuorto (2012), among others. Shin and Agnew (2002; 2007) discuss the transition towards a new electoral map of Italy and the complex patterns of party replacement.

⁶For example, the area surrounding the city of Fabriano has been traditionally specialized in the production of paper and paper products as well as domestic appliances and, therefore, it has been one of the local labor markets facing the largest increases in competition from Chinese firms. Another example is Montegranaro and its surrounding local labor market specialized in the manufacturing of footwear.

local labor demand and depress wages. This, in turn, may affect voting choices due to discontent. This observation indicates that the empirical analysis of the impact of our global drivers on local voting should rely on geographical units where such labor market-related effects can be captured with limited spillovers from adjacent areas. Accordingly, this work will focus on so-called labor market areas, geographical units within which most people tend to live and commute to work.⁷

3 Data and empirical approach

3.1 Data

Our investigation starts off from a dataset constructed combining data from multiple sources that cover information on the economic structure, the demographic composition and the electoral outcomes (in 2001, 2008 and 2013) of about 8,000 municipalities in Italy. As the focus of the analysis is the impact of global economic drivers on electoral outcomes through local labor markets, we aggregate the municipal data at that level, adopting as geographical units of analysis the Labor Market Areas (LMAs) developed by the Italian Institute of Statistics (Istat). In 2001, there were 684 sub-regional, economically integrated, units identified on the basis of daily workers' commuting patterns, rather than administrative boundaries.

Electoral results were kindly provided by the Italian Ministry of the Interior. To identify far-right parties we resort to the University of North Carolina's Chapel Hill Expert Survey 2014 (CHES), a dataset collecting experts' opinions on the stance that individual parties take over several political issues.⁸ Data on the local economic structure come from the 2001 wave of the Census of Industry and Services (CIS) carried out by Istat and presenting information on the industry mix (at the three-digit level of the NACE industry classification) of employment at the municipality level.⁹ The number of immigrants and resident population come from the Istat Population Census and Istat Demo database. The data on Chinese imports, disaggregated at the six-digit product level of the WCO Harmonized System (HS), have been drawn from the United Nations International Trade Statistics Database (Comtrade) and matched with three-digit NACE sectors on the basis of Eurostat RAMON correspondence tables so as to relate trade flows and local industrial production.¹⁰ Data on robots were purchased from the International Federation of Robotics (IFR).¹¹ The dataset contains the stock of industrial robots in

⁷In Italy, the way Italian political parties organize the lists of candidates for the general elections seldom imply that candidates stand for election where they are born or work. Accordingly, the composition of the lists is likely to represent a minor issue and we can overlook issues connected with friends-and-neighbors voting (Gimpel et al., 2008; Johnston et al., 2016).

⁸More specifically, we look at the position of each party in terms of left-right score (provided in an interval between 0 and 10) and identify as far-right every party with a score greater than or equal to 7.

⁹Data on other socio-demographic factors for municipalities and NUTS-2 regions also come from Istat databases.

¹⁰A more detailed description of a similar dataset, with data up to 2008, is provided in Caselli et al. (2018).

¹¹An industrial robot is defined by IFR as "an automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications".

Table 1: Descriptive statistics - LMA level

	2001-2008		2008-2013	
	Mean	St. dev.	Mean	St. dev.
Δ Share of votes for far right x 100	-5.729	8.518	-2.225	6.370
Δ Share of votes for 5SM x 100	—	—	24.442	6.619
Δ Voters' turnout x 100	1.621	6.716	-6.674	3.668
Δ Immigration share x 100	2.739	1.935	1.404	0.869
Δ China imports pw	1.165	1.150	-0.304	0.629
Δ Robots pw x 1000	0.270	0.396	-0.099	0.300

Notes: The table reports means and standard deviations of each variable. The number of observations is 684. The analytical units are 2001 LMAs. Chinese imports per worker (pw) is expressed in thousands of constant 2010 US dollars. Robots per worker is the number of robots per thousand workers.

Italy and other countries by sector and year.¹²

Our investigation focuses on changes in local electoral outcomes between 2001 and 2008 and between 2008 and 2013. Therefore, Table 1 presents the mean values and the standard deviations of the variables of interest in both sub-periods, calculated using the LMAs as unit of analysis.

Table 1 hides significant heterogeneity in our variables of interest across geographic units. In particular, as we believe that people in nearby areas may influence each other's voting choices, we show a graphical representation of the geographical distribution of the changes in the shares of votes going to far-right parties and the 5SM and in voters' turnout over the two periods analyzed. A cursory look at the maps in Figure 1 reveals that electoral outcomes are spatially clustered and spatial autocorrelation between adjacent LMAs may be present. Indeed, we can observe that during the period 2001-2008, votes for far-right parties increased more in north-eastern regions, particularly in Veneto, while turnout decreased more in north-western regions as well as in some central and southern regions. These patterns suggest that political discontent over traditional parties manifested itself in different ways depending on the area. Voting patterns, moreover, changed substantially during the period 2008-2013. The northern regions, except for Alto Adige, observed the largest decreases in votes for far-right parties. The 5SM generally gained large shares of votes, particularly in Sicily, Marche and Liguria. Finally, voters' turnout decreased in all regions, particularly in the South.¹³

To explore more formally the possibility of spatial autocorrelation in the above electoral outcomes, Table 2 shows Moran's I tests to assess the degree of spatial dependence between adjacent LMAs. The data reject the null hypotheses that the electoral outcomes

¹²As the IFR data are based on the ISIC Rev 4 classification, in order to match them with the data for the local industrial production from the CIS, we employ a correspondence table between ISIC Rev 4 and NACE Rev 1 classifications at the 2-digit level of aggregation

¹³In Appendix A, we show the geographical distribution of our global economic factors. Figure 2 shows that, during the period 2001-2008, all three variables, i.e., immigration share, Chinese imports per worker and robots per worker, increased relatively more in richer northern and central regions. On the other hand, during the crisis period from 2008 to 2013, immigration still increased, particularly in north-western and some central regions, while Chinese imports per worker and robots per worker experienced more idiosyncratic changes, even though they generally decreased, especially in northern regions. We should notice that spatial autocorrelation of these variables is not taken into account in our models below as, by definition, labor market shocks should be absorbed within local labor markets.

Figure 1: Changes in voting for far-right parties, 5SM and voters' turnout

Table 2: Moran's I tests for spatial dependence

	2001-2008		2008-2013		
	$\Delta FarRight$	$\Delta Turnout$	$\Delta FarRight$	$\Delta 5SM$	$\Delta Turnout$
Spatial weight matrix M	1265.43***	522.92***	1260.57***	855.55***	446.06***

Notes: The table reports the chi-squared values of Moran's I tests for spatial dependence. The number of observations is 684. The spatial weight matrix M is equal to one for contiguous local labor markets and zero otherwise. *** indicates rejection of the null hypothesis of i.i.d. error terms at the 1% level.

in a given LMA are spatially independent from those in contiguous areas. This result is in line with that in Agnew and Shin (2017), who use a less fine level of geographical disaggregation.

Next, we describe how our global economic drivers are constructed. The first variable refers to changes in the local presence of immigrants and is captured by changes in the

number of immigrants per resident in LMA i at period t , times 100. Hence,

$$\Delta IMM_{i,t}^{shr} = 100 \times \Delta Immigrants_{i,t} / Residents_{i,2001}, \quad (1)$$

where $\Delta Immigrants_{i,t} = Immigrants_{i,t} - Immigrants_{i,t_0}$. As we study changes between 2001 and 2008 and between 2008 and 2013, t_0 is 2001 when $t = 2008$, and 2008 when $t = 2013$.

The intensity of the local exposure to import competition from China is measured by interacting data on local sectoral employment with country-level data on imported goods following the shift-share methodology adopted by Autor et al. (2013). This allows to exploit the large heterogeneity in the regional industry mix to allocate aggregate national trade data at the local level. In practice, we attribute higher values of Chinese imports per worker to the LMAs specialized in those sectors in which Italian imports from China are larger. Following Autor et al. (2013), changes over time in Chinese imports per worker are thus calculated as

$$\Delta IPW_{i,t}^{chn} = \frac{1}{L_{i,2001}} \sum_s \eta_{is,2001} \Delta IMP_{s,t}^{chn}, \quad (2)$$

where $\Delta IMP_{s,t}^{chn} = IMP_{s,t}^{chn} - IMP_{s,t_0}^{chn}$ and $IMP_{s,t}^{chn}$ indicates the value (expressed in thousands of constant 2010 US dollars) of imports from China of goods belonging to three-digit NACE sector s at time t . As before, t_0 is 2001 when $t = 2008$ and 2008 when $t = 2013$. $L_{i,2001}$ is the total employment of local labor market i in 2001, and $\eta_{is,2001} = L_{is,2001} / L_{s,2001}$ stands for the fixed weight of local labor market i in country-level employment for sector s in 2001, at the beginning of the period analyzed. Values for the employment structure are calculated for the year 2001 so as to ensure that local specialization is not due to contemporaneous trade exposure.

The local intensity of robotization is calculated in a similar way, as the data on robots are available only at the national level (Acemoglu and Restrepo, 2016; 2017). Accordingly, changes in the number of robots per worker at the LMA level are given by the formula:

$$\Delta RPW_{i,t} = \frac{1}{L_{i,2001}} \sum_q \eta_{iq,2001} \Delta RMP_{q,t}, \quad (3)$$

where $\Delta RMP_{q,t} = RMP_{q,t} - RMP_{q,t_0}$ and $RMP_{q,t}$ indicates the number of robots belonging to the two-digit NACE sector q that were installed in Italy at time t . When t is 2008, $t_0 = 2001$ and when t is 2013, then $t_0 = 2008$. Again, the values for the employment structure ($\eta_{iq,2001}$) are calculated for the year 2001. It is worth noticing that the geographical distribution of Chinese imports can be calculated exploiting a finer disaggregation (three digit) than that of robotization (two digit). This is likely to produce smaller variation in $\Delta RPW_{i,t}$ across neighboring LMAs than in $\Delta IPW_{i,t}^{chn}$.

3.2 Empirical specification

To address unobserved time-invariant heterogeneity at the LMA level, the empirical analysis is not run in levels but rather based on mixed first-difference models, one covering the period 2001-2008 and another one over the time span 2008-2013. The empirical specification for the mixed first-difference models can be described by the following formula:

$$\Delta y_{i,t} = \alpha_1 \Delta IMM_{i,t}^{shr} + \alpha_2 \Delta IPW_{i,t}^{chn} + \alpha_3 \Delta RPW_{i,t} + \mathbf{x}'_{i,t0} \boldsymbol{\gamma} + \mathbf{r}'_{i,t0} \boldsymbol{\psi} + \epsilon_{i,t}, \quad (4)$$

where $\Delta y_{it} = y_{it} - y_{i,t0}$ denotes the change in the share of votes to a certain group of parties or the change in voters' turnout in LMA i between t and $t0$, (with $t0$ equal to 2001 when $t = 2008$ and equal to 2008 when $t = 2013$). The vector $\mathbf{x}_{i,t0}$ is a vector of controls at the LMA level measured at the beginning of the period and $\mathbf{r}_{i,t0}$ is a vector of controls at the regional level measured at the beginning of the period.¹⁴ Although the impact of the control variables may be of interest per se, we include these terms only to avoid possible omitted variables and we do not discuss their effects in detail.

Given the geographical correlation in the electoral outcomes of interest, we also analyze the effect of our global drivers on electoral outcomes using a spatial regression model. Following the literature, and in particular Agnew and Shin (2017), we adopt a spatial autoregressive model that contains a spatially-lagged dependent variable constructed with a binary spatial weight matrix M , taking value one for contiguous local labor markets and zero otherwise. As the empirical analysis focuses on LMAs as units of analysis, we believe that the inclusion of spatial lags of the independent variables would not be appropriate as in this case labor market shocks should not spill over nearby areas and should rather be absorbed within each local labor market. On the other hand, people in nearby areas may influence each other's voting choices, which is captured by the spatial lag of the dependent variable. The empirical specification is, therefore, given by the following formula:

$$\Delta y_{i,t} = \beta_1 \Delta IMM_{i,t}^{shr} + \beta_2 \Delta IPW_{i,t}^{chn} + \beta_3 \Delta RPW_{i,t} + \beta_4 M_i \cdot \Delta y_t + \mathbf{x}'_{i,t0} \boldsymbol{\gamma} + \mathbf{r}'_{i,t0} \boldsymbol{\psi} + \epsilon_{i,t}, \quad (5)$$

where $M_i \cdot \Delta y_t$ is the spatially lagged dependent variable, which is constructed as the weighted average of the electoral outcomes in the neighboring LMAs.

Despite the inclusion of many controls, the estimation of specifications 4 and 5 might suffer from endogeneity problems. In particular, difficulties may arise when both the dependent variable and the regressors are correlated with unobserved shocks. For instance, voters' turnout and immigration inflows could both contract in areas where social capital worsens, and this effect might bias the estimation of the coefficient. Hence, improving on what is usually done in the political geography literature, we address the endogeneity concerns by adopting an instrumental variable (IV) approach.

As suggested by Autor et al. (2013), the potential endogeneity of imports per worker can be tackled by using information on the imports from China recorded in eight high-income countries outside the European Union (EU). This helps to identify the exogenous and 'supply-driven' component of the surge in Chinese imports in Italy. Thus, we instrument ΔIPW_{it}^{chn} with a new variable defined as

$$\widehat{\Delta IPW_{i,t}^{chn}} = \frac{1}{L_{i,2001}} \sum_s \eta_{is,2001} \widehat{\Delta IPW_{s,t}^{chn}}, \quad (6)$$

¹⁴The LMA-level controls include the number of residents, the share of residents over 65 in the adult population, the share of residents with primary or lower secondary education and the share of residents with tertiary education. The regional-level controls include the share of informal labor, the share of expenditure on cultural activities, tickets in cultural activities per capita, volunteering, attractiveness of universities, internet diffusion and hospital migration rate (to other regions).

where $\widehat{\Delta IPW}_{s,t}^{chn} = \widehat{IMP}_{s,t}^{chn} - \widehat{IMP}_{s,t0}^{chn}$ and $\widehat{IMP}_{s,t}^{chn}$ represents the average of sectoral imports from China of the eight non-EU countries at time t expressed in thousands of constant 2010 US dollars.

A similar approach can be adopted to build the instrumental variable for $\Delta RPW_{i,t}$ so as to capture the impact of exogenous factors influencing robot adoption, rather than local demand-driven forces affecting both robotization and voting. Thus, we build the following instrumental variable:

$$\widehat{\Delta RPW}_{i,t} = \frac{1}{L_{i,2001}} \sum_q \eta_{iq,2001} \widehat{RMP}_{q,t}, \quad (7)$$

where $\widehat{\Delta RMP}_{q,t} = \widehat{RMP}_{q,t} - \widehat{RMP}_{q,t0}$ and $\widehat{RMP}_{q,t}$ indicates the number of robots belonging to the two-digit NACE sector q that were installed in other advanced economies at time t .

As immigration might also be endogenous, we instrument $\Delta IMM_{i,t}^{shr}$ with the share of immigrants at the beginning of each period, $IMM_{i,t0}^{shr}$, as done for instance by Otto and Steinhardt (2014).

4 Empirical results

We first estimate the baseline specifications in equation (4) by means of a two-stage least squares (2SLS) estimator with robust standard errors. Table 3 shows the estimates of the mixed first-difference 2SLS specifications with instrumental variables for the three global economic drivers, ignoring spatial dependence. In all regressions, the relatively high values for the Cragg-Donald and the Kleibergen-Paap F statistics imply that the instruments used are informative for our endogenous variables.

Columns (1) and (2) refer to the period 2001-2008. With regards to the coefficients, they reveal that the LMAs where immigration increased more during the period 2001-2008 were characterized by a larger reduction in voters' turnout and a higher increase in the share of votes accruing to far-right parties. Relatively larger increases in Chinese imports were also positively associated with larger gains by far-right parties, whereas no significant effect is found for changes in voters' turnout. Finally, in those local labor markets where the increase in robots was larger, both voters' turnout and the share of votes to far-right parties increased relatively more.

While the first two results are in line with the predicament that positive changes in the exposure to globalization are associated with political discontent, which tends to manifest itself in lower participation and a more extremist voting pattern, as occurred in rich northern regions, the findings for robotization are more puzzling. The increase in robots per worker, in fact, turns out to be positively associated with a rise in the support to far-right parties but, at the same time, with an increase in voters' turnout. On the one hand, it is possible that, at least in the years that preceded the 2008 crisis, voters' perception of increasing investment in industrial robots was mixed, therefore not necessarily leading to electoral behaviors associated with resentment and dissatisfaction. On the other hand, the evolution in the local adoption of robots may *de facto* mimic local business performance. Indeed, in the most dynamic industrialized areas, voters might have decided to participate in the elections so as to avert the possibility that

Table 3: Effects of globalization and robotization on electoral outcomes, FD-IV

	2001-2008		2008-2013		
	$\Delta FarRight$ (1)	$\Delta Turnout$ (2)	$\Delta FarRight$ (3)	$\Delta 5SM$ (4)	$\Delta Turnout$ (5)
Δ Immigration share	0.870*** (0.331)	-0.420* (0.250)	-3.210*** (0.870)	2.570*** (0.763)	0.179 (0.342)
Δ China imports pw, log	3.528** (1.672)	0.612 (1.618)	1.552 (2.054)	-0.809 (2.830)	-3.192** (1.406)
Δ Robots pw, log	9.535** (4.752)	12.385** (5.102)	1.625 (1.895)	-3.327* (1.869)	-1.521 (0.938)
LMA controls	yes	yes	yes	yes	yes
Regional controls	yes	yes	yes	yes	yes
2SLS	yes	yes	yes	yes	yes
Observations	684	684	684	684	684
R-squared	0.543	0.265	0.401	0.241	0.322
Cragg-Donald F	12.874	12.874	38.858	38.858	38.858
Kleibergen-Paap F	5.324	5.324	22.571	22.571	22.571

Notes: Columns (1) and (2) refer to changes between 2001 and 2008, while columns (3), (4) and (5) refer to changes between 2008 and 2013. The dependent variable is the percentage point change in the votes for far-right parties, columns (1) and (3), the votes for the 5-Star Movement (5SM), column (4), and voters' turnout, columns (2) and (5). The variable immigration share is multiplied by 100, while Chinese imports per worker (pw) and robots per worker are in natural logarithms. The LMA controls include number of residents, share of residents above 65 in the adult population, share of residents with primary or lower secondary education and share of residents with tertiary education. The regional controls include hospital migration, informal labor, share of expenditure on cultural activities, tickets in cultural activities per capita, volunteering, attractiveness of universities and internet diffusion. The 2SLS specifications instrument for the change in the immigrants using the value at the beginning of the period, for the change in Chinese imports in Italy using the change in other developed countries' imports from China and for the change in robots using the change in the number of robots used in other developed countries. Robust standard errors are shown in parentheses. *, ** and *** indicate coefficients significantly different from zero at the 10%, 5% and 1% level respectively.

the incumbent left-wing coalition could win as it did in 2006. Such mechanism would explain the equal sign of the term in the two regressions, however it would also imply that the robotization variable may be a proxy for local industrial sophistication rather than capture the technology-driven impact of robots on labor displacement.

Columns (3), (4) and (5) in Table 3 report the estimates for, respectively, the change in the share of votes for far-right parties and for the newly-born 5SM, and in voters' turnout over the period 2008-2013. The estimates change considerably compared to the previous period analysed. Increases in immigration shares are negatively associated with changes in votes to far-right parties, but positively associated with changes in votes for the 5SM. On the other hand, changes in immigration are not significantly associated with changes in voters' turnout. This finding indicates that in the areas subject to higher immigration during the 2008-2013 period, i.e., mainly rich northern and central regions, a larger share of votes shifted from far-right parties to the 5SM. As the 5SM has never had an anti-immigration platform, this may appear bizarre. Yet, it is only seemingly puzzling. During the period 2001-2013, we observe substantive changes in terms of political supply among Italian right-wing parties. Most notably, National Alliance, which was the largest far-right party in the coalition led by Mr Berlusconi in 2001, merged with Forza Italia

right before the 2008 national elections to form a new politically moderate party called The People of Freedom. The role of the largest far-right party in the coalition led by Mr Berlusconi was taken up by the Northern League, which saw a doubling of votes during the period 2001-2008.¹⁵ Yet, in the following period, the Northern League faced a series of scandals that led to substantial reduction in its support. Moreover, the new far-right party Brothers of Italy was founded just a few months before the 2013 elections. Accordingly, there were no strong and consolidated far-right parties in Italy in 2013. This implies that the negative estimates for the coefficient for immigration may indicate that former far-right voters and electors holding anti-immigration preferences did exercise their right to vote (as turnout did not diminish), but decided to switch to other political parties, in particular the 5SM, for the lack of alternatives on the far-right side.¹⁶ This, undoubtedly, set the stage for the more radical changes observed in the following period: the setback that the far-right parties faced in 2013 was the trigger of the so-called sovereigntist and conservative twist adopted by the Northern League before and after the 2018 elections.

With regards to the coefficients related to Chinese imports during the period 2008-2013, we can observe that the only significant effect is on voters' turnout. In those areas more affected by increased competition from China, a larger proportion of voters decided not to vote and, thus, to express a form of protest against political parties.

Another estimated coefficient that is worth discussing is the negative value for the robotization's coefficient in the specification for changes in the votes for the 5SM. Although only weakly significant, the estimate indicates that in more dynamic LMAs the 5SM gained relative less support. This can be understood by noticing that the 5SM obtained better results in less dynamic regions, such as Sicily, Marche and Liguria, and more limited results in more dynamic areas, such as Lombardy, Veneto, and Trentino-Alto Adige. Again, this would suggest that the robotization variable might be a more general proxy for local industrial sophistication rather than simply the adoption of industrial robots.

Given that Moran's I tests in Table 2 suggest that spatial dependence is an issue that needs to be considered, next we estimate equation (5) including the spatially-lagged dependent variable and instrumental variables with the use of the generalized spatial two-stage least-squares (GS2SLS) estimator. The model we estimate, accordingly, is a spatial autoregressive version of the specifications shown in Table 3.

¹⁵According to Passarelli and Tuorto (2012), the success of the Northern League in the 2008 elections can be explained by the ability of the party to gains votes from the dominant moderate forces, both within the right-wing and the left-wing coalitions. The authors argue that this was mainly due to a uniquely strong stance against immigration and globalization, in line with the findings by (Beirich and Woods, 2000), and our results support this claim. A more nuanced view is proposed by Huyseune (2010), who claims that the Northern League faced a tension between its resistance against globalization and its historically privileged connections with a territory characterized by export-oriented companies: the Northern League proposed an asymmetric model of globalization based on unequal rights and obligations, emphasizing, in particular, the drawback of foreign immigrant workers.

¹⁶This interpretation is confirmed by individual-level data on political preferences taken from the surveys run by the Italian National Election Studies (ITANES). According to such data, 46.8% of respondents in 2008 answered that the centre-right coalition was the most capable of addressing the issue of immigration. In 2013, the percentage of voters that answered in the same way decreased to 35.8%, while at the same time 17.9% of respondents believed that the 5SM was the most capable of dealing with immigration.

Table 4: Effects of globalization and robotization on electoral results, SAR-IV

	2001-2008		2008-2013		
	$\Delta FarRight$ (1)	$\Delta Turnout$ (2)	$\Delta FarRight$ (3)	$\Delta 5SM$ (4)	$\Delta Turnout$ (5)
Δ Immigration share	0.466** (0.198)	-0.418** (0.210)	-0.419 (0.371)	2.002*** (0.607)	0.104 (0.328)
Δ China imports pw, log	2.947*** (1.075)	-0.493 (1.148)	1.827 (1.265)	0.696 (2.174)	-2.576** (1.157)
Δ Robots pw, log	6.399*** (2.293)	6.984*** (2.424)	-0.315 (0.926)	-3.333** (1.629)	-2.448*** (0.852)
$M \cdot \Delta Y$	0.504*** (0.056)	0.568*** (0.089)	0.848*** (0.054)	0.070** (0.034)	0.116** (0.054)
<i>Direct impact, average</i>					
Δ Immigration share	0.481** (0.204)	-0.436** (0.217)	-0.473 (0.415)	2.003*** (0.607)	0.104 (0.328)
Δ China imports pw, log	3.042*** (1.110)	-0.515 (1.198)	2.062 (1.425)	0.697 (2.175)	-2.580** (1.159)
Δ Robots pw, log	6.604*** (2.367)	7.282*** (2.513)	-0.355 (1.047)	-3.334** (1.630)	-2.451*** (0.854)
<i>Indirect impact, average</i>					
Δ Immigration share	0.281** (0.119)	-0.311** (0.157)	-0.858 (0.723)	0.108* (0.065)	0.010 (0.030)
Δ China imports pw, log	1.777** (0.743)	-0.368 (0.884)	3.745 (2.684)	0.037 (0.118)	-0.239 (0.164)
Δ Robots pw, log	3.858** (1.563)	5.202** (2.181)	-0.645 (1.926)	-0.179 (0.110)	-0.227 (0.151)
<i>Total impact, average</i>					
Δ Immigration share	0.762** (0.316)	-0.747** (0.361)	-1.331 (1.130)	2.110*** (0.643)	0.113 (0.358)
Δ China imports pw, log	4.819*** (1.809)	-0.882 (2.079)	5.807 (4.066)	0.734 (2.291)	-2.818** (1.274)
Δ Robots pw, log	10.462*** (3.829)	12.485*** (4.395)	-1.001 (2.971)	-3.514** (1.697)	-2.678*** (0.960)
LMA controls	yes	yes	yes	yes	yes
Regional controls	yes	yes	yes	yes	yes
GS2SLS	yes	yes	yes	yes	yes
Observations	684	684	684	684	684
Pseudo R-squared	0.576	0.345	0.534	0.280	0.332

Notes: Columns (1) and (2) refer to changes between 2001 and 2008, while columns (3), (4) and (5) refer to changes between 2008 and 2013. The dependent variable is the percentage point change in the votes for far-right parties, columns (1) and (3), the votes for the 5-Star Movement (5SM), column (4), and voters' turnout, columns (2) and (5). The variable immigration share is multiplied by 100, while Chinese imports per worker (pw) and robots per worker are in natural logarithms. The spatial weight matrix M is equal to one for contiguous local labor markets and zero otherwise. ΔY refers to the percentage point change in the dependent variable of interest in each column. The LMA controls include number of residents, share of residents above 65 in the adult population, share of residents with primary or lower secondary education and share of residents with tertiary education. The regional controls include hospital migration, informal labor, share of expenditure on cultural activities, tickets in cultural activities per capita, volunteering, attractiveness of universities and internet diffusion. The GS2SLS specifications instrument for the change in the immigrants using the value at the beginning of the period, for the change in Chinese imports in Italy using the change in other developed countries' imports from China and for the change in robots using the change in the number of robots used in other developed countries. Standard errors are shown in parentheses. *, ** and *** indicate coefficients significantly different from zero at the 10%, 5% and 1% level respectively.

The coefficients for the spatial lag in all five regressions in Table 4 are positive, lower than one and significantly different from zero at least at the 5% confidence level. This is further evidence confirming the presence of spatial dependence. Notably, spatial dependence is stronger for far-right parties than for the 5SM.

With regards to the main variables of interest, it suffices to say that most previous findings carry along in these spatial specifications, with only a few changes in the statistical significance of some estimates. With regards to the direct and indirect effects of our main variables of interest, it is interesting to notice that, as the coefficients for the spatial lag are always positive and less than one, the two effects always have the same sign. The direct effects show the same levels of significance as the estimated coefficients (and similar sizes too). The same observation is true for the total effects. On the other hand, the indirect effects tend to be less significant, with the exception of the coefficients in the period 2001-2008. This seems to confirm the above remark that the results do not change substantially when using the spatially autoregressive model. The inclusion of regional controls in the specifications and the focus on labor market areas, which by definition represent the units of analysis within which labor market shocks can be absorbed, may contribute to this finding. Possibly, spatial dependence may turn out more relevant in simpler specifications with several missing variables and different geographical units of analysis.

5 Closing remarks

This work has analyzed from a spatial perspective the economic forces driving changes in the Italian national elections in 2001, 2008 and 2013. In particular, the paper studies the locally-mediated effect of three global economic drivers (i.e., the higher flows of migrants coming from countries of the Global South, the fiercer foreign competition in international trade, especially from China, and the diffusion of skill-biased and labor-substituting technological change in the form of robotization) on the local electoral outcomes associated with discontent in Italy, i.e., larger shares of votes for far-right parties and the 5SM, and lower voters' turnout.

The main findings are that all these global factors had an impact on political outcomes associated with discontent, albeit in different ways. Moreover, the analysis reveals a change over time in the way these forces affected the different electoral outcomes of interest, probably due to changes in political supply associated with scandals and party mergers. The very emergence of the 5SM is indeed a big change in the political supply, whereby voters could express their dissatisfaction without voting for far-right parties.

By combining various methodological advances coming from the political geography and the political economy literature, this paper tries to bridge the divide that exists between various disciplines sharing similar interests but adopting different tools of analysis. While our results seem not to change substantially when using a spatially autoregressive model, possibly due to the focus on labor market areas and the inclusion of several controls, this does not imply that other works looking at different outcomes, drivers or periods will come up with the same conclusions. As such, it is important that further works also make use of methodologies coming from all these different disciplines for a complete and robust analysis of the phenomena at hand.

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Appendix

A Geographical distribution of changes in global economic factors

Figure 2: Changes in immigration, Chinese imports and robotization

(a) Δ Immigration share, (b) Δ China imports pw, (c) Δ Robots pw, 2001-2008
2001-2008 2001-2008 2001-2008

(d) Δ Immigration share, (e) Δ China imports pw, (f) Δ Robots pw, 2008-2013
2008-2013 2008-2013 2008-2013

Source: Own calculations based on data from Istat, Comtrade and International Federation of Robotics.