Public Spending, Green Growth, and Corruption: a Local Fiscal Multiplier Analysis for Italian Provinces

Matteo Ficarra[†]

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Abstract

This paper estimates local fiscal multipliers for green and non-green public works in Italian provinces, and disentangles the geographic and institutional heterogeneities behind them. I construct a fiscal shock by taking the variation of the difference between actual and budgeted spending, and I show that it is exogenous to provincial institutional and macroeconomic conditions. Using local projections, I find that a €1 increase in government spending generates negligible GDP losses in the first two years for overall and non-green projects, while it increases output by €0.98 after 3 years for green projects. These results are smaller than the prevailing estimates in the literature. A triple interaction approach reveals that overall and non-green multipliers are driven by southern provinces, while the green multiplier is driven by the rest of the country, despite the contemporaneous green multiplier being equal to 1.43 in the south. I link the heterogeneity to governance characteristics: higher government effectiveness and institutional quality decrease the overall and non-green multiplier, while they increase the green multiplier. Interestingly, corruption positively affects all multipliers. I show that the effect of corruption can be explained by its role in easing bureaucratic and regulatory burdens. These results suggest that taking national fiscal multipliers at face value can lead to an overestimation of the impact of fiscal expansions.

Keywords: fiscal policy, local multiplier, green multiplier, climate policy, institutional quality, local projections, triple interactions.

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[†]Geneva Graduate Institute (email: matteo.ficarra@graduateinstitute.ch).

Contents

1 Introduction

Government investments are often seen as important drivers of economic growth and the solution to broader societal issues such as adapting to climate change. Most empirical estimates place fiscal multipliers above 1 but the evidence is heterogeneous, a dimension that remains relatively unexplored. It is reasonable to expect that different institutional and economic characteristics do affect fiscal multipliers, especially at the local level. In other words, the fact that a multiplier is estimated to be above unity at the national level does not mean that fiscal expansion will necessarily generate homogeneous growth across the whole country at the same rate.

In this paper, I compute local fiscal multipliers for green and non-green public spending in Italian provinces, and I investigate how it varies both geographically and based on institutional quality differences. Italy is a good case study for two reasons. First, it is a net beneficiary of €211 billions under the Recovery and Resilience Facility (RRF) plan approved by the European Union. To access these funds, member states have to allocate at least 37% of resources to investments for the green transition, meaning that Italy should spend at least €78 billions on green projects. This paper provides preliminary evidence on the potential impact of this massive inflow of money, especially for green investments, and on the factors that could determine its economic success. Second, Italian administrative subdivisions of the state, such as provinces, finance themselves mostly through direct taxation instead of receiving funds from the central government. This institutional framework alleviates some of the theoretical concerns around local multipliers (see Brückner and Tuladhar, 2014; Chodorow-Reich, 2019).

I use detailed information at the level of individual investment projects to build a novel longitudinal dataset on public works at the province level that covers the years 2013-2021. Based on the categorization of the works, I divide the sample into overall, green, and non-green projects. To construct the fiscal shock, I first compute a measure of unanticipated spending by taking the difference between actual and expected spending for each project, which I then aggregate at the province-year level. I then define the fiscal spending surprise as the variation of unanticipated spending from year $t-1$ to t. I show that surprise spending is exogenous to institutional quality measures and macroeconomic conditions of the provinces, and can thus be safely used as an instrument for government spending.

Using a local projections analysis *à la* Jordà (2005), I find that while overall public works spending, if anything, hinders growth, the green multiplier is positive but below unity 3 years after implementation. These results, however, hide significant heterogeneity. By employing a triple interaction approach, I investigate how the multiplier varies in different areas of the country and with different levels of institutional quality. I find the following five empirical regularities: *i)* the small and negative baseline multiplier for overall and non-green spending is driven by provinces in the south; *ii)* the positive cumulated green multiplier 3 years after implementation is driven by provinces in the north, where green spending has a low but increasing and lasting impact on economic growth; *iii)* the contemporaneous green multiplier is very high in the south (a €1 increase in green spending increases output by €1.43), but green spending does not sustain growth further; *iv)* higher government effectiveness and institutional quality decrease by a negligible amount the overall and non-green multipliers, while they increase the multiplying effect of green spending; and *v)* more pervasive corruption strongly improves the fiscal multiplier, especially for green spending.

To understand the role of corruption, I first show that its effect on the multiplier is not simply capturing geographical differences. In particular, corruption affects the green multiplier differently depending on whether a province is in the north or in the rest of the country. While in southern provinces corruption raises the multiplier, in the rest of the country it lowers it. Following Akcigit et al. (2023), I argue that these results can be explained by the fact that corruption eases the negative effects of bureaucratic and regulatory burdens on growth. I show that when a province has low regulatory quality, an increase in corruption increases the green multiplier. Conversely, when a province has high regulatory quality, an increase in corruption lowers the multiplier.

The contribution of this paper is threefold. First, I exploit publicly available information to build a novel dataset on green and non-green spending on public works at the province level. The features of this data allow for a strong identification technique that could in principle be used to study other aspects of fiscal expenditure. Second, I bring new evidence on local multipliers, comparing green and non-green spending. My findings suggest that regardless of the nature of the investments the fiscal multiplier in Italian provinces is lower than 1.5, the prevailing estimate in the literature. Third, I study the heterogeneity in the multiplier. I show that the impact of spending on output varies within the country and depending on the level of institutional quality. These results are particularly important from a policy point of view: assuming a homogeneous national multiplier can lead to an overestimation of the impact of fiscal expansions. In fact, I find that spending money in the south does not have the same effect as spending it in the rest of the country. Moreover, the way in which government expenditure affects growth is strictly intertwined with the quality of the institutions. These findings could help tailor public spending programs such as the RRF plan. For instance, policy makers and politicians should place greater care in the alleviation of regulatory and bureaucratic burdens.

Related Literature. This paper is related to three main streams of the existing literature. First, it broadly relates to the vast literature on local fiscal multipliers, and in particular to multipliers for Italy. Chodorow-Reich (2019) provides a comprehensive review of the main findings, and places the local multiplier between 1.5 and 1.8. Most estimates are based on the American Recovery and Reinvestment Act (ARRA) of 2009 (Feyrer and Sacerdote, 2011; Chodorow-Reich et al., 2012; Wilson, 2012; Conley and Dupor, 2013; Dupor and Mehkari, 2016; Dube et al., 2018; Dupor and McCrory, 2018), but there are relevant contributions exploiting different settings (e.g. Shoag, 2010; Suárez Serrato and Wingender, 2016; Adelino et al., 2017) in different countries (see Brückner and Tuladhar, 2014; Corbi et al., 2019; Brückner et al., 2022). Estimates for local multipliers in Italy are lower. Acconcia et al. (2014) exploit a law to combat political corruption and Mafia infiltration of city councils as an instrument for government spending, and find a multiplier for Italian provinces equal to 1.5. Porcelli and Trezzi (2014) estimate a "reconstruction multiplier" of around 1 for municipalities receiving government grants following the 2009 earthquake in the Abruzzo region. For overall spending, I find the local multiplier to be either 0 or negative but very close to 0. These results are more in line with Cerrato et al. (2023), who exploit tighter budgetary rules for Italian municipalities as a quasi-experiment and find the multiplier to be never significant. So far, only two papers have investigated within country differences in the multiplier, with opposite results. Piacentini et al. (2016) find that regions in the south of Italy have larger multipliers, and are thus hit harder by spending cuts. On the other hand, Deleidi (2022) find a higher impact of government investments and consumption on GDP in the centre-north regions. This paper aims to shed further light on the debate concerning local multipliers in Italy.

Second, this paper relates to the growing literature on green multipliers. Garrett-Peltier (2017) finds that $1 million spent in the fossil fuels sectors creates 2.65 full-time jobs, while the same amount spent in the clean energy sectors creates 7.49-7.72 jobs. Similarly, Chen et al. (2020) focus on ARRA direct spending targeted at green investments, and estimate a positive and permanent effect on job creation emerging primarily in the long-run with an extremely wide plausible range (zero to 25 jobs for every $1 million spent). Focusing on output, Batini et al. (2022) build an international dataset on spending in clean energy, biodiversity conservation, and land use activities to estimate aggregate green multipliers. They find that every $ spent on green activities can generate more than a $'s worth of economic activity (1.1-1.5), and that green spending has a larger multiplying effect than investments on fossil fuel energy (0.5-0.6). This paper is closer to Hasna (2021), who estimates a local multiplier of public investments in green energy in U.S. states exploiting the difference between approved and actual spending in green energy by the Department of Energy. She finds that a $1 increase in green spending increases state-level output by $1.1 contemporaneously, and up to $4.2 within two years of implementation. Her estimates of non-green multipliers are never statistically different from 0. I expand this literature by providing further evidence on green multipliers at the local level.

Lastly, this paper touches upon the literature on institutional quality and economic growth. In particular, the fact that the multiplier increases with corruption is seemingly in contrast with the wide consensus that better institutions help governments use physical and human capital more efficiently to achieve greater levels of income and maintain higher macroeconomic stability (Acemoglu et al., 2001; Rodrik, 2008). For example, Haque et al. (2008) find that corruption reduces the return to public investments and makes them ineffective in raising economic growth. This in turn can translate into higher institutional quality raising the spending multiplier (Avellán et al., 2020). However, corruption can alleviate other burdens to economic growth. For example, Akcigit et al. (2023) show that the presence of political connections can mitigate the regulatory and bureaucratic burdens for connected firms. Similarly, Braccioli (2023) proves that criminal organizations can act as an effective substitute of the State when the judicial system is an obstacle to the correct functioning of a democracy. This paper sheds further light on the role of institutional quality on growth. In particular, I provide evidence of how corruption can increase growth when other institutional obstacles are present.

The remainder of this paper is organized as follows. Section 2 discusses the data and provides some stylized facts on overall and green spending. I then define green spending and show that underreporting concerns are not an issue for this analysis. In Section 3 I present the fiscal shock and describe the empirical strategy. Section 4 discusses baseline results and robustness checks. I then analyse heterogeneity of the multiplier in Section 5, while in Section 6 I investigate the role of corruption. Section 7 concludes.

2 A Detailed Dataset on Italian Public Investments

I construct a novel longitudinal dataset on (green) public works in 107 Italian provinces for the years 2013-2021. An Italian province is a geographic entity containing several municipalities, similar to a US county. Following Law No. 229/2011 on public works monitoring and Law No. 190/2012 on anticorruption and transparency, public administrations[1] are required to keep track of and make publicly available all relevant information concerning the expenditure cycle of public works. The Ministry of Economy and Finance (MEF) then assembles and integrates this information into the BDAP MOP (*Banca Dati Opere Pubbliche per il Monitoraggio delle Opere Pubbliche*) database[2]. As soon as a project is presented, it gets a unique code (*Codice Unico di Progetto*, or CUP). The CUP identifies the work throughout its life cycle, from approval to the final outlay, and the public administration in charge is required to periodically monitor, collect, and update all relevant information[3]. For every public work, the BDAP MOP provides information concerning the administration in charge, the type of investment, the expected and actual dates for different stages of the investment's life cycle, the expected and actual costs, and the different sources of financing. I express all monetary variables in per capita current euro values.

I start with more than 480,000 projects, spanning years from the early 1980's to 2021. Because all CUPs before 2013 have been added retroactively, I restrict my sample to the years 2013-2021[4]. I also drop all projects with strictly positive expected costs and zero actual expenditure, as they correspond to approved investments for which works have not yet started. My final sample is composed of 266,288 interventions, of which 10.4% are green.

I compute the multiplier by using annual per capita GDP at NUTS3 level (which corresponds to provinces) from the Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy (ARDECO[5]). I express GDP in current euros. Population data to compute per capita government spending comes from the Italian National Institute of Statistics (ISTAT[6]). In the heterogeneity analysis, I use data on institutional quality at the province level from Nifo and Vecchione (2014), which I describe in detail in the Appendix.

[1] Regions, provinces, municipalities, and all state-owned and state-run companies and institutions.

[2] The data can be found here.

[3] At least on a quarterly basis, unless otherwise provided for by the law.

[4] Prior to Law No. 229/2011 and Law No. 190/2012, public administrations were not required to keep track of and monitor investments digitally. Therefore, all CUPs in the data for the years prior to 2013 either correspond to projects that were not yet completed in 2013, or were arbitrarily added afterwards. Either way, for a lack of consistency and a clear issue of underreporting, I exclude these years from my sample.

[5] The data is available here

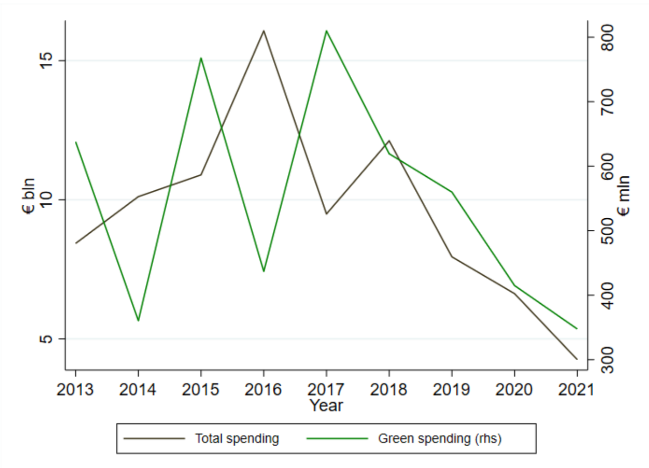
[6] The time series stops in 2019, and I perform a simple interpolation to get population values for 2020 and 2021. Due to the pandemic, I might be overestimating population values, which could in turn cause an underestimation of per capita investments.

2.1 Green Investments: Classification and Stylized Facts

Investments are classified according to 24 different types (see Appendix Table 7 in the Appendix for a list of all investment types): I define as green spending all investments of the types "Extraordinary maintenance with energy efficiency" and "Renovation with energy efficiency". This in line with the recent literature exploiting energy efficiency and renewable energy spending by the Department of Energy (DOE) to compute the green multiplier in the US (see for example Chen et al., 2020; Hasna, 2021). Moreover, in the context of Italy, energy efficiency measures represent an important component of the RFF: in its plan submitted to the European Commission, the Italian Government allocated more than 22 billion euros to energy efficiency investments. BDAP further classifies projects according to 255 different sub-categories. Six of them are of interest for this study, namely "Infrastructures for environmental protection, enhancement, and fruition", "Green public spaces", "Plants for energy production from renewable sources", "Systems for network efficiency and energy saving", "Air quality infrastructure", and "Plants and equipment for natural disaster management". I therefore also include in the definition of green spending all investments that are not energy efficiency measures but fall under one of these categories. Overall, I identify 27,656 green projects of which 62% pertain to energy efficiency interventions (see Appendix Table 8 for a breakdown of green interventions).

Figure 1 plots the evolution of total and green spending. It highlights three main takeaways: first, there is a sizeable variation over time of both overall and green government spending, with a declining path starting in 2018. Second, the pairwise correlation between green and non-green spending is not very strong. Figure 9 in the Appendix plots the population weighted correlation between the two components: the coefficient is positive and statistically different from 0, but low[7]. Third, green spending represents a small yet relevant share of total spending across all years (the average share across all years is around 6.2%, see Figure 8 in the Appendix).

Figure 1: (Green) Government Spending Over Time

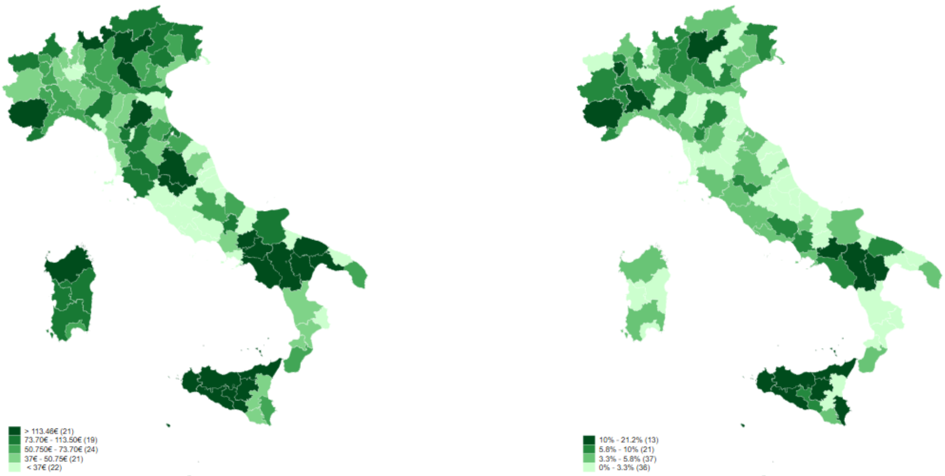


Source: BDAP MOP database and own calculations
Note: The Figure plots overall green and non-green spending at national level. Overall spending is plotted in billions of euros (left axis), green spending is plotted in millions of euros (right axis). Spending refers to actual costs in the year of the projects' announcement.

Figure 2 plots total per capita green spending (left panel) and the share of green spending (right panel) by province. We do not observe any apparent and systematic patterns across geographic areas, as provinces spending more for green projects are spread throughout the country. With a few exceptions, larger amounts of green spending are generally associated with larger shares of green spending, in line with the low pairwise correlation of Figure 9.

[7] As a benchmark, Chen et al. (2020) find a pairwise coefficient of 0.393.

Figure 2: Green Spending by Province



(a) Total Green Spending

(b) Share of Green Spending

Source: BDAP MOP database and own calculations
Shapefile: 2021 Istat shapefile (107 provinces)
Coverage: 100% (107 provinces)
Note: per capita green spending is computed by taking the ratio of all green spending in a given province and the average population. The share of green spending is the ratio of overall green spending and total spending in a given province. Spending refers to actual costs and it is collapsed at the province level for the years 2013-2021.

2.2 Checking for Underreporting

All relevant details concerning a CUP are gathered and loaded by employees of the public administration in charge of the project, which may cast some doubts on the representativeness of the data. Arguably, it's possible that public administrations with a lack of personnel or digital skills systematically underreport the number of projects. This may bias the results in two ways: first, the fiscal multiplier computed on a subsample of actual spending most likely overestimates the true impact of the fiscal stimulus. Second, if underreporting is correlated to the level of economic development, provinces with lower (higher) values of output will be characterized by lower (higher) total and green spending values compared to the actual ones. This too may induce an upward bias in the estimate.

Some summary statistics concerning public works are available on the MEF's website[8]. Although it does not report on total public works spending, the website provides information on the share of spending for public works by region for the period 2016-2021. I consider these shares to be the "official" ones, and compute an analogous measure with BDAP data[9]. Figure 10 in the Appendix plots the "official" and own regional shares of total spending. A large and systematic difference between the two would suggest the presence of a pattern of underreporting. The self-computed shares of spending in Friuli-Venezia Giulia, Liguria, Molise, Piemonte, Trentino-Alto Adige, and Valle d'Aosta, which combined account for 21 out of 107 provinces, are lower in all years compared to the MEF's websites shares. On the other hand, I overestimate the shares of spending in Emilia-Romagna and Marche (14 provinces combined). For the remaining 12 regions (accounting for 72 provinces), there is no pattern of over- or under-estimation. Moreover, differences in the shares are overall small: the average "official" regional share is 4.997%, against an average of the self measured regional share of 5%. The difference in absolute terms between the two measures has a median of less than 1.5 percentage points, with only 2 region-year observations reporting a difference larger than 9 p.p.. I thus conclude that underreporting, if present, is most likely randomly distributed throughout the country and not very large on average.

[8] See here.

[9] The data assembled by the MEF into the BDAP MOP database is highly disaggregated. At a more aggregated level (i.e., regional or national), the MEF is likely to rely on more complete information coming from official documents and balance sheets.

To check if underreporting is in any way correlated to the level of economic development, I regress the absolute value of the difference between the "official" and the self measured shares of total spending on regional per capita GDP (Appendix Table 9 summarizes the results). The contemporaneous relationship between the two variables is very low and not statistically different from 0. Similarly, past levels of per capita GDP do not predict higher wedges between "official" and self-measured shares. The same is true for future values of GDP. Overall, I can therefore exclude that provinces in less economically developed regions are more prone to underreporting.

3 Empirical Strategy

3.1 Computing a Spending Shock

Estimating a fiscal multiplier presents the usual challenges. Public investment programs such as those in the BDAP MOP database are by construction endogenous to economic conditions. The local authorities may allocate funds or facilitate investments in response to local developments, in ways that province fixed-effects cannot account for (Acconcia et al., 2014). In practice, I need a measure of government spending that is unanticipated and exogenous to economic conditions, i.e. a fiscal shock. I exploit the fact that the data reports both budgeted and actual spending. I take the difference of the two and use its time variation as my measure of the fiscal shock. After accounting for province and time specific conditions through fixed effects, this wedge should be unanticipated and exogenous to macroeconomic conditions and institutional characteristics.

For each project, I compute its unanticipated spending as the difference between expected and actual expenses. I then aggregate this measure at the province-year level and define, for each spending type, the unanticipated per capita expenditure in province i at time t as $gs_{i,t}^{unant.} = gs_{i,t}^{actual} - gs_{i,t}^{exp.}$. The expenditure surprise, i.e. the fiscal shock, is the difference between the variation in per capita actual spending and the variation in per capita requested spending, or the variation in unanticipated spending:

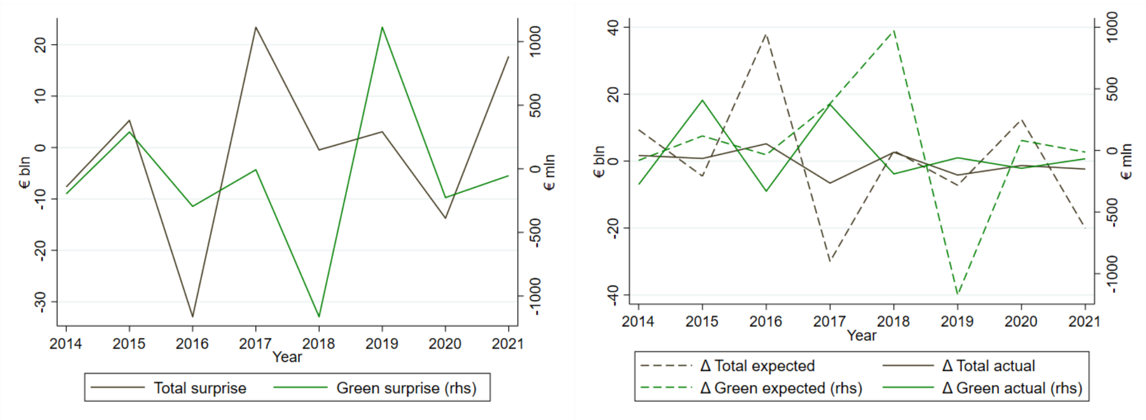
$$surprise_{i,t} = (gs_{i,t}^{actual} - gs_{i,t}^{exp.}) - (gs_{i,t-1}^{actual} - gs_{i,t-1}^{exp.}) = gs_{i,t}^{unant.} - gs_{i,t-1}^{unant.}. \quad (1)$$

Cost overruns ($gs_{i,t}^{unant.} > 0$) and project surpluses ($gs_{i,t}^{unant.} < 0$) are common features of public works. In the sample, 74% of the projects did not respect initial estimates, without any relevant difference between green (75.5%) and non-green (74.2%) works. However, unanticipated spending is usually relatively small: the median value is 0, and more than 80% of the projects had unanticipated spending within 10% in absolute value of the project's actual costs. The sample is strongly right-skewed: while cost overruns are as likely as project surpluses, the latter are on average larger. This is mostly due to delays in the works. For example, in 2013 the province of Mantova announced a project for the renovation of the San Benedetto Po bridge to increase road safety and reduce environmental impact. The initial estimate was to complete the project in 630 days, but works only started in 2017 and halted right away due to a revision of the initial cost estimates and a subsequent lack of funds. In the data, this sums up to an unanticipated spending amount of -33.8 million euros. Although very large, cases like this remain the exception, with 89% of the works that were finished by 2021 being concluded within 2 years of the announcement.

In the rest of this section, I argue in favour of my identification strategy by showing that $surprise_{i,t}$ varies over time and across provinces, and that it is exogenous to macroeconomic and institutional conditions.

Variation Across Time. In the left panel of Figure 3 I plot the fiscal shock for overall and green spending as defined in equation (1), aggregated at the national level. In the right panel, I decompose it into the variation of expected and actual spending. Figure 3 shows that both overall and green surprise spending vary considerably over time. Actual spending is less volatile, especially starting in 2018, but the high variability of expected spending ensures variation of the surprise.

Figure 3: Surprise Spending Over Time



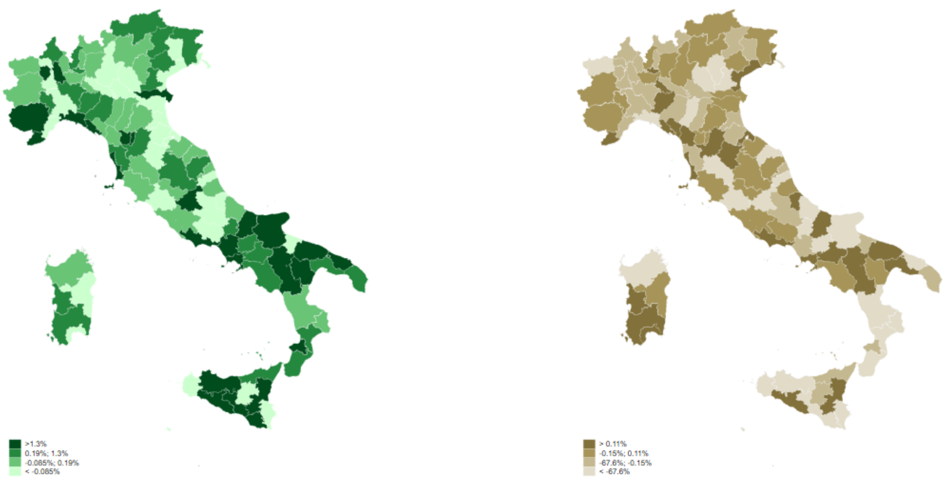
(a) Variation of the surprise

(b) Variation of expected and actual spending

Source: BDAP MOP database and own calculations
Note: the left panel plots the $surprise_{i,t}$ as defined in equation (1) for overall and green spending (right axis). The right panel decomposes the fiscal shock and plots the difference between expected (actual) costs in year t and expected (actual) costs in year $t-1$ for both green (right axis) and total projects at national level. Because 2013 is the first year of the sample, the time series starts in 2014.

Variation Across Provinces. In the left panel of Figure 4 I show that green surprises do not follow an obvious pattern. The average yearly green surprise as a percentage of green spending is often higher in southern provinces, but cost overruns and project surpluses are common in the north as well. Similarly, surprises for total spending (right panel) do not show clear geographical consistencies.

Figure 4: Green vs. Total Surprise by Province



(a) Green surprise

(b) Total surprise

Source: BDAP MOP database and own calculations
Shapefile: 2021 Istat shapefile (107 provinces)
Coverage: 100% (107 provinces)
Note: the Figure plots the average surprise by province for green (left panel) and total spending as a percentage of actual spending (in $t-1$). The surprise is defined as in equation (1).

Exogeneity. Provinces characterized by a lower institutional quality (e.g., more corruption, less efficient government, low accountability etc.) may be economically less developed and, at the same time, more prone to errors in the forecast of projects' spending. To check whether institutional quality represents a confounding factor, I investigate the relationship between the surprise and three separate measures of institutional quality from the Institutional Quality Index (IQI) developed by Nifo and Vecchione (2014), namely the overall institutional quality index, absence of corruption, and government effectiveness. Both overall and green spending surprises are unrelated to all measures of institutional quality, as the very low and never statistically significant coefficients in Table 10[10] show.

It is also possible that provinces characterised by historically lower levels of economic development are more often subject to forecasting errors for reasons unrelated to institutional quality. For example, poorer provinces may deliberately underestimate their future costs to respect budgetary constraints at the time of the approval of the projects, only to overshoot initial estimates later. To test this hypothesis, I regress the overall and green surprise on past values of per capita GDP growth (see Appendix Table 11). I find that past growth cannot predict the wedge between actual and expected spending, even after controlling for institutional quality. Hence, I can overall reject the hypothesis that the variation in unanticipated spending is correlated to local economic conditions.

3.2 Econometric Specification

To facilitate the direct estimation of multipliers and avoid ad hoc log-transformations (Owyang et al., 2013; Ramey, 2016), I use the Hall-Barro-Redlick transformation (see Hall, 2009; Barro and Redlick, 2011). I define as $Y_{i,t+h} = (y_{i,t+h} - y_{i,t-1})/y_{i,t-1}$ the cumulated growth rate of per capita GDP from year $t-1$ to year $t+h$ (with $h = \{0, 1, 2, 3\}$) in province i, and employ a 4-period local projection method *à la* Jordà (2005) to estimate the cumulated multiplier at each horizon h:

$$Y_{i,t+h} = \alpha_i + \lambda_t + \theta_h \frac{surprise_{i,t}}{y_{i,t-1}} + \varepsilon_{i,t+h}, \qquad h = \{0; 3\} \tag{2}$$

In all specifications, I first estimate the model using total surprise spending, and then decompose it into green and non-green[11]:

$$Y_{i,t+h} = \alpha_i + \lambda_t + \theta_h^g \frac{surprise_{i,t,g}}{y_{i,t-1}} + \theta_h^{ng} \frac{surprise_{i,t,ng}}{y_{i,t-1}} + \varepsilon_{i,t+h}, \qquad h = \{0; 3\} \tag{3}$$

I include province fixed-effects (α_i) to address potential endogeneity issues related to the possibility that certain province-specific characteristics are correlated with spending allocation criteria (Acconcia et al., 2014). For example, it is possible that provinces with lower output growth decide to spend more to boost economic activity. The inclusion of year fixed-effects (λ_t), on the other hand, deals with distortions rising from national spending and output components common to all provinces, as well as with monetary and fiscal policies at the national level. For example, not including year fixed-effects could lead to a relevant bias in the first and last years of the sample when Italy was, respectively, coming out of the sovereign debt crisis and entering the Covid crisis. The coefficient θ_h measures the cumulated multiplier. By normalizing both output and green spending by the same euro value (i.e., per capita GDP in year $t-1$), I can interpret the multiplier in euro-terms, whereby a 1 euro increase in per capita (green) spending in province i between $t-1$ and t increases per capita GDP in province i between $t-1$ and $t+h$ by θ_h euros. Due to the relatively short panel, I do not include lags of the dependent and independent variables. When I use lags, control variables, and lags of the control variables, I find similar results but lower AIC scores, suggesting worse fits.

4 Estimates of Multipliers

4.1 Baseline Results

I compute the overall, green, and non-green multipliers for all 107 provinces. There are two possible and complementary reasons for which the green multiplier might be larger. On the one hand, the public infrastructure

[10] In both Table 10 and Appendix Table 11 coefficients are very large because the dependent variable is regressed on very small values. I report these coefficients as I am testing the exogeneity of $surprise_{i,t}$ as defined in equation(1). Scaling the dependent variable by GDP, as I do later on in the analysis, leads to the exact same conclusions.

[11] To ease notation, in later equations I will use $surprise_{i,t}$ to indicate either total surprise spending or its decomposition into green and non-green.

multiplier is higher when public infrastructure capital is further away from its optimal level (Ramey, 2020). If the initial level of investment in green public capital is further away from its desired steady state, then its marginal productivity is larger and its multiplier should be higher (Hasna, 2021). On the other hand, green spending has been shown to create permanent jobs in the top percentiles of the skills distribution, which require significantly more training than non-green jobs (Chen et al., 2020). This can in turn generate more growth by reshaping the economy in the long run.

Table 1 and Figure 5 summarize the dynamic effects of green and non-green public spending on output from the baseline model in equations (2)-(3). Table 1 reports the cumulated multipliers up to a 3-year horizon from implementation, whereas Figure 5 plots the corresponding IRFs along with their 90% confidence intervals. The overall multiplier in panel (a) is negative and significant in the first two years, yet extremely low (less than 1 cent of a euro in output is lost for every €1 spent), and not statistically different from 0 in the following periods. Hence, public works do not stimulate growth - if anything, they hinder it. Panel (b) decomposes spending into green and non-green projects. While the non-green multiplier behaves exactly as its overall counterpart - unsurprisingly, as most projects are non-green, results show that an increase in green spending has no statistically significant effect on output until 3 years after implementation, when it generates a €0.98 increase in economic activity per euro spent.

Table 1: Baseline Model: Overall Output Multiplier

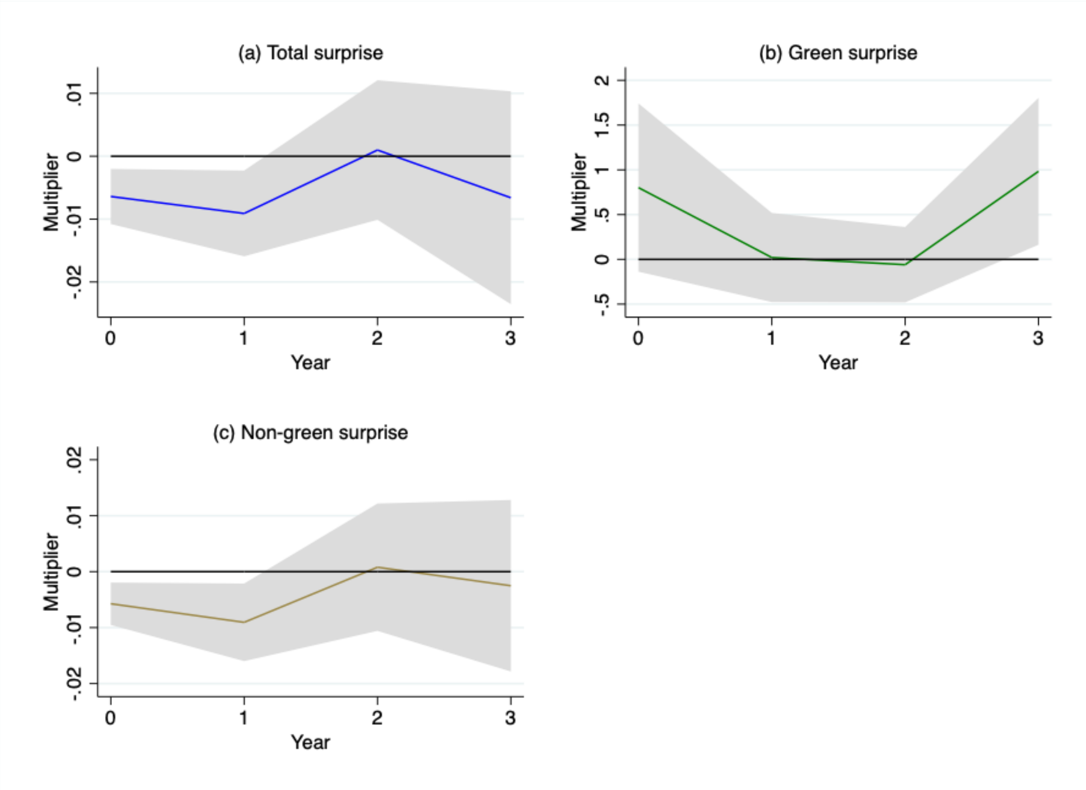
	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. Surprise	-0.006**	-0.009**	0.001	-0.007
	(0.003)	(0.004)	(0.007)	(0.010)
(b) Green vs. non-green				
Green surprise	0.802	0.021	-0.060	0.983*
	(0.571)	(0.302)	(0.256)	(0.498)
Non-green surprise	-0.006**	-0.009**	0.001	-0.003
	(0.002)	(0.004)	(0.007)	(0.009)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	816	714	612	510

Source: BDAP MOP database, ARDECO, and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 107 provinces for the time period 2013-2021. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, **$p < 0.05$,*** $p < 0.01$, **** $p < 0.001$

In line with previous studies, public spending has a larger multiplying effect when it finances green public works. However, the green multiplier is much lower compared to similar estimates in the literature. Hasna (2021) finds that a $1 increase in green spending increases output by $1.1 contemporaneously, $2.5 in 1-year and $4.2 in 2-years of implementation, while non-green spending has no effects on output. Similarly, Batini et al. (2022) estimate a multiplier associated with spending on renewable and fossil fuel energy investment of 1.1-1.5 and 0.5-0.6 respectively. The investments under analysis here are rapidly executed routine public works that reach €800 million at their peak in 2017, with a median province-year green expenditure of slightly less than €21 million. On the other hand, Hasna (2021) uses green investment projects financed by the US Department of Energy that cumulate to more than \$1-\$2 billion every year. Batini et al. (2022) instead build an international dataset tracing investments on key carbon-neutral projects from several countries. Hence, the difference in magnitude and especially in the nature of the investments is probably behind the smaller multipliers found in this study. The fact that green spending only affects output after 3 years since implementation is instead consistent with the idea that it takes time to build new physical capital (Ramey, 2020).

Moreover, my analysis places the multiplier for non-green spending well below the prevailing estimate of 1.5-1.8 (Chodorow-Reich, 2019). However, previous studies suggest that the infrastructure multiplier at the local level in Italy may be lower. While Acconcia et al. (2014) find that a €1 increase in spending increases output by €1.5 in Italian provinces, Porcelli and Trezzi (2014) estimate a local multiplier closer to unity, and Cerrato et al. (2023) do not find a statistically significant effect on output.

Figure 5: Cumulated Multiplier: Overall Output Multiplier



Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for a 1€ increase in surprise spending. The shaded area represents the 90% confidence bands.

4.2 Robustness Checks

In this section, I dig deeper into the nature of the multipliers by testing their robustness and decomposing spending along different dimensions. In particular, I investigate whether the Covid pandemic might be biasing results, whether and how positive and negative growth in spending have different effects on economic activity, and how important projects size is in creating growth.

First, I test whether including the first two years of the Covid crisis in the panel generates a bias. Covid hit Italy particularly strong, but some areas were hit harder than others in a way that only province-year fixed effects might be able to account for. Say, for example, that a project was approved in the province of Milan in January 2020 for €1 million. As Covid is first found in Italy in February and cases start to rise, by the beginning of March the government announces the first generalized lockdown for Lombardia, the region of Milan. Due to the lack of resources and the mutated priorities, the project is halted and works never start: the surprise spending generated by this project would then equal -€1 million. Moreover, following the repeated lockdowns, Milan's GDP in 2020 contracted by more than 7% compared to the previous year. Supposing this scenario was the rule more than the exception, and knowing that other provinces in other regions of the country were hit later and more mildly, this could generate an upward bias in the overall multiplier if province-year fixed effects are not included. As an alternative, one could exclude 2020 and 2021 from the analysis, but doing so would reduce the time dimension of the sample too much. I instead repeat the estimation of equations (2)-(3) removing all provinces in Lombardia, the region hit hardest by the pandemic - in terms of deaths, cases, and lockdown days. The results, reported in Appendix Table 12, match and confirm the baseline findings, hence excluding a confounding effect of Covid.

Second, I test whether the multipliers for positive and negative spending differ. The overall cumulated multipliers found in Table 1 raise some questions as to the efficiency of the public works under investigation. With the exception of green spending 3 years after implementation, all other estimates are either negative or zero. This evidence seems to suggest that this type of public expenditure might actually hurt economic activity, for example by pulling away resources from more productive projects. Distinguishing between positive and negative spending growth should shed more light on this issue. To test this hypothesis, I allow the model to estimate different slopes for positive and negative growth in spending by defining the dummy[12]:

$$pos_{i,t} = \begin{cases} 1, & \text{if } surprise_{i,t} > 0 \\ 0, & \text{otherwise} \end{cases}$$

and estimating:

$$Y_{i,t+h} = \alpha_i + \lambda_t + \frac{surprise_{i,t}}{y_{i,t-1}}(\theta_h + \phi_h \times pos_{i,t}) + \varepsilon_{i,t+h}, \qquad h = \{0; 3\}. \tag{4}$$

The interpretation of the coefficients is the following: θ_h is the multiplier for negative spending growth, ϕ_h determines whether the multipliers for positive and negative spending growth are different (e.g. if $\phi_h > 0$, the multiplier for positive spending growth is higher), and $\theta_h + \phi_h$ is the multiplier for positive spending growth. Results are summarized in Appendix Table 13-14 and Figures 11-13. The overall multiplier for negative spending is negative and significant at all horizons except 2 years after implementation: a €1 decrease in spending increases GDP by €0.02 on impact, €0.02 after 1 year, and €0.04 after 3 years. The positive spending multiplier is significantly higher only on impact, but is never statistically different from 0. Although very small, these coefficients seem to confirm the idea that public works generate inefficiencies that hinder growth. When I decompose spending into green and non-green, I find that the coefficients for non-green spending follow the overall evidence. On the other hand, a €1 decrease in green spending decreases output by €1.12 on impact and by €0.89 after 3 years, suggesting that green projects are not as inefficient as non-green ones. However, a €1 increase in green spending has a lower and never statistically significant effect on GDP. Overall, the evidence suggests that while public works hinder growth, green projects are relevant for economic development. However, although not spending on green works is bad, doing it does not bring gains.

Lastly, I test whether project size matters in determining the multipliers. The public works in the data are in part routine and rapidly executed projects, which not always entail a relevant disbursement of public money. Hence, it is possible that the rarely significant multipliers found in the baseline estimation hide significant heterogeneity depending on the size of the investments. Therefore, I assign each project in a given category (total, green, non-green) to a quartile of the spending surprise in the same category for the whole sample[13]. In practice, this leaves me with 4 different spending groups: large and negative surprises, small and negative surprises, small and positive surprises, and large and positive surprises. I combine the second and third quartiles and compare the

[12]Notice that this analysis rests on the assumption that the sign of the surprise follows the sign of endogenous spending. The pairwise correlation between unanticipated spending is quite high (0.354) and highly significant.

[13]Once again, I am assuming that the quartiles of surprise spending match the quartiles of endogenous spending.

multipliers for small surprises ($\theta_h^{(S^{\gtrless 0})}$) with those of large negative ($\theta_h^{(L^{<0})}$) and large positive surprises ($\theta_h^{(L^{>0})}$):

$$\begin{aligned} Y_{i,t+h} = \alpha_i + \lambda_t + \theta_h^{(L^{<0})} \frac{surprise_{i,t}^{(L^{<0})}}{y_{i,t-1}} + \theta_h^{(L^{>0})} \frac{surprise_{i,t}^{(L^{>0})}}{y_{i,t-1}} \\ + \theta_h^{(S^{\gtrless 0})} \frac{surprise_{i,t}^{(S^{\gtrless 0})}}{y_{i,t-1}} + \varepsilon_{i,t+h}, \qquad h = \{0;3\}, \end{aligned} \tag{5}$$

I report the results in Appendix Table 15 and Figure 14. The sample size is smaller than in previous estimates, especially for green spending, because not all provinces had at least one project in each quartile every year. The overall multiplier for large and negative surprises is very small and significant only on impact, driving the negative overall multiplier in the baseline estimation. The negative multiplier 1 year after implementation, on the other hand, is driven by large and positive surprises. The coefficients for small surprises are very high but never significant. When I decompose into green and non-green spending, I find that the cumulated multiplier for non-green spending is never statistically significant regardless of the size of the projects. On the other hand, despite being significant only after 3 years since implementation in the baseline model, the green multiplier hides a lot of size heterogeneity. In particular, a €1 increase in spending on a large green project increases GDP by more than €2 on impact, and is only partially offset in the following year ($\theta_1^{(L>0)} = -0.62$). After 3 years since implementation a large project still increases GDP by €1.38. Large negative spending also has a positive and lasting multiplier, but significantly smaller than its positive counterpart: a €1 decrease in spending on a large project decreases output by €0.16 on impact, €0.28 after 2 years, and €0.47 after 3 years. The very large coefficients for small surprises are never significant with the exception of the 1-year horizon. However, multipliers for small surprises are to be taken with a grain of salt. Being the sum of small and positive and small and negative surprises, they are very close to 0. Hence, even a small increase (decrease) in GDP, when associated to 0 or close to 0 surprises, generates a very large and positive (negative) multiplier. Moreover, spending surprises are good proxies of government spending but do not match it perfectly, and it is possible that a very large project that generated a significant increase in economic activity respected initial cost estimates. For this project, the spending surprise would be assigned to one of the two small quartiles and would be associated with high GDP growth, hence generating a large multiplier.

In this section, I have dug deeper into the baseline results, as the baseline estimation hides significant heterogeneity. First, I have established that including the first two years of the Covid crisis does not affect my estimates. Second, I have confirmed that public works, when they are not green, can hinder growth. Green projects are more relevant for economic development, but only in the sense that decreasing green spending slows down economic growth. Lastly, I have shown that the baseline results for the overall multiplier are driven by large and negative and large and positive surprises. Moreover, despite being only significant after 3 years since implementation in the baseline estimation, the green multiplier is very high and strongly significant for large and positive spending surprises and it is lower but consistently significant for large and negative surprises.

5 The Role of Geography and Institutional Characteristics

I now investigate heterogeneity along the geographical and institutional dimensions. Specifically, I first study the behaviour of the multiplier in the south of Italy compared to the rest of the country. The difference is not easily predictable *a priori*: while Deleidi et al. (2021) find that government investments multipliers are lower in the southern regions than in the centre-north, Piacentini et al. (2016) compute a higher multiplier in the south of Italy. Moreover, traditional Keynesian theories suggest that the impact of government spending on output should be larger when an economy is functioning below capacity (Shoag, 2010). Because historically southern provinces have lagged behind both economically and infrastructurally, one could expect to find a higher multiplier in the south. However, empirical evidence does not support this prediction unequivocally: Auerbach and Gorodnichenko (2012) estimate larger government multipliers during recessions, but Ramey and Zubairy (2018) find no difference in the multiplier irrespective of the amount of slack in the economy.

Second, I estimate how institutional quality affects the multiplier. It is a well established fact that better institutions help governments use physical and human capital more efficiently to achieve greater levels of income and maintain higher macroeconomic stability (Acemoglu et al., 2001; Rodrik, 2008). For example, Haque et al. (2008) find that corruption reduces the return to public investments and makes them ineffective in raising economic growth. This in turn can translate into higher spending multipliers for countries with higher institutional quality (see Avellán et al., 2020).

In this section, I first show that the baseline multiplier hides significant geographical heterogeneity. Next, I confirm that institutional quality does affect the multiplier, but not always in the expected way.

5.1 South vs. North

I test whether the baseline multiplier hides within country heterogeneity by first dividing provinces into two separate groups. The 34 provinces in the regions of Basilicata, Calabria, Campania, Molise, Puglia, Sardegna, and Sicilia will be part of the southern provinces, accounting for 40% of total government spending on public works (52% of green spending) and 19% of the average of national GDP over the whole panel (see Table 3). The remaining 73 provinces represent the rest of the country. I then estimate:

$$Y_{i,t+h} = \alpha_i + \lambda_t + \frac{surprise_{i,t}}{y_{i,t-1}}(\theta_h + \phi_h \times north_i) + \varepsilon_{i,t+h}, \qquad h = \{0;3\}, \tag{6}$$

where $north_i$ is a dummy equal to 1 if province i is part of the rest of the country. The interpretation of the coefficients is similar to equation (4): θ_h is the cumulated spending multiplier in the south, and ϕ_h determines whether it is different from the multiplier in the rest of the country, represented by $(\theta_h + \phi_h)$. A negative ϕ_h, for example, means that the multiplier is lower in the rest of the country compared to the south. I summarize results in Table 2 (Appendix Table 16 reports the multiplier for the rest of the country independently to check for statistical significance). Figure 6 plots the green multiplier in the south, in the rest of the country, and their difference. I plot the corresponding IRFs for total and non-green spending in Figures 15 and 16 in the Appendix.

The baseline multiplier for overall government spending is mainly driven by southern provinces. For the overall multiplier (panel (a)), θ_h is negative, significant, and very low in the first two periods, matching the aggregate baseline results very closely. Moreover, ϕ_h is negative but never statistically different from 0. Nevertheless, the cumulated multiplier in the rest of the country $(\theta_h + \phi_h)$ is negative and significant 1 year after implementation (see Table 16). Decomposing spending into green and non-green (panel (b)), I find that the cumulated non-green multiplier follows the overall results, while green spending presents some interesting peculiarities.

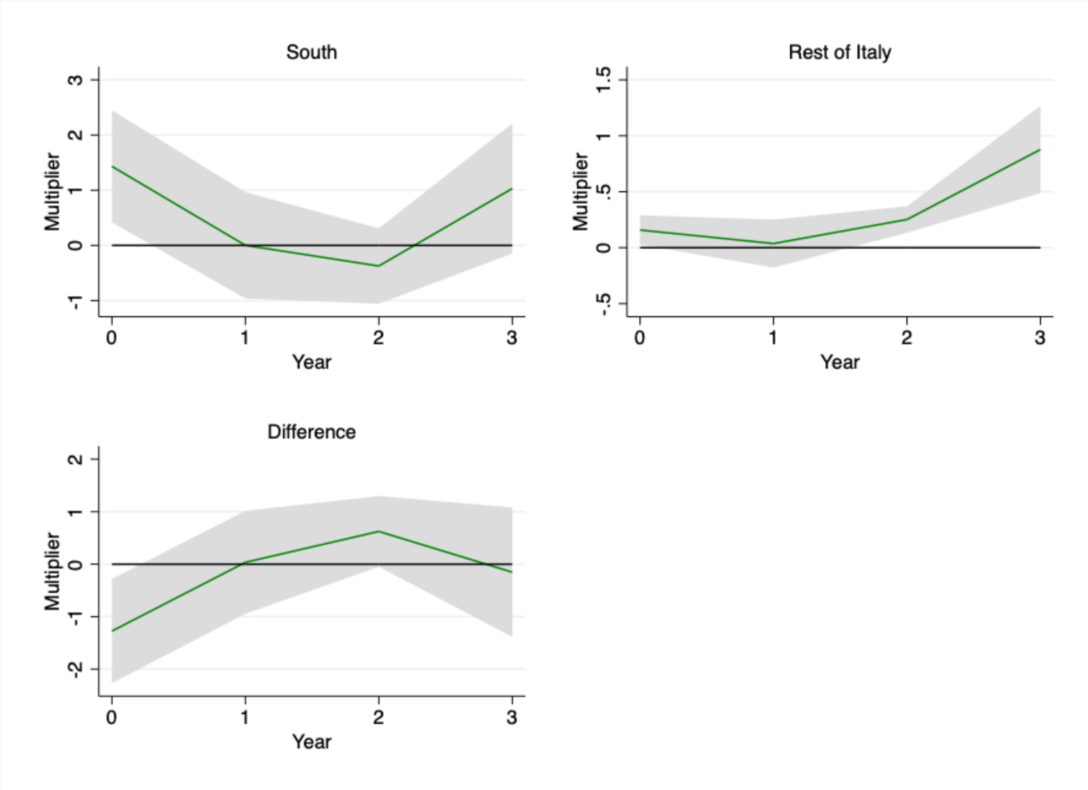
In particular, the contemporaneous green multiplier is very large and significant in the south: a €1 increase in green spending in a southern province increases output by €1.43 the same year, but it generates no significant growth in the following years. This result is still well below other documented green multipliers in the literature (see Chen et al., 2020; Hasna, 2021), but fits well the existing evidence for local multipliers in Italy (e.g. Acconcia et al., 2014; Porcelli and Trezzi, 2014). The contemporaneous green multiplier is significantly larger in the south than in the rest of the country ($\phi_0 = -1.275$). In the rest of the country, however, the green multiplier $(\theta_h + \phi_h)$, despite being lower on impact, sustains growth longer: a €1 increase in green spending increases GDP by €0.16 the same year, €0.25 after 2 years, and €0.88 3 years after implementation, arguably driving the aggregate results in $h = 3$ (see Figure 6 and Table 16). This evidence does not fully solve the debate on whether the multiplier is higher in the south or in the north. However, the fact that spending affects growth at different horizons justifies a more thorough analysis of other factors that may affect this relationship. This is the scope of the next section, where I investigate heterogeneities along different levels of institutional quality.

Table 2: South vs. Rest of Italy

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. Surprise	-0.006***	-0.008*	0.006	-0.008
	(0.002)	(0.004)	(0.007)	(0.011)
Tot. surprise×$north_i$	-0.002	-0.014	-0.028	0.006
	(0.024)	(0.014)	(0.026)	(0.022)
(b) Green vs. non-green				
Green surprise	1.433**	0.001	-0.373	1.030
	(0.617)	(0.585)	(0.414)	(0.715)
Green surprise×$north_i$	-1.275**	0.035	0.625	-0.153
	(0.602)	(0.596)	(0.409)	(0.749)
Non-green surprise	-0.005***	-0.008*	0.004	-0.003
	(0.002)	(0.005)	(0.007)	(0.011)
Non-green surprise×$north_i$	-0.002	-0.014	-0.027	0.001
	(0.024)	(0.013)	(0.026)	(0.022)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	816	714	612	510

Source: BDAP MOP database, ARDECO, and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $north_i$ is a dummy equal to 1 if province i is not in the south of Italy. Provinces in the following regions are considered to be in the south: Basilicata, Calabria, Campania, Molise, Puglia, Sardegna, Sicilia. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 107 provinces for the time period 2013-2021. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, **$p < 0.05$,*** $p < 0.01$, **** $p < 0.001$

Figure 6: South vs. Rest of Italy - Green Spending



Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for a 1€ increase in surprise spending for provinces in the south and in the rest of Italy. The difference between the two is plotted in the third panel. The shaded area represents the 90% confidence bands.

5.2 Fiscal Multiplier and Institutional Quality

To test whether and how institutional quality affects the baseline multipliers, I use the IQI data from Nifo and Vecchione (2014) to measure different dimensions of institutional quality. In particular, I study how absence of corruption, government effectiveness, and overall institutional quality influence the impact of spending on GDP. Previous studies suggest that all three dimensions should increase the efficiency of public spending in generating growth. However, in the previous section I have shown that the contemporaneous green multiplier is much higher in the south than in the rest of the country. Moreover, overall and non-green multipliers do not differ based on geographic location. Despite this, Table 3 shows that over the 2013-2021 period southern provinces have spent more and have grown less on average than provinces in the rest of the country, and have been characterized by lower absence of corruption (abs_corr), government effectiveness (eff), and overall institutional quality (iqi). If better institutions helped local authorities use capital more efficiently, one should find consistently lower multipliers in the south of the country where institutional quality is lower, which goes against the findings in Table 2.

Table 3: Descriptive Statistics

	Whole country			South			Rest of the country		
	Mean	Median	Std. dev	Mean	Median	Std. dev	Mean	Median	Std. dev
GDP	26,249	26,242	239.6	17,812	17,694	128.1	29,600	29,058	222.2
GDP growth	1.41%	1.77%	0.002	1.24%	1.61%	0.003	1.48%	1.82%	0.002
Tot. spending	194	122	11.34	257	136	29.09	164	119	9.42
Green spending	10.6	4.97	1.055	18.5	5.75	3.21	6.95	4.81	0.306
Non-green spending	183	113	11.1	238	126	28.4	157	109	9.38
abs_corr	0.798	0.881	0.007	0.595	0.616	0.011	0.890	0.910	0.004
eff	0.424	0.452	0.007	0.252	0.235	0.009	0.501	0.515	0.008
iqi	0.597	0.676	0.009	0.296	0.321	0.010	0.733	0.752	0.006
regq	0.517	0.528	0.008	0.303	0.277	0.013	0.614	0.608	0.007

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: GDP and spending variables are expressed in € per capita. GDP growth is the 1-year growth in GDP. abs_corr, eff, iqi, and $regq$ are all indexes between 0 and 1. Mean, median, and standard deviations are all taken on the whole sample between 2013-2021. Provinces in the following regions are considered to be in the south: Basilicata, Calabria, Campania, Molise, Puglia, Sardegna, Sicilia.

To test how these different indicators of institutional quality affect the impact of spending on GDP, I estimate:

$$Y_{i,t+h} = \alpha_i + \lambda_t + \frac{surprise_{i,t}}{y_{i,t-1}}(\theta_h + \phi_h \times inst_{i,t}) + \gamma_h inst_{i,t} + \varepsilon_{i,t+h}, \qquad h = \{0;3\}, \tag{7}$$

where $inst_{i,t}$ is in turn a proxy for the absence of corruption in province i at times t ($abs\_corr_{i,t}$), the level of government effectiveness ($eff_{i,t}$), and the overall IQI index ($iqi_{i,t}$). In this model, θ_h is the cumulated multiplier for a province with $inst_{i,t} = 0$, while ϕ_h indicates whether a province's institutional quality level affects the multiplier. In principle, one would expect to find a positive ϕ_h irrespective of the institutional quality index used: higher absence of corruption, government effectiveness, and overall institutional quality should all help translate public spending into higher economic growth by ensuring higher efficiency of the spending process. I show that this is rarely the case.

(Absence of) Corruption. I start by studying the interaction between fiscal spending and corruption. To measure corruption I use the absence of corruption index ($abs\_corr_{i,t}$), an indicator between 0 and 1 with 1 corresponding to complete absence of corruption and 0 to the highest possible level of corruption. In equation (7), θ_h is the cumulated multiplier at time $t+h$ for a province with an absence of corruption index equal to 0, and ϕ_h indicates whether a province's absence of corruption index affects the multiplier. I summarize the results in Table 4. Panel (a) reports the results for overall spending, while panel (b) distinguishes between green and non-green spending. At the bottom of Table 4, I report for each spending category the difference in the multiplier between a province in the first (Q1, $abs\_corr_{i,t} = 0.93$) and last (Q3, $abs\_corr_{i,t} = 0.68$) quartile of the absence of corruption index. In Figure 7, I plot the corresponding cumulated green multipliers, along with their 90% confidence intervals (see Figures 17-18 in the Appendix for the total and non-green multipliers).

Overall, absence of corruption significantly affects the spending multiplier only after 2 years, decreasing it ($\phi_2 = -0.110$). This means that less corruption negatively affect the impact of public spending on output. This is further reinforced by the difference between the multiplier in the first and in the last quartiles of the absence of corruption score, which is negative and significant in $h = 2$. Panel (b) shows that this evidence is driven by non-green spending, as green spending behaves once again differently.

In particular, the contemporaneous green multiplier for a province with an absence of corruption index equal to 0 (i.e., the highest possible level of corruption) is close to 4 ($\theta_0 = 3.959$), but as corruption becomes less pervasive the multiplier drops ($\phi_0 = -4.080$, e.g. a province with median absence of corruption will have a contemporaneous multiplier of 0.37[14]). The difference between the contemporaneous multiplier in the first and last quartiles of the absence of corruption index is indeed close to 1. Moreover, the multiplier for provinces in the last quartile is positive and significant on impact and after 3 years, while it is never statistically different from 0 in the first quartile (see Figure 7).

[14] Median absence of corruption score is 0.88, meaning that the multiplier is 3.959(4.080 × 0.88).

The fact that corruption helps translate fiscal spending into economic growth might seem counterintuitive, and goes against previous findings (e.g., Haque et al., 2008). It is possible that since corruption is more pervasive in the south, Table 4 actually picks up the effect on the multiplier of being a southern province. I argue that this is not the case for two reasons. First, for overall (and non-green spending), ϕ_h is not statistically different from 0 at $h = 0$ and $h = 1$. These are the two horizons at which the overall and non-green multiplier, driven by southern provinces, is significantly different from zero. If absence of corruption was capturing the effect of being a province in the south, I should find a negative and significant ϕ_h at the same horizons. Second, the fact that the contemporaneous green multiplier is significantly higher both in southern provinces and when corruption is more pervasive seems to suggest that the two are good substitutes. However, Table 16 and Figure 6 show that the green multiplier in the rest of the country is positive and significant at $h = 0$, $h = 2$, and $h = 3$, while it is never statistically different from 0 in the south after implementation. If absence of corruption scores were just a proxy for being in the south, I should find a positive and significant ϕ_h at the same horizons. Evidence for the other two proxies of institutional quality help clarify these results.

Government Effectiveness and IQI. I now turn to the role of government effectiveness and overall institutional quality in driving the multiplier. Government effectiveness ($gov_{i,t}$) is an index between 0 and 1 that takes higher values for higher effectiveness of the provincial authorities. IQI ($iqi_{i,t}$) is a composite indicator between 0 and 1 taking higher values for higher levels of overall institutional quality. I summarize results for government effectiveness in Table 17, and I plot the cumulated multipliers for the first and last quartiles of government effectiveness in the sample, along with their difference, in Figures 19-21. The corresponding results for IQI are summarized in Table 18 and Figures 22-24. As before, θ_h in equation (7) is the multiplier at time $t+h$ for a province with a government effectiveness (IQI) index equal to 0, and ϕ_h indicates whether government effectiveness (IQI) affects the multiplier.

Government effectiveness significantly affects the overall multiplier only after 1 year, once again lowering it by a negligible amount ($\phi_0 = -0.079$). This evidence is confirmed by the negative and significant difference between the multiplier in the first and in the last quartile. Moreover, the cumulated multipliers for the same quartiles are never statistically different from 0 with the exception of the multiplier in the first quartile 1 year after implementation, which is very small and negative (see Figure 19). When decomposing spending into green and non-green projects, I find that the non-green multiplier follows the overall results very closely.

The opposite is true for green spending. In a province with a government effectiveness score equal to 0, a 1€ increase in green spending decreases output by €3.01 after 2 years ($\theta_2 = -3.012$). As government effectiveness improves, the multiplying effect of green spending increases ($\phi_2 > 0$): while the green multiplier for provinces in the last quartile of government effectiveness is not statistically different from 0, it is significantly higher and equal to 1.33 in provinces in the first quartile.

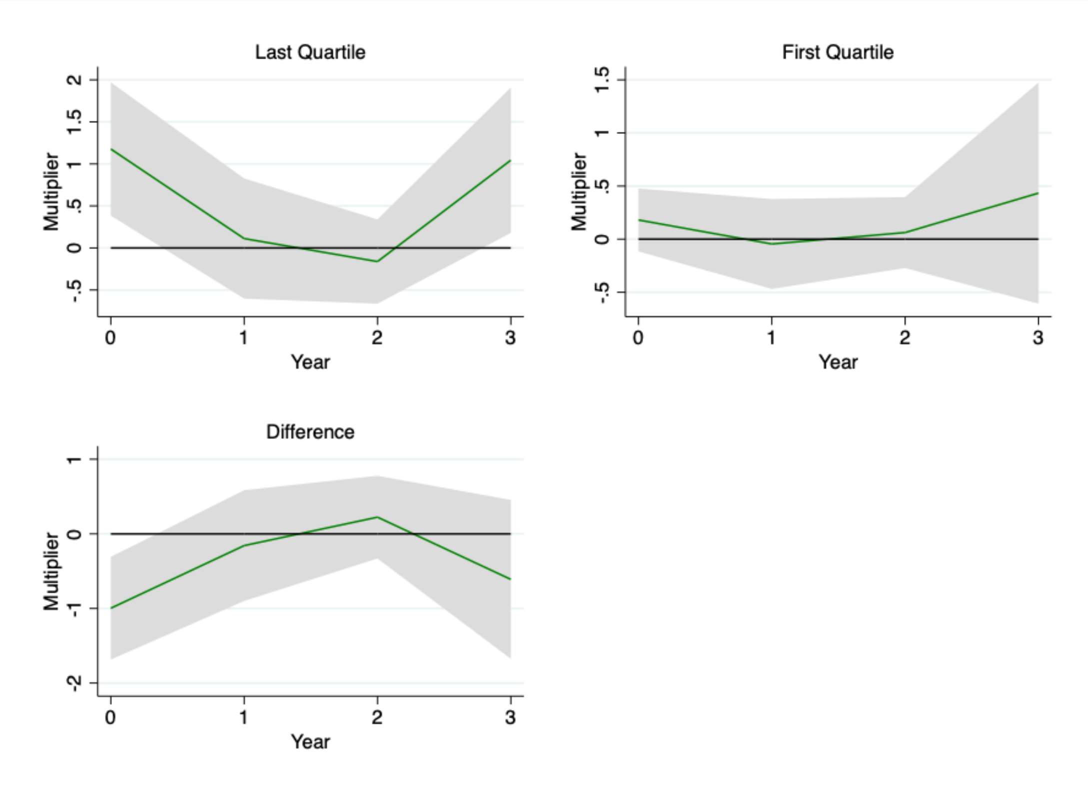
Overall institutional quality has a similar effect on the multiplier. As for government effectiveness, for both overall and non-green spending a higher IQI index slightly lowers the multiplier after 1 year. On top of this, overall institutional quality has a negative effect also 3 years after implementation. For green spending, however, higher IQI scores increase the cumulated multiplier after 2 years ($\phi_2 = 2.835$), as confirmed by the significantly higher multiplier in the first quartile of the IQI index in the sample. Moreover, the green multiplier for a province in the first quartile of IQI is increasing and always significantly higher than 0 (with the only exception of $h = 1$), getting close to 1 by 3 periods after implementation, while it is never statistically different from 0 in the last quartile of the IQI index in the sample (see Figure 24 in the Appendix).

Table 4: Multiplier and Absence of Corruption

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. surprise	0.049	0.038	0.062*	0.005
	(0.038)	(0.026)	(0.033)	(0.040)
Tot. surprise$\times abs_corr_{i,t}$	-0.100	-0.074	-0.110*	-0.020
	(0.070)	(0.048)	(0.061)	(0.060)
(b) Green vs. non-green				
Green surprise	3.959**	0.551	-0.787	2.746
	(1.624)	(1.636)	(1.198)	(2.088)
Green surprise$\times abs_corr_{i,t}$	-4.080**	-0.644	0.917	-2.497
	(1.712)	(1.844)	(1.378)	(2.648)
Non-green surprise	0.055	0.039	0.062*	0.019
	(0.043)	(0.025)	(0.032)	(0.043)
Non-green surprise$\times abs_corr_{i,t}$	-0.099	-0.073	-0.112*	-0.033
	(0.077)	(0.046)	(0.060)	(0.065)
Q1-Q3 (tot.)	-0.025	-0.018	-0.027*	-0.005
	(0.017)	(0.012)	(0.015)	(0.015)
Q1-Q3 (green)	-0.997**	-0.157	0.224	-0.610
	(0.418)	(0.451)	(0.337)	(0.647)
Q1-Q3 (non-green)	-0.024	-0.018	-0.027*	-0.008
	(0.019)	(0.011)	(0.015)	(0.016)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	612	612	612	510

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $abs\_corr_{i,t}$ is a continuous index between 0 and 1 that takes higher values for less pervasive levels of corruption. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). The third panel reports the difference between the multiplier in the first and in the last quartile (Q1-Q3) of the absence of corruption index. The first quartile (Q1) corresponds to an absence of corruption index of 0.93, the last one (Q3) to an absence of corruption index of 0.68. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, **$p < 0.05$,*** $p < 0.01$, **** $p < 0.001$

Figure 7: Green Multiplier and Absence of Corruption



Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) corruption scores, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Discussion. So far, the heterogeneity analysis reveals 5 empirical regularities: *i)* the small and negative baseline multiplier for overall and non-green spending is driven by provinces in the south; *ii)* the positive cumulated green multiplier 3 years after implementation is driven by provinces in the north, where green spending has a low but increasing and lasting impact on economic growth; *iii)* the contemporaneous green multiplier is extremely high in the south ($\theta_0 = 1.433$), but green spending does not sustain growth further; *iv)* higher government effectiveness and institutional quality decrease by a negligible amount the overall and non-green multiplier, while they increase the multiplying effect of green spending; and *v)* more pervasive corruption strongly improves the fiscal multiplier, especially for green spending. For overall and non-green spending, heterogeneities along the geographical and institutional dimension seem to be capturing the same thing. Whether lower government effectiveness (IQI) is a proxy for southern provinces or the other way around is not clear, but the two analyses point in the same direction. Similarly, the fact that green spending is more efficient at generating growth in the medium term when government effectiveness (IQI) is higher seems redundant and consistent with the fact that the green multiplier is positive and significant in the north in the medium term. However, given the large contemporaneous multiplier in southern provinces, one would expect to find a high and negative impact of government effectiveness (IQI) on the contemporaneous green multiplier, but $\phi_0 = 0$.

On the other hand, the role of corruption is puzzling. For overall and non-green spending, while the sign is the same as for the other institutional quality variables, I find some time inconsistencies. Government effectiveness (IQI) lowers the impact of overall and non-green spending on growth at $h = 1$, when the baseline multiplier is driven by southern provinces. Absence of corruption, instead, significantly lowers the multiplier at $h = 2$, when the baseline multiplier is not statistically different from zero irrespective of geographical differences. Moreover, higher absence of corruption decreases the contemporaneous green multiplier, in line with a higher effect of green spending in the south. However, ϕ_h never turns positive in the following years, when the green multiplier is higher in the rest of the country.

In other words, the evidence suggests that corruption has a peculiar role that, unlike other institutional quality measures, is not entirely attributable to geographical differences. This is especially true for green spending. In the next section, I dig deeper into the mechanism through which corruption affects the multiplier.

6 Understaing the Impact of Corruption

I start by showing that the impact of corruption on the multiplier is not capturing the effect of being a province in the south of Italy. I estimate:

$$\begin{aligned} Y_{i,t+h} = \alpha_i + \lambda_t + \frac{surprise_{i,t}}{y_{i,t-1}}(\theta_h + \phi_h \times south_i + \zeta_h \times abs\_corr_{i,t} + \omega_h \times abs\_corr_{i,t} \times south_i) \\ + \gamma_h abs\_corr_{i,t} \times south_i + \varepsilon_{i,t+h}, \qquad h = \{0;3\}, \end{aligned} \tag{8}$$

where $south_i$ is now a dummy equal to 1 if province i is in the south. The interpretation of the coefficients is the following: θ_h is the multiplier for a province in the north or centre with maximum possible corruption ($abs\_corr_{i,t} = 0$); ϕ_h indicates whether the multiplier is different if a province with an absence of corruption index equal to 0 is in the south; ζ_h indicates whether absence of corruption score affects the multiplier for provinces in the north or centre, and ω_h captures how absence of corruption affects the multiplier in the south. To ease the analysis I focus on green spending, as it has proven to be more relevant for economic growth and it interacts with institutional quality in a way that does not seem to be driven by geographical differences. The analysis for overall and non-green spending follows the same logic.

Based on previous results, it is hard to know *a priori* the sign of θ_h and ϕ_h. While the multiplier is higher in the south, yet positive and significant also in the rest of the country, its value at the maximum level of corruption might be different. The coefficients of interest are ζ_h and ω_h. If $abs\_corr_{i,t}$ was just a proxy for southern provinces, neither of the two coefficients should be significantly different from 0, as all geographical heterogeneity would be captured by θ_h and ϕ_h. I report the results in Table 5. Appendix Table 19 reports the overall, green, and non-green multipliers under four different scenarios: *i)* a province in the north or centre with low absence of corruption ("North-Low"); *ii)* a province in the north or centre with high absence of corruption ("North-High"); *iii)* a province in the south with low absence of corruption ("South-Low"); and *iv)* a province in the south with high absence of corruption ("South-High")[15].

[15] High absence of corruption corresponds to the first quartile ($abs\_corr_{i,t} = 0.93$) of the absence of corruption index in the sample, low absence of corruption corresponds to the last quartile ($abs\_corr_{i,t} = 0.68$).

Table 5: Corruption and Geographical Heterogeneity - Extended

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. surprise (north)	0.324****	-0.078	0.114	0.206****
	(0.067)	(0.061)	(0.075)	(0.058)
Tot. surprise$\times south_i$	-0.329****	0.139*	-0.045	-0.268**
	(0.082)	(0.081)	(0.085)	(0.122)
Tot. surprise$\times abs_corr_{i,t}$	-0.425****	0.064	-0.168	-0.256***
	(0.101)	(0.089)	(0.110)	(0.076)
Tot. surprise$\times south_i \times abs_corr_{i,t}$	0.427***	-0.179	0.043	0.359*
	(0.147)	(0.144)	(0.131)	(0.216)
(b) Green vs. non-green				
Green surprise (north)	-18.16***	-29.13***	-18.85	-18.91
	(6.803)	(9.422)	(15.47)	(20.85)
Green surprise$\times south_i$	30.26***	45.77****	34.96**	52.38**
	(9.448)	(12.65)	(16.57)	(21.48)
Green surprise$\times abs_corr_{i,t}$	19.13***	30.59***	20.02	20.29
	(7.145)	(9.883)	(16.21)	(21.29)
Green surprise$\times south_i \times abs_corr_{i,t}$	-37.05***	-58.77***	-48.12**	-75.47***
	(13.73)	(17.86)	(19.36)	(22.79)
Non-green surprise (north)	0.334****	-0.064	0.128*	0.223****
	(0.062)	(0.051)	(0.067)	(0.064)
Non-green surprise$\times south_i$	-0.390****	0.065	-0.113	-0.400****
	(0.083)	(0.086)	(0.083)	(0.113)
Non-green surprise$\times abs_corr_{i,t}$	-0.435****	0.046	-0.186*	-0.275***
	(0.094)	(0.076)	(0.097)	(0.084)
Non-green surprise$\times south_i \times abs_corr_{i,t}$	0.556****	-0.033	0.177	0.641***
	(0.150)	(0.163)	(0.140)	(0.195)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	612	612	612	510

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $abs\_corr_{i,t}$ is a continuous index between 0 and 1 that takes higher values for less pervasive corruption. $south_i$ is a dummy that takes value 1 for provinces in the following provinces: Basilicata, Calabria, Campania, Molise, Puglia, Sardegna, Sicilia. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

The results in Table 5 show that ζ_h is always positive and significant in the first two periods. This means that in provinces in the north and centre of Italy higher absence of corruption increases the green multiplier. As further proof, Table 19 shows that a province in the north or centre with an absence of corruption score in the last quartile of the index ("North-Low") has a multiplier equal to -5.12 on impact and -8.29 after 1 year. When a province is in the first quartile of the absence of corruption index ("North-High") the multipliers instead increase steeply to -0.45 and -0.80 respectively. In the south, the exact opposite holds. When corruption is at its highest, the green multipliers are much higher than in the rest of the country ($\phi_h > 0\ \forall h$). However, as absence of corruption increases the green multiplier in the south drops significantly at all periods ($\omega_h < 0\ \forall h$). Indeed, a southern province with low absence of corruption ("South-Low") has very high and positive multipliers in the first two periods, and positive yet not statistically significant multipliers in the last two. Conversely, when absence of corruption is high ("South-High") the multiplier is not statistically different from 0 in the first two periods and turns negative in the last two (see Table 19).

This evidence highlights two important phenomenons. First, the fact that absence of corruption significantly affects the multiplier even after accounting for geographical differences contradicts the hypothesis that corruption is just a proxy for southern provinces. Second, corruption affects the multiplier differently depending on whether a province is in the south or in the rest of the country. While in southern provinces corruption seems to help the multiplier, in the rest of the country it hinders growth, in line previous evidence in the literature.

What mechanism lies behind these results? One possible explanation is that corruption affects the ability of a province to attract funds, and the allocation thereof towards sectors with higher multipliers (Barone and Narciso, 2015; Di Cataldo and Mastrorocco, 2022). In particular, more pervasive corruption increases the amount of EU funds and EU financed projects assigned to a province (Pereira dos Santos et al., 2021). Because EU funds are generally subject to more intense preliminary screening and monitoring activity, one could expect EU financed projects to be more growth enhancing. However, the investments I consider here are mostly financed by the provinces themselves through taxation, with less than 1% of the projects fully or partly EU financed. Moreover, looking at geographical heterogeneity concerning these few projects does not support the idea that higher corruption increases EU funding. In fact, in my data *i)* per capita EU funding is not higher in the south, *ii)* only 30% of EU funded projects are in the south, and *iii)* they are not larger than non-EU funded ones. On top of this, such mechanism would reasonably be at play throughout the whole country, and not just in the south as the opposite signs of ζ_h and ω_h suggest.

An alternative explanation is that corruption eases the negative effects of bureaucratic and regulatory burdens on growth[16]. Akcigit et al. (2023) show that in Italy the presence of political connections can mitigate the regulatory burden for connected firms, recovering 30% of the output that they estimate to be lost due to regulatory obstacles. Similarly, Braccioli (2023) argues that organized crime, in particular the Mafia, thrives as a substitute of the State for contract enforcement when the judicial system is slow or ineffective. In other words, given a high regulatory burden level, higher levels of corruption can be good for growth. Table 3 shows that the mean regulatory quality score ($regq$) is more than half as small in the south compared to the rest of the country. I argue that the negative relationship between the absence of corruption index and the multiplier in the south can be explained by the lower regulatory quality scores in the southern provinces. Assuming corruption is a good proxy for political connectedness, more pervasive corruption eases the negative effect of lower regulatory quality scores on the multiplier. In the rest of the country, where the regulatory burden is less severe, corruption instead hinders growth through the usual channels. I test this hypothesis by estimating the following model:

$$\begin{aligned} Y_{i,t+h} = {} & \frac{surprise_{i,t}}{y_{i,t-1}}(\theta_h + \phi_h \times abs\_corr_{i,t} + \zeta_h \times regq_{i,t} + \omega_h \times abs\_corr_{i,t} \times regq_{i,t}) \\ & + \gamma_h abs\_corr_{i,t} \times regq_{i,t} + \alpha_i + \lambda_t + \varepsilon_{i,t+h}, \qquad h = \{0;3\}, \end{aligned} \tag{9}$$

where $regq_{i,t}$ is an index between 0 and 1 from Nifo and Vecchione (2014) describing regulatory quality in province i at time t: higher scores correspond to higher regulatory quality (i.e., a lower regulatory burden). The interpretation of the coefficients of interest is the following: θ_h measures the multiplier for a province with absence of corruption index and regulatory quality score equal to 0; ϕ_h indicates how absence of corruption affects the multiplier in a province with a regulatory quality score equal to 0; ζ_h indicates how the regulatory quality score affects the multiplier in a province with an absence of corruption index equal to 0. The coefficient of interest is ω_h, which captures the impact on the multiplier of an increase of both absence of corruption and regulatory quality.

I expect to find a negative ϕ_h and a positive and significant ω_h, in line with the hypothesis that when regula-

[16]This mechanism is similar to the "greasing wheels" hypothesis of Kaufmann and Wei (1999), who argue that political connections can have a positive effect on welfare if they increase efficiency by relieving the burden of regulation.

tory quality is low, higher absence of corruption negatively affects the multiplier ($\phi_h < 0$) because more pervasive corruption eases the regulatory burden. As regulatory quality increases, the regulatory burden fades and higher absence of corruption increases the impact of public spending on growth ($\omega_h > 0$). I summarize results in three separate tables. In Table 6 I show the coefficients from equation (9). In Appendix Table 21 I report the multipliers under four different scenarios: provinces in the first quartile of the absence of corruption index and the regulatory quality score ("High $abs\_corr_{i,t}$ - High $regq_{i,t}$"), provinces in the first quartile of the absence of corruption index and in the last quartile of the regulatory quality score ("High $abs\_corr_{i,t}$ - Low $regq_{i,t}$"), provinces in the last quartile of the absence of corruption index and in the first quartile of the regulatory quality score ("Low $abs\_corr_{i,t}$ - High $regq_{i,t}$"), and provinces in the last quartile of the absence of corruption index and the regulatory quality score ("Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$"). Lastly, in Appendix Table 20 I report the same results comparing the multipliers in the south and in the rest of the country by adding a fourth interaction term to equation (9).

As per the hypothesis highlighted above, ϕ_h is negative and highly significant at $h = 2$ and $h = 3$. This means that when a province has the minimum possible regulatory quality score ($regq_{i,t} = 0$), higher absence of corruption decreases the green multiplier. However, as regulatory quality improves, an increase in the absence of corruption index increases the green multiplier ($\omega_h > 0$ and significant at $h = 2$ and $h = 3$). This evidence is further confirmed by the cumulated multipliers in Table 21. When regulatory quality is low, the multiplier is consistently higher for provinces in the last quartile of the absence of corruption index (i.e., "Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$" is larger than "High $abs\_corr_{i,t}$ - Low $regq_{i,t}$" at all horizons). On the other hand, when regulatory quality is high, the multiplier is higher for provinces in the first quartile of the absence of corruption index (i.e., "High $abs\_corr_{i,t}$ - High $regq_{i,t}$" is larger than "Low $abs\_corr_{i,t}$ - High $regq_{i,t}$"). As Table 20 shows, these results are driven by the relationship between regulatory quality and corruption in southern provinces.

Through this triple interaction analysis, I show that the impact of corruption on the (green) multiplier is not capturing the effect of being a southern province. In particular, I have produced evidence that reveals how corruption in the south of Italy helps translating higher public spending into higher GDP, while it hinders growth in the rest of the country. In line with the hypothesis that corruption can ease the negative effects of bureaucratic and regulatory burdens on growth, I find that a higher absence of corruption index decreases the multiplier when regulatory quality is low, but increases it as regulatory quality improves. This relationship is driven by southern provinces, hence providing a convincing explanation for the different multipliers found in the heterogeneity analysis.

Table 6: Corruption and Regulatory Quality Scores

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. surprise	0.038	0.147	0.107	-0.047
	(0.195)	(0.141)	(0.192)	(0.198)
Tot. surprise$\times abs_corr_{i,t}$	-0.045	-0.259	-0.175	0.136
	(0.334)	(0.256)	(0.319)	(0.342)
Tot. surprise$\times regq_{i,t}$	-0.037	-0.232	-0.109	-0.065
	(0.409)	(0.270)	(0.391)	(0.418)
Tot. surprise$\times abs_corr_{i,t} \times regq_{i,t}$	-0.039	0.363	0.142	-0.093
	(0.635)	(0.457)	(0.599)	(0.625)
(b) Green vs. non-green				
Green surprise	13.56	15.78	19.57**	45.81****
	(9.233)	(12.10)	(9.070)	(6.217)
Green surprise$\times abs_corr_{i,t}$	-21.73	-23.67	-34.19**	-73.77****
	(15.28)	(19.26)	(14.84)	(12.39)
Green surprise$\times regq_{i,t}$	-11.79	-28.00	-29.94**	-65.40****
	(15.01)	(19.76)	(14.01)	(6.847)
Green surprise$\times abs_corr_{i,t} \times regq_{i,t}$	23.14	39.51	51.10**	104.1****
	(22.52)	(29.11)	(21.55)	(14.15)
Non-green surprise	0.009	0.095	0.017	-0.212
	(0.186)	(0.156)	(0.186)	(0.140)
Non-green surprise$\times abs_corr_{i,t}$	0.039	-0.147	-0.008	0.485*
	(0.328)	(0.280)	(0.317)	(0.253)
Non-green surprise$\times regq_{i,t}$	-0.009	-0.140	0.058	0.262
	(0.384)	(0.300)	(0.374)	(0.291)
Non-green surprise$\times abs_corr_{i,t} \times regq_{i,t}$	-0.144	0.180	-0.147	-0.701
	(0.613)	(0.497)	(0.585)	(0.445)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	612	612	612	510

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $abs\_corr_{i,t}$ is a continuous index between 0 and 1 that takes higher values for less pervasive corruption. $regq_{i,t}$ is a continuous index between 0 and 1 that takes higher values for higher values of regulatory quality. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

7 Conclusions

In this paper, I study a local fiscal multiplier for green and non-green public works in Italian provinces. To do so, I use the variation of the difference between actual and expected spending as the fiscal shock, that I show to be independent of institutional and economic conditions. Using a local projections analysis, I find that a €1 increase in overall and non-green spending generates negligible losses in the first two years. On the contrary, a €1 increase in green spending increases output by €0.98, but only 3 years after implementation. These multipliers are well below the prevailing estimates in the literature. Next, I exploit a triple interaction approach to find that the baseline multipliers hide significant heterogeneity. In particular, overall and non-green multipliers are driven by provinces in the south. For green spending, on the other hand, baseline results are driven by the rest of the country, despite the contemporaneous green multiplier in the south being very high and equal to 1.43. I further estimate the effect of institutional quality and show that higher government effectiveness and overall institutional quality decrease the overall and non-green multipliers, while they increase the green multiplier. On the other hand, higher corruption increases the multiplier regardless of the nature of the investments. Such relationship is is concentrated in southern provinces. I show that the positive effect of corruption can be explained by its role in easing bureaucratic and regulatory burdens.

These results contribute to the literature on local fiscal multipliers, and in particular to the infant body of evidence on green multipliers. They also shed more light on the important heterogeneities potentially hiding behind these estimates. Policy makers should be wary of taking fiscal multipliers at face value, as assuming a homogeneous national multiplier can easily lead to an overestimation of the impact of fiscal expansions. This is particularly relevant in the context of the European Union's RRF plan, which liberated an unprecedented amount of money for member states to tackle the economic damages of the pandemic. Italy, for example, is a net recipient of €211 billions, €78 of which are allocated to the green transition. This paper shows that where this money is spent will determine how effective it will be at generating economic growth. Moreover, the well-known bureaucratic and regulatory burdens have already proved to be a serious obstacle to the implementation of the many projects presented by the central government. The results in this paper warn that failing to address these barriers may incentivise the rise of corruption as an alternative tool to induce economic growth.

A Appendix

A.1 Data

A.1.1 Institutional Quality Index

As a measure of institutional quality I use the Institutional Quality Index by Nifo and Vecchione (2014). The data is freely available on the IQI website. The IQI is a composite indicator based on five groups of elementary indexes (evaluating corruption, governance, regulation, law enforcement and social participation) and measures institutional quality at the provincial and regional levels for the period 2004-2019. The items of IQI concern 5 major pillars of institutional quality at provincial level: (1) *Voice and accountability* capturing the citizens degree of participation in public elections, civic and social associations, the number of social cooperatives, the INVALSI test and the cultural liveliness measured in terms of books published; (2) *Government effectiveness* measuring the endowment of social and economic structures in Italian provinces and the administrative capability of provincial and regional governments in terms of health policies, waste management and environment; (3) *Regulatory quality* concerning the degree of openness of the economy, the rate of firms mortality, indicators of business environment and business density; (4) *Rule of law* summarizing data on crime against persons or property, magistrate productivity, trial times, tax evasion and shadow economy; (5) *Corruption* collecting data on crimes against the Public Administration, the number of local administrations overruled by the federal authorities and the Golden-Picci Index.

A.1.2 Additional Tables and Figures

Table 7: Breakdown of Investment Types

Type of intervention	Sub-type of intervention	N
Extraordinary maintenance	Extraordinary maintenance	142,825
	Extr. maint. of systems and/or firefighting adaptation	4,434
	Completion of estraordinary maintenance	2,477
	Extr. maint. for accessibility and removal of architectural barriers	2,275
	Extraordinary maintenance for safety	1,639
	Total	**153,650**
New realization	New realization	36,834
	Completion of new realization	878
	Total	**37,712**
Renovation, recovery, expansion, enhancement	Renovation (for change of intended use)	10,072
	Expansion (including elevation) or enhancement	6,897
	Recovery	6,396
	Restoration	5,040
	Technological and laboratory modernization	1,010
	Completion of renovation	421
	Completion of recovery	173
	Completion of restauration	145
	Total	**30,154**
Energy efficiency interventions	Extr. maint. with energy efficiency	14,709
	Renovation with energy efficiency	2,661
	Total	**17,370**
Seismic and hydrogeological interventions	Extr. maint. for hydrogeological instability	5,978
	Seismic adjustment extr. maint.	1,580
	Seismic improvement erxtr. maint.	1,075
	Total	**8,633**
Demolition	Demolition	789
	Completion of demolition	7
	Total	**796**
Other	Socially useful works	375
	Other	17,598
	Total	**17,973**
	Total interventions	**266,288**

Source: BDAP MOP database and own calculations.
Note: Each CUP is counted as 1 investment project. The Table only considers investments announced in the time period 2013-2021. All projects with strictly positive expected costs and actual expenditure equal to zero are dropped, as they correspond either to investments that have been approved and announced, but for which works have not yet started, or to human error. BDAP provides a list of 24 different intervention types. For the sake of tractability, I have grouped them into 7 macro-types based on common features: extraordinary maintenance; new realization; renovation, recovery, expansion, enhancement; energy efficiency interventions; seismic and hydrogeological interventions; demolition; and other. Categories are listed in a descending order.

Table 8: Breakdown of Green Investments

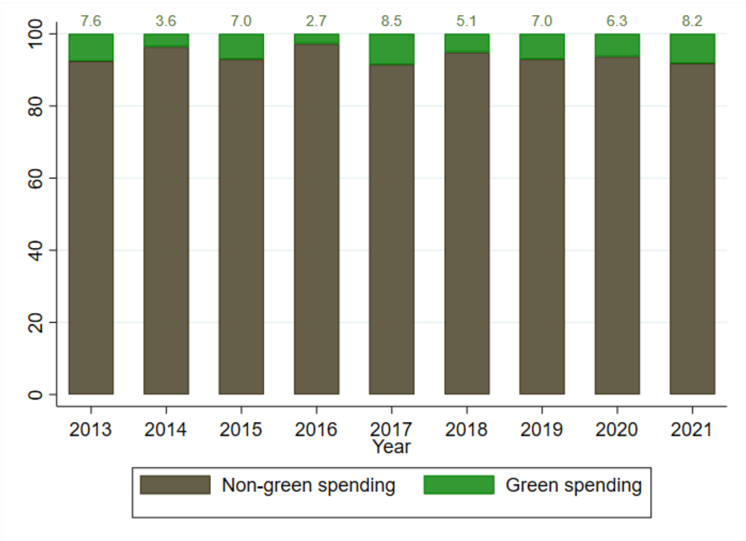
Type of intervention	Sub-type of intervention	N
Energy efficiency	Extr. maint. with energy efficiency	14,709
	Renovation with energy efficiency	2,661
	Total energy efficiency interventions	17,370
Type of intervention	Category of intervention	N
Non-energy efficiency	Other infrastructures for environmental protection, enhancement, and fruition	6,920
	Green public spaces	1,783
	Plants for energy production from renewable sources	802
	Systems for network efficiency and energy saving	763
	Air quality infrastructure	13
	Plants and equipment for natural disaster management	5
	Total non-energy efficiency interventions	10,286
	Total green interventions	**27,656**

Table 9: Relationship Between Underreporting and GDP

	(1)	(2)	(3)	(4)	(5)	(6)
GDP_t	0.000	0.001				
	(0.000)	(0.001)				
GDP_{t-1}			-0.000	0.000		
			(0.000)	(0.001)		
GDP_{t+1}					0.000	-0.001
					(0.000)	(0.001)
Obs.	100	100	80	80	80	80
Year FE	No	Yes	No	Yes	No	Yes
Number of reg.	20	20	20	20	20	20

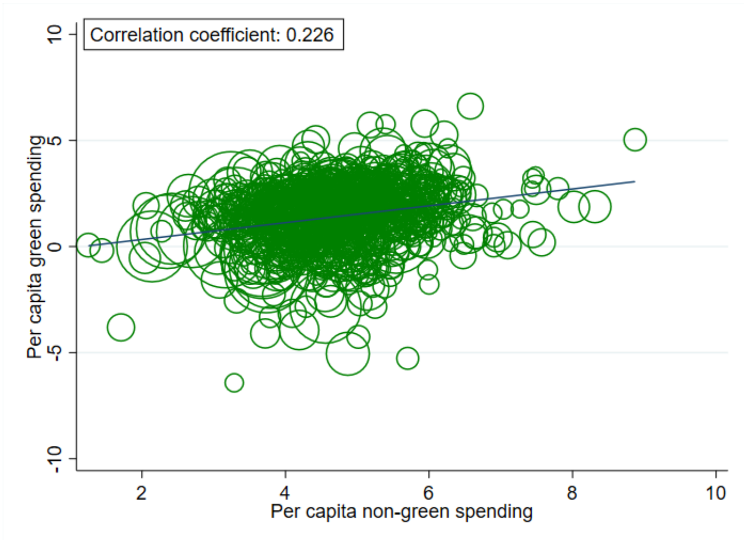
Source: BDAP MOP database, ARDECO, and own calculations.
Note: All regressions include province fixed-effects. Columns (2), (4), and (6) include year fixed-effects. Sample: 20 regions for the time period 2016-2020 ("official" shares are not available before 2016, and ARDECO data stops in 2020). The dependent variable is the difference (in absolute value) between the share of spending in each region-year reported by the MEF and the one I calculate based on BDAP data. The independent variables are contemporaneous per capita GDP (columns (1) and (2)), lagged (in $t-1$) per capita GDP (columns (3) and (4)), and lead (in $t+1$) per capita GDP (columns (5) and (6)). For Trentino-Alto Adge, GDP is computed as a simple average between the autonomous provinces of Bolzano/Bozen and Trento. Standard errors are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure 8: Green Share of Total Spending



Source: BDAP MOP database and own calculations
The Figure plots the share of green spending as a percentage of total spending. Spending refers to actual costs in the year of the projects' announcement.

Figure 9: Correlation Between Green and non-Green Spending



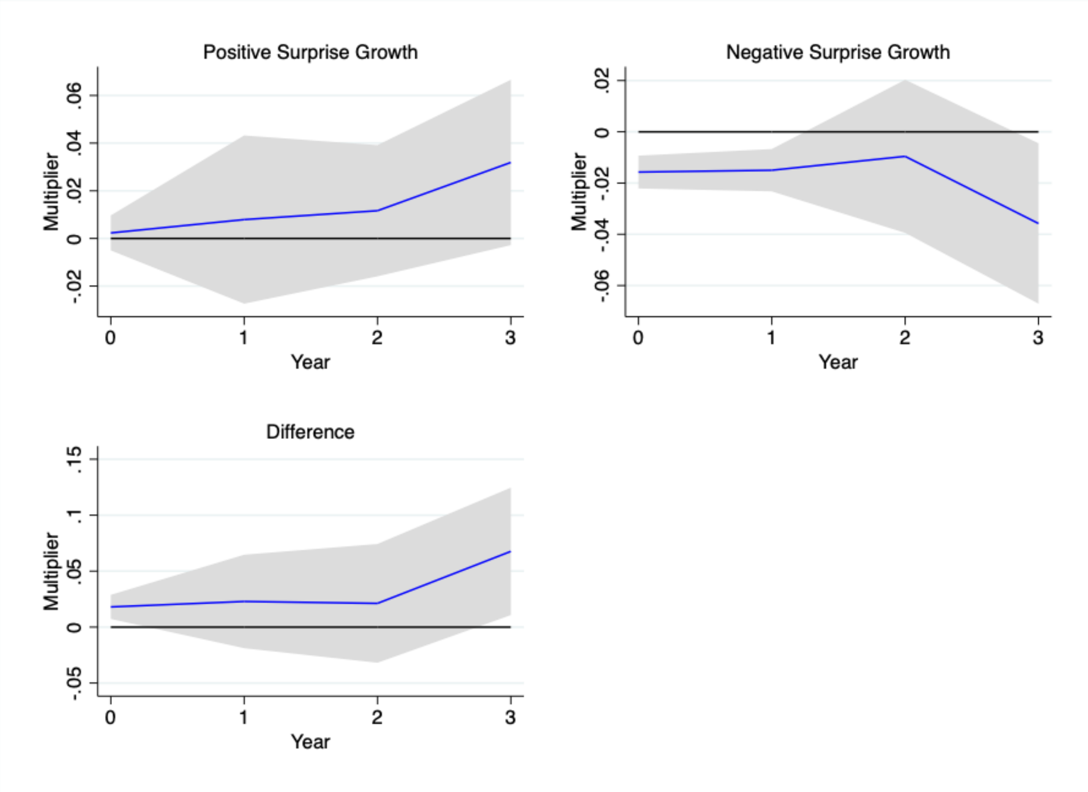
Source: BDAP MOP database, MEF website, and own calculations
Note: the Figure is a scatter plot of per capita green and non-green spending. Spending refers to actual costs, and variables are taken in logs. Every circle correspond to one province-year observation. Observations are weighted by population, with larger circles corresponding to more populated provinces. Population data for 2020 and 2021 is not available, and it is therefore retrieved by interpolation. Sample size: 107 provinces for the time period 2013-2021. The coefficient displayed comes from a simple pairwise correlation estimation, and is significant at the 99% level. The correlation between green and non-green spending is lower compared to previous analyses (e.g., Chen et al., 2020).

Figure 10: Share of total spending by region: BDAP shares vs own shares (2016-2021)

Source: BDAP MOP database, MEF website, and own calculations
Note: The Figure compares the share of total public work spending per region provided by the MEF website and the same share computed with BDAP data. Sample: 20 regions for the years 2016-2021.

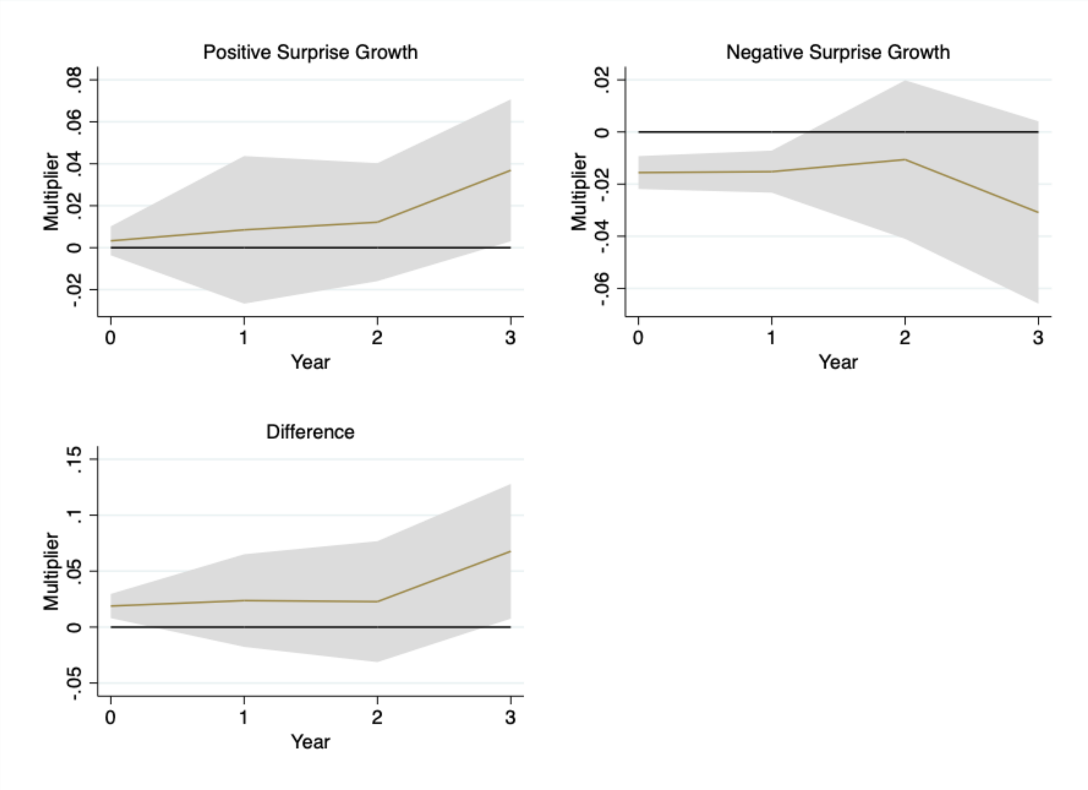
A.2 Figures

Figure 11: Positive vs. Negative Total Surprise Growth



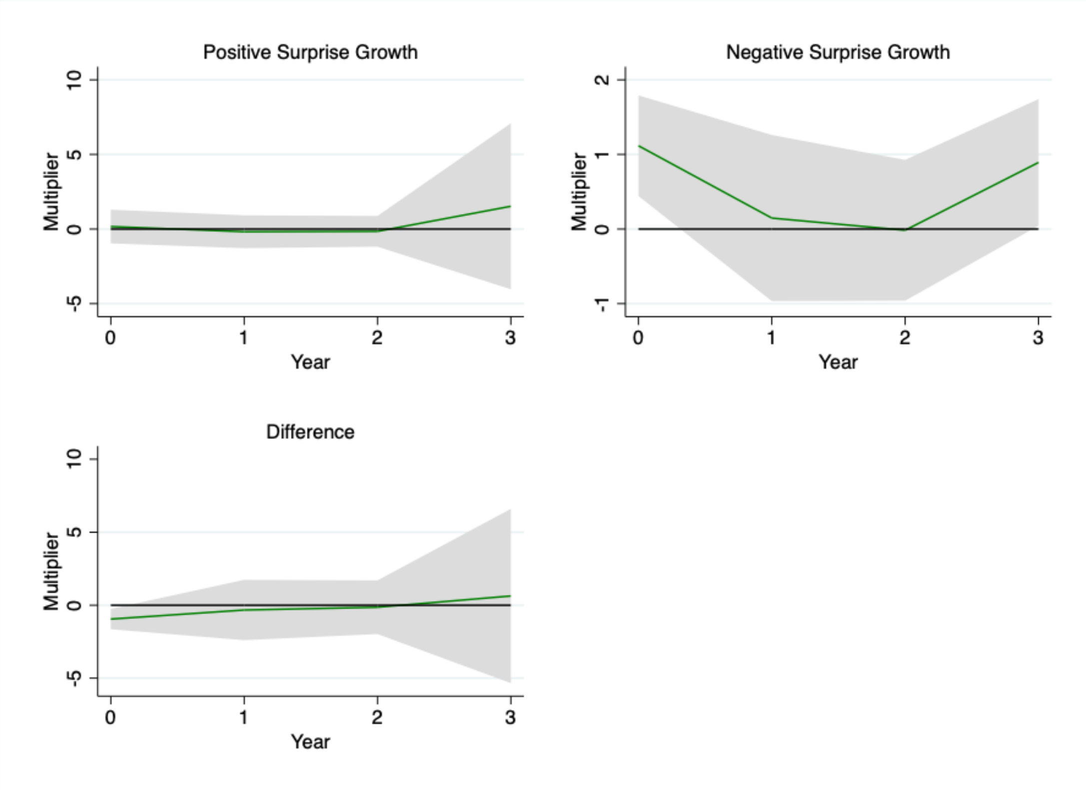
Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for positive and negative total surprise growth. The difference between the two is plotted in the third panel. The shaded area represents the 90% confidence bands.

Figure 12: Positive vs. Negative Non-Green Surprise Growth



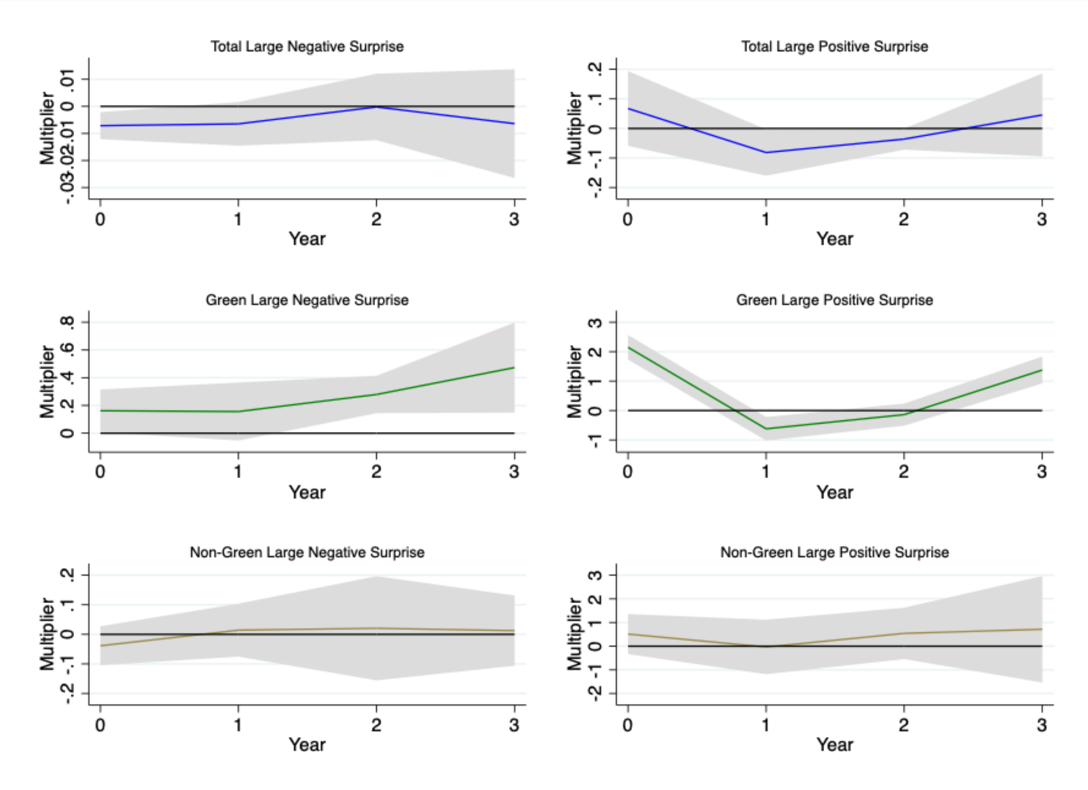
Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for positive and negative non-green surprise growth. The difference between the two is plotted in the third panel. The shaded area represents the 90% confidence bands.

Figure 13: Positive vs. Negative Green Surprise Growth



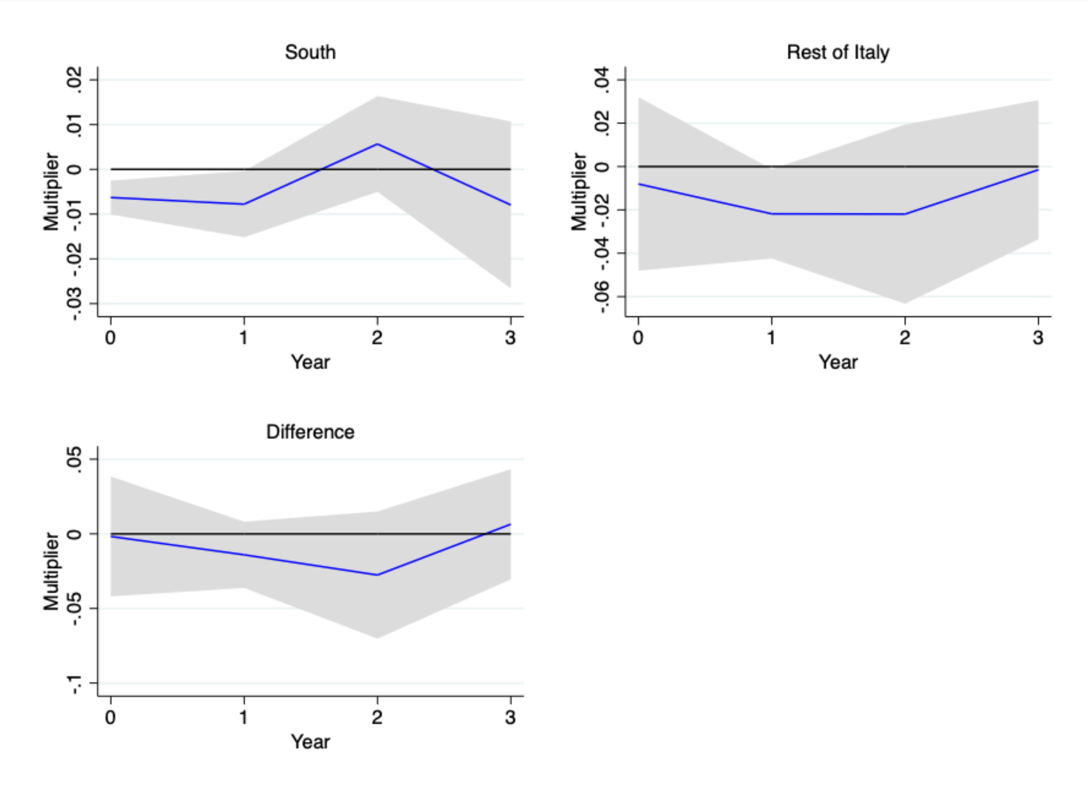
Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for positive and negative green surprise growth. The difference between the two is plotted in the third panel. The shaded area represents the 90% confidence bands.

Figure 14: Cumulated Multiplier - Size Analysis



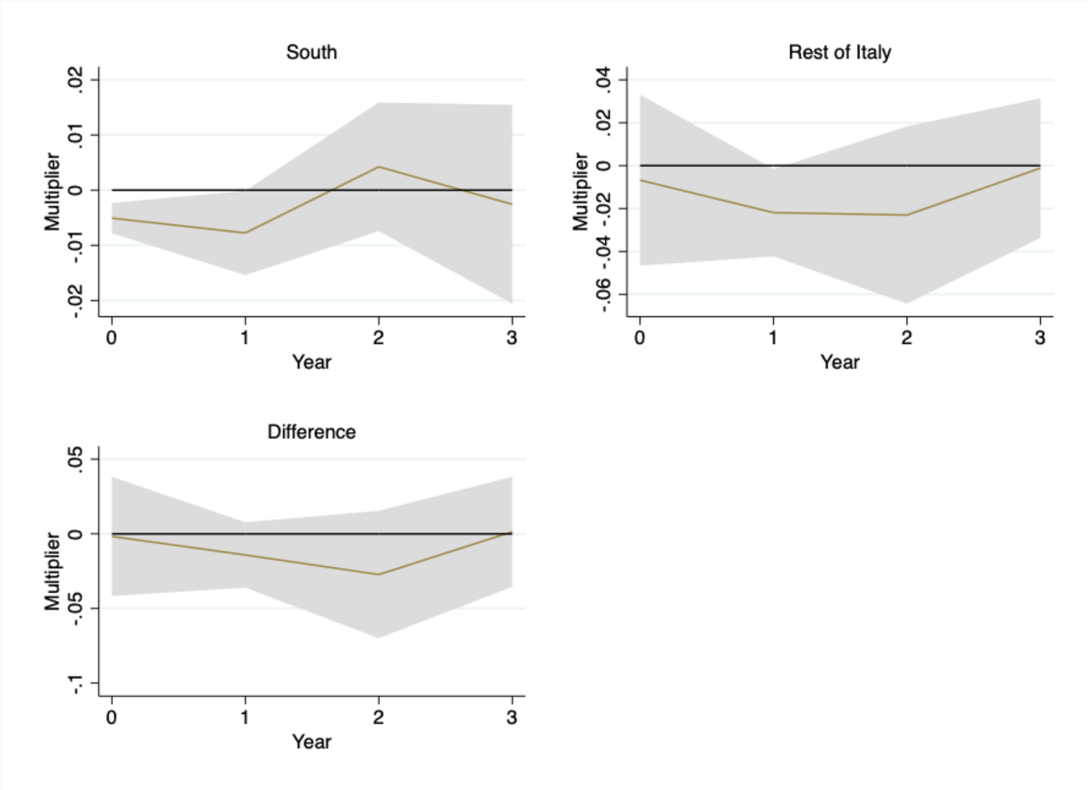
Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for total, green, and non green surprises. The left panels plot the cumulated multipliers for the first quartile of projects surprises, the right panels plot the cumulated multipliers for the last quartile. The shaded area represents the 90% confidence bands.

Figure 15: South vs. Rest of Italy - Total Surprise



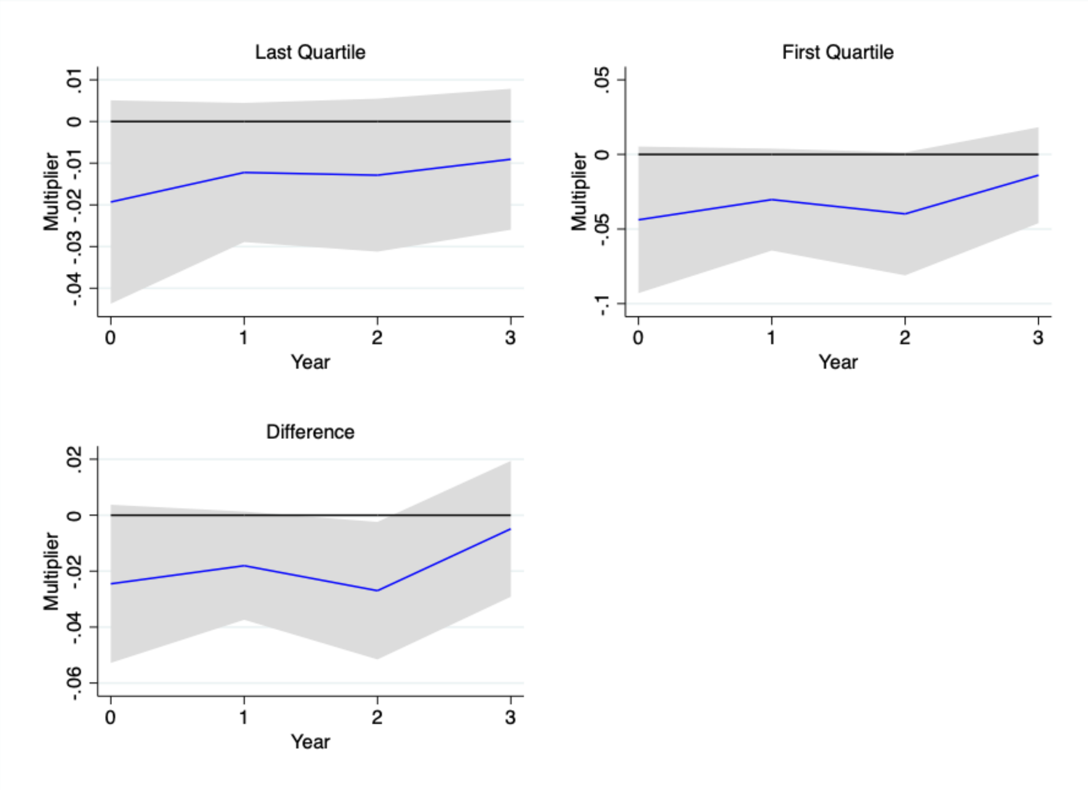
Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for a 1€ increase in surprise spending for provinces in the south and in the rest of Italy. The difference between the two is plotted in the third panel. The shaded area represents the 90% confidence bands.

Figure 16: South vs. Rest of Italy - Non-Green Surprise



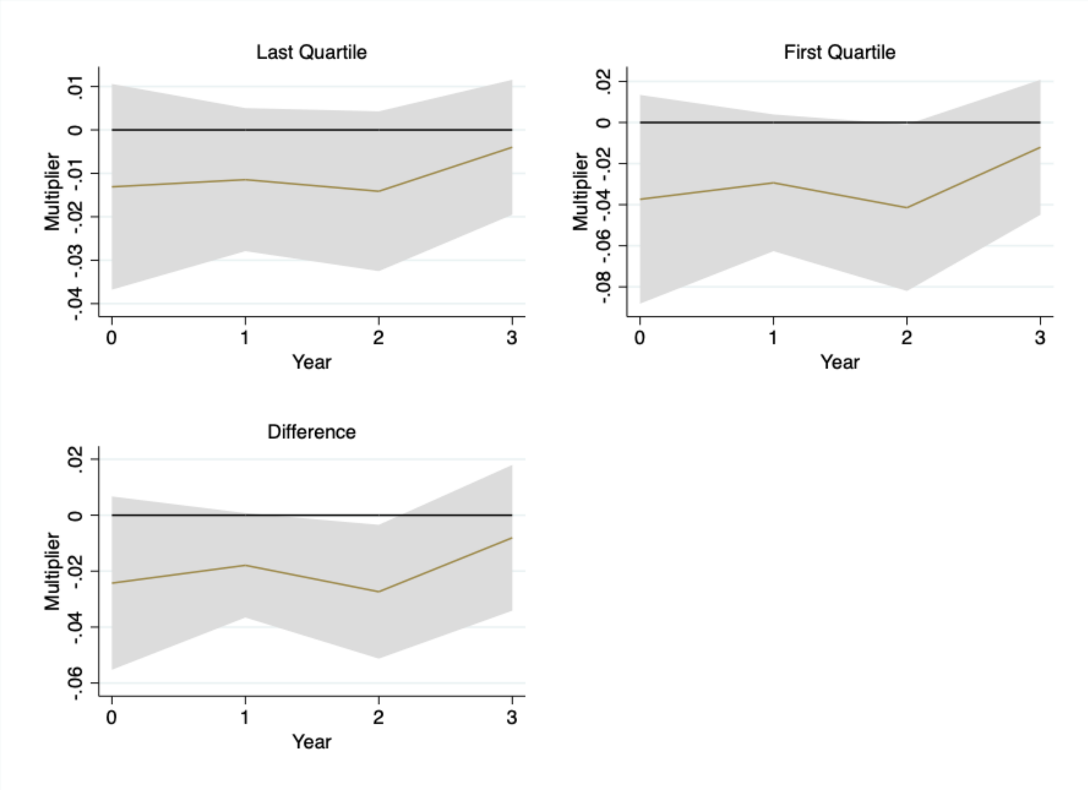
Source: BDAP MOP database, ARDECO, and own calculations.
Note: Cumulative GDP multipliers for a 1€ increase in surprise spending for provinces in the south and in the rest of Italy. The difference between the two is plotted in the third panel. The shaded area represents the 90% confidence bands.

Figure 17: Corruption Score and Multiplier - Total Surprise



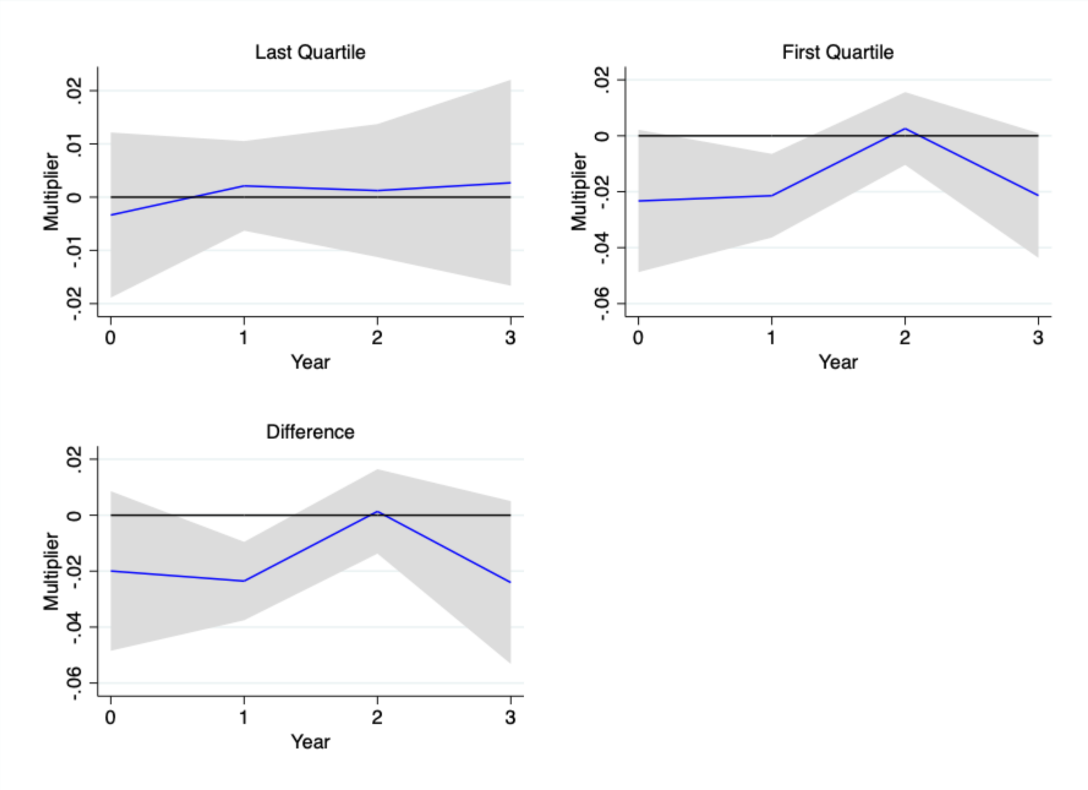
Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) corruption scores, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Figure 18: Corruption Score and Multiplier - Non-Green Surprise



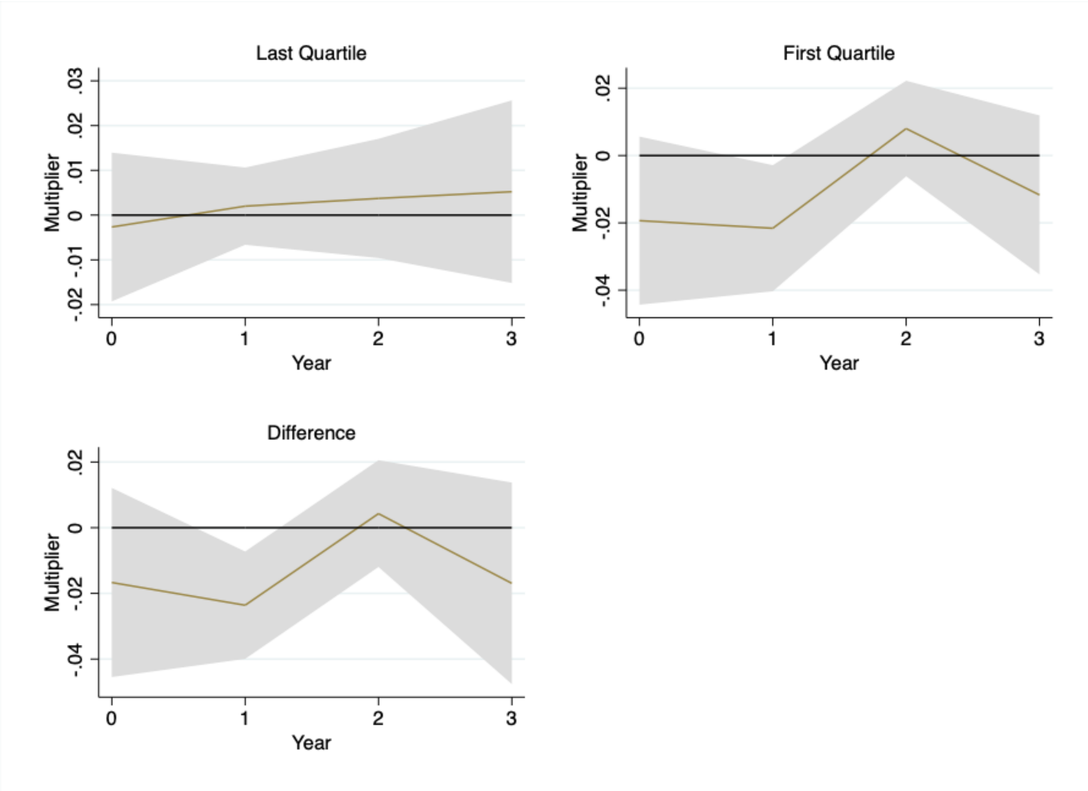
Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) corruption scores, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Figure 19: Government Effectiveness and Multiplier - Total Surprise



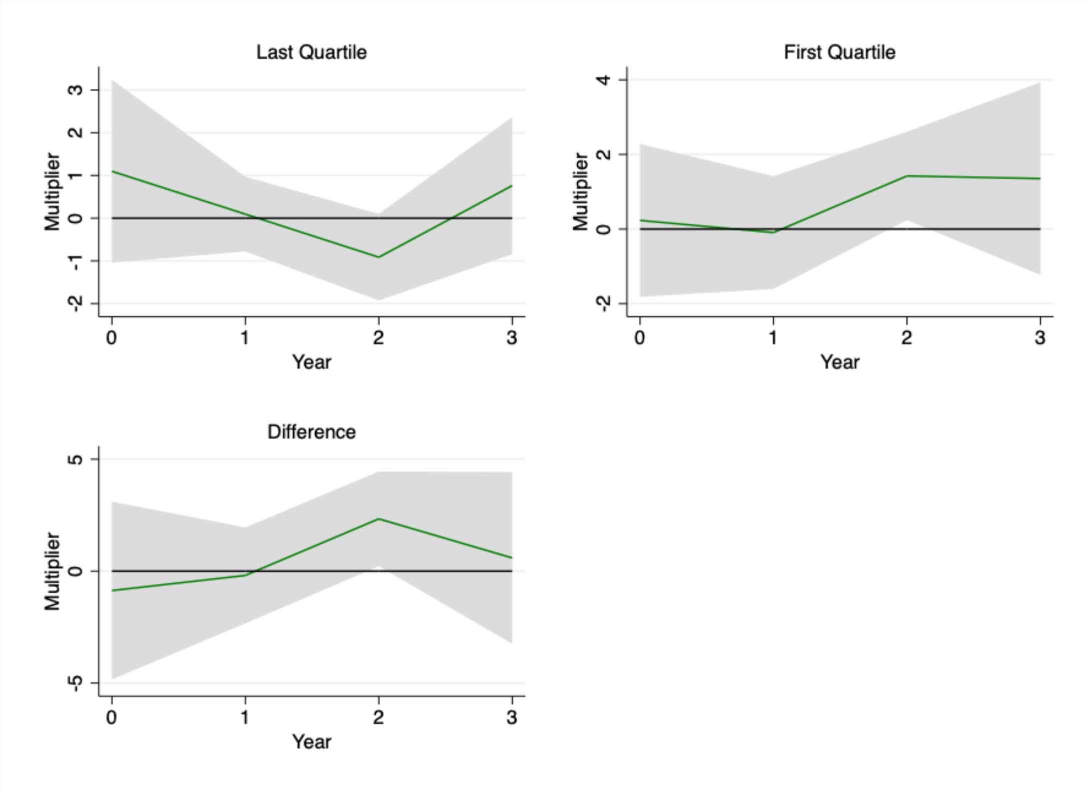
Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) government effectiveness index, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Figure 20: Government Effectiveness and Multiplier - Non-Green Surprise



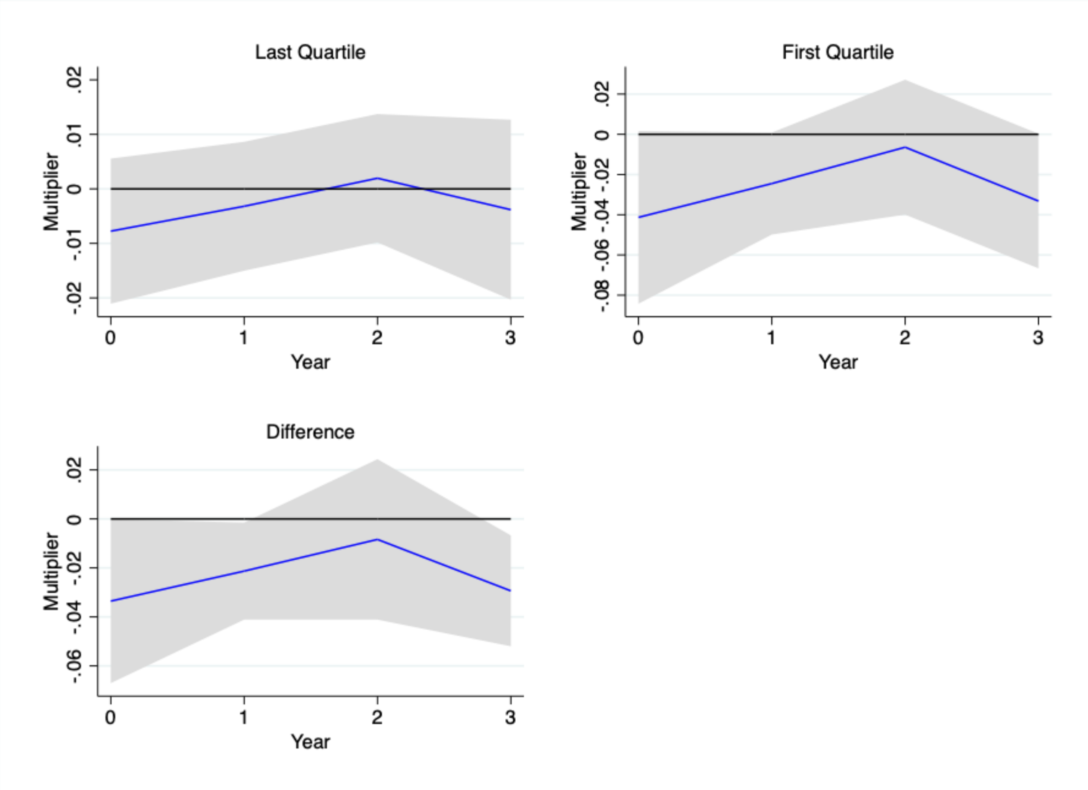
Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) government effectiveness index, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Figure 21: Government Effectiveness and Multiplier - Green Surprise



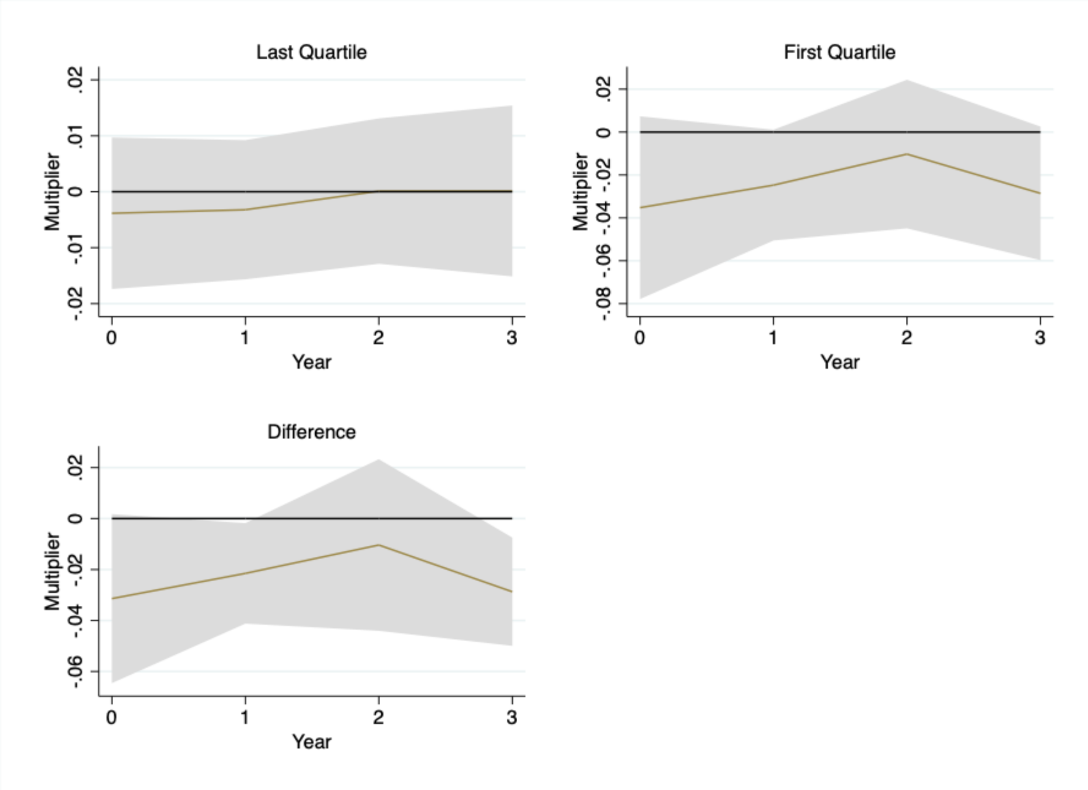
Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) government effectiveness index, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Figure 22: Insitutional Quality Index and Multiplier - Total Surprise



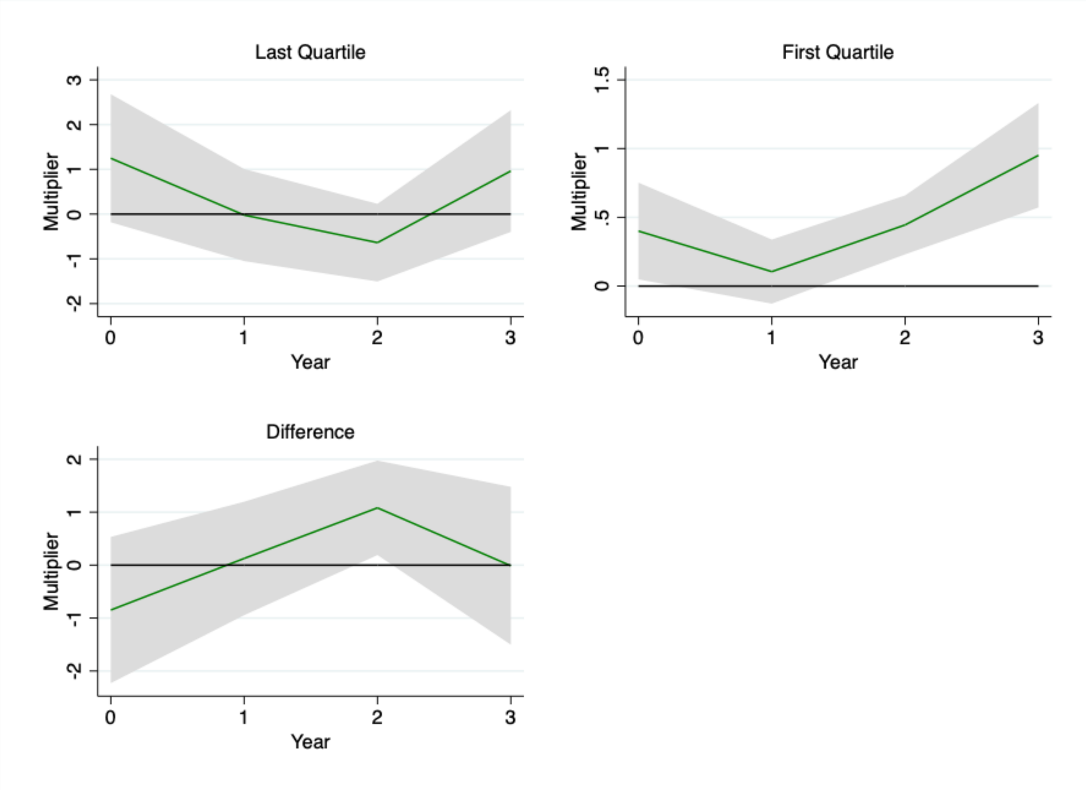
Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) IQI, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Figure 23: Insitutional Quality Index and Multiplier - Non-Green Surprise



Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) IQI, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

Figure 24: Insitutional Quality Index and Multiplier - Green Surprise



Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: Cumulative GDP multipliers from a 1€ increase in surprise spending for low (first quartile in the sample) and high (last quartile) IQI, and difference between the two multipliers. The shaded area represents the 90% confidence bands.

A.3 Tables

Table 10: Exogeneity Test - Institutional Quality

	(1) Green	(2) Green	(3) Green	(4) Total	(5) Total	(6) Total
$iqi_{i,t}$	-0.59×10^2			-0.21×10^4		
	(47.48)			(2453)		
$abs\_corr_{i,t}$		-0.96×10^2			-0.15×10^4	
		(122.6)			(1381)	
$eff_{i,t}$			-0.26×10^2			-0.11×10^4
			(34.06)			(1212)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	636	636	636	636	636	636

Source: BDAP MOP database, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The dependent variable is $surprise_{i,t}$ expressed in terms of per capita GDP in current euros in year. Columns (1)-(3) report the green surprise, columns (4)-(6) the overall surprise. $iqi_{i,t}$, $abs\_corr_{i,t}$, and $eff_{i,t}$ are contitnuous indexes between 0 and 1 that take higher values for higher values of overall institutional quality, absence of corruption, and government effectiveness. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 11: Exogeneity Test - Past Growth

	(1) Green	(2) Green	(3) Green	(4) Green	(5) Total	(6) Total	(7) Total	(8) Total
$gdp_{i,t-1}$	-0.29×10^3		-0.35×10^3		0.90×10^4		0.62×10^4	
	(178.3)		(238.2)		(6703)		(5289)	
$gdp_{i,t-2}$		0.82×10^2		0.12×10^3		-0.22×10^4		-0.28×10^4
		(98.65)		(138.5)		(4679)		(4359)
$iqi_{i,t}$			-0.52×10^2	-0.11×10^3			-0.23×10^4	0.71×10^4
			(78.93)	(110.3)			(4341)	(6675)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	714	612	510	408	714	612	510	408

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The dependent variable is $surprise_{i,t}$ expressed in terms of per capita current euros. Columns (1)-(4) report the green surprise, columns (5)-(8) the overall surprise. $iqi_{i,t}$ is a contitnuous indexes between 0 and 1 that takes higher values for higher values of overall institutional quality. All regressions include year and province fixed effects. The sample includes 107 provinces (106 when controlling for $iqi_{i,t}$, as data are not available for the Sud Sardegna province) for the time period 2013-2019. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 12: Overall Multiplier: Removed Lombardia

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. Surprise	-0.006**	-0.009**	0.000	-0.008
	(0.002)	(0.004)	(0.007)	(0.009)
(b) Green vs. non-green				
Green surprise	0.780	0.002	-0.071	0.958*
	(0.559)	(0.301)	(0.265)	(0.496)
Non-green surprise	-0.005**	-0.009**	-0.000	-0.004
	(0.002)	(0.004)	(0.007)	(0.009)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	720	630	540	450

Source: BDAP MOP database, ARDECO, and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 95 provinces for the time period 2013-2021 (the following provinces have been removed: Bergamo, Brescia, Como, Cremona, Lecco, Lodi, Mantova, Milano, Monza e della Brianza, Pavia, Sondrio, Varese). Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 13: Positive vs. Negative Surprise

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. Surprise	-0.016****	-0.015***	-0.010	-0.036*
	(0.004)	(0.005)	(0.018)	(0.019)
Tot. Surprise$\times pos_{i,t}$	0.018***	0.023	0.021	0.068*
	(0.007)	(0.025)	(0.032)	(0.035)
(b) Green vs. non-green				
Green Surprise	1.117***	0.147	-0.017	0.892*
	(0.410)	(0.676)	(0.573)	(0.516)
Green Surprise$\times pos_{i,t}$	-0.949**	-0.328	-0.138	0.633
	(0.421)	(1.254)	(1.115)	(3.626)
Non-green Surprise	-0.016****	-0.015***	-0.011	-0.031
	(0.004)	(0.005)	(0.019)	(0.021)
Non-green Surprise$\times pos_{i,t}$	0.019***	0.024	0.023	0.068*
	(0.007)	(0.025)	(0.033)	(0.037)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	816	714	612	510

Source: BDAP MOP database, ARDECO, and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $pos_{i,t}$ is a dummy equal to 1 if $surprise_{i,t}$ is positive. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 107 provinces for the time period 2013-2021. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 14: Positive vs. Negative - Extended

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. Surprise $(-)$	-0.016****	-0.015***	-0.010	-0.036*
	(0.004)	(0.005)	(0.018)	(0.019)
Tot. Surprise $(+)$	0.002	0.008	0.012	0.032
	(0.004)	(0.021)	(0.017)	(0.021)
Tot. Surprise$\times pos_{i,t}$	0.018***	0.023	0.021	0.068*
	(0.007)	(0.025)	(0.032)	(0.035)
(b) Green vs. non-green				
Green Surprise $(-)$	1.117***	0.147	-0.017	0.892*
	(0.410)	(0.676)	(0.573)	(0.516)
Green Surprise $(+)$	0.168	-0.181	-0.155	1.525
	(0.684)	(0.668)	(0.624)	(3.379)
Green Surprise$\times pos_{i,t}$	-0.949**	-0.328	-0.138	0.633
	(0.421)	(1.254)	(1.115)	(3.626)
Non-green Surprise $(-)$	-0.016****	-0.015***	-0.011	-0.031
	(0.004)	(0.005)	(0.019)	(0.021)
Non-green Surprise $(+)$	0.003	0.009	0.012	0.037*
	(0.004)	(0.021)	(0.017)	(0.021)
Non-green Surprise$\times pos_{i,t}$	0.019***	0.024	0.023	0.068*
	(0.007)	(0.025)	(0.033)	(0.037)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	816	714	612	510

Source: BDAP MOP database, ARDECO, and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $pos_{i,t}$ is a dummy equal to 1 if $surprise_{i,t}$ is positive. The multipliers for positive surprises (+) have been computed in separate and synmmetric regressions for the sake of comparison. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 107 provinces for the time period 2013-2021. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 15: Multiplier by Size of Surprise

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Large negative	-0.007**	-0.006	-0.000	-0.006
	(0.003)	(0.005)	(0.007)	(0.012)
Small	11.83	6.601	8.898	26.07
	(8.779)	(8.350)	(20.12)	(28.92)
Large positive	0.067	-0.082*	-0.036	0.046
	(0.077)	(0.048)	(0.022)	(0.085)
(b) Green vs. non-green				
Green - Large negative	0.162*	0.156	0.279***	0.473**
	(0.093)	(0.127)	(0.082)	(0.197)
Green - Small	19.04	30.82**	9.949	-99.82
	(17.04)	(14.15)	(31.36)	(68.56)
Green - Large positive	2.148****	-0.620**	-0.138	1.377****
	(0.252)	(0.242)	(0.227)	(0.277)
Non-green - Large negative	-0.039	0.014	0.021	0.013
	(0.040)	(0.054)	(0.107)	(0.072)
Non-green - Small	8.086	-13.14	13.49	29.61
	(17.30)	(18.94)	(31.17)	(26.02)
Non-green - Large positive	0.511	-0.034	0.541	0.714
	(0.514)	(0.699)	(0.658)	(1.368)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs. Tot. Surprise	797	698	596	494
Obs. Green vs. non-green surprise	338	286	213	150

Source: BDAP MOP database, ARDECO, and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. Large negative corresponds to the first quartile of project surprises, small corresponds to the second and the third quartiles grouped, and large positive corresponds to the fourth quartile of project surprises. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 107 provinces for the time period 2013-2021. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, **$p < 0.05$,*** $p < 0.01$, **** $p < 0.001$

Table 16: South vs. Rest of Italy - Extended

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. Surprise (south)	-0.006***	-0.008*	0.006	-0.008
	(0.002)	(0.004)	(0.007)	(0.011)
Tot. Surprise (north)	-0.008	-0.022*	-0.022	-0.001
	(0.024)	(0.013)	(0.025)	(0.020)
Tot. Surprise $\times north_i$	-0.002	-0.014	-0.028	0.006
	(0.024)	(0.014)	(0.026)	(0.022)
(b) Green vs. non-green				
Green surprise (south)	1.433**	0.001	-0.373	1.030
	(0.617)	(0.585)	(0.414)	(0.715)
Green surprise (north)	0.158*	0.037	0.252****	0.878****
	(0.080)	(0.130)	(0.072)	(0.237)
Green surprise $\times north_i$	-1.275**	0.035	0.625	-0.153
	(0.602)	(0.596)	(0.409)	(0.749)
Non-green surprise (south)	-0.005***	-0.008*	0.004	-0.003
	(0.002)	(0.005)	(0.007)	(0.011)
Non-green surprise (north)	-0.007	-0.022*	-0.023	-0.001
	(0.024)	(0.012)	(0.025)	(0.020)
Non-green surprise $\times north_i$	-0.002	-0.014	-0.027	0.001
	(0.024)	(0.013)	(0.026)	(0.022)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	816	714	612	510

Source: BDAP MOP database, ARDECO, and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $north_i$ is a dummy equal to 1 if province i is not in the south of Italy. Provinces in the following regions are considered to be in the south: Basilicata, Calabria, Campania, Molise, Puglia, Sardegna, Sicilia. The multipliers for provinces in the north have been computed in seperate and symmetric regressions for the sake of comparison. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 107 provinces for the time period 2013-2021. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 17: Government Effectiveness

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. surprise	0.015	0.023**	0.000	0.024
	(0.022)	(0.010)	(0.014)	(0.025)
Tot. surprise$\times eff_{i,t}$	-0.067	-0.079***	0.005	-0.081
	(0.059)	(0.029)	(0.031)	(0.059)
(b) Green vs. non-green				
Green surprise	1.877	0.265	-3.012*	0.232
	(3.427)	(1.631)	(1.752)	(2.975)
Green surprise$\times eff_{i,t}$	-2.925	-0.638	7.885*	1.994
	(8.146)	(4.389)	(4.337)	(7.865)
Non-green surprise	0.012	0.023**	-0.000	0.020
	(0.023)	(0.010)	(0.015)	(0.026)
Non-green surprise$\times eff_{i,t}$	-0.056	-0.080**	0.015	-0.057
	(0.059)	(0.034)	(0.033)	(0.063)
Q1-Q3 (tot.)	-0.020	-0.024***	0.001	-0.024
	(0.017)	(0.009)	(0.009)	(0.018)
Q1-Q3 (green)	-0.867	-0.189	2.337*	0.591
	(2.414)	(1.300)	(1.285)	(2.331)
Q1-Q3 (non-green)	-0.017	-0.024**	0.004	-0.017
	(0.0175)	(0.010)	(0.010)	(0.019)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	612	612	612	510

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $eff_{i,t}$ is a continuous index between 0 and 1 that takes higher values for higher values of government effectiveness. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). The third panel reports the difference between the multiplier in the first and in the last quartile (Q1-Q3) of the government effectiveness index. The first quartile (Q1) corresponds to a government effectiveness index of 0.56, the last one (Q3) to a government effectiveness index of 0.27. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, **$p < 0.05$,*** $p < 0.01$, **** $p < 0.001$

Table 18: Institutional Quality Index

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
Tot. surprise	0.028	0.020	0.011	0.028**
	(0.018)	(0.013)	(0.023)	(0.014)
Tot. surprise$\times iqi_{i,t}$	-0.088	-0.056*	-0.022	-0.077**
	(0.053)	(0.032)	(0.052)	(0.036)
(b) Green vs. non-green				
Green surprise	2.159	-0.157	-1.801	0.977
	(1.757)	(1.316)	(1.101)	(1.785)
Green surprise$\times iqi_{i,t}$	-2.227	0.332	2.844**	-0.032
	(2.203)	(1.709)	(1.424)	(2.380)
Non-green surprise	0.030	0.020	0.011	0.031**
	(0.018)	(0.013)	(0.024)	(0.013)
Non-green surprise$\times iqi_{i,t}$	-0.083	-0.057*	-0.027	-0.075**
	(0.053)	(0.032)	(0.054)	(0.034)
Q1-Q3 (tot.)	-0.034*	-0.021*	-0.008	-0.029**
	(0.020)	(0.012)	(0.020)	(0.013)
Q1-Q3 (green)	-0.848	0.126	1.083**	-0.012
	(0.839)	(0.651)	(0.542)	(0.906)
Q1-Q3 (non-green)	-0.031	-0.022*	-0.010	-0.029**
	(0.020)	(0.012)	(0.020)	(0.013)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	612	612	612	510

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.

Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $iqi_{i,t}$ is a continuous index between 0 and 1 that takes higher values for higher values of institutional quality. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). The third panel reports the difference between the multiplier in the first and in the last quartile (Q1-Q3) of the IQI. The first quartile (Q1) corresponds to an IQI of 0.79, the last one (Q3) to a government effectiveness index of 0.41. Standard errors clustered at province level are provided in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 19: Corruption and Geographical Heterogeneity

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
North-Low	0.034***	-0.035****	-0.001	0.031**
	(0.011)	(0.009)	(0.0120)	(0.013)
North-High	-0.070**	-0.020	-0.042	-0.031*
	(0.029)	(0.024)	(0.030)	(0.019)
South-Low	-0.037	0.016	-0.016	-0.023
	(0.029)	(0.025)	(0.016)	(0.035)
South-High	0.067	-0.027	-0.005	0.064
	(0.060)	(0.056)	(0.041)	(0.083)
(b) Green vs. non-green				
North-Low (green)	-5.122***	-8.286***	-5.196	-5.083
	(1.933)	(2.686)	(4.416)	(6.338)
North-High (green)	-0.449**	-0.803***	-0.304	-0.126
	(0.210)	(0.289)	(0.460)	(1.145)
South-Low (green)	4.998**	5.698*	2.153	0.923
	(2.493)	(3.148)	(4.586)	(6.400)
South-High (green)	-4.054	-8.661	-9.603**	-17.52****
	(4.370)	(5.323)	(3.860)	(2.799)
North-Low (non-green)	0.037****	-0.033****	0.001	0.036***
	(0.011)	(0.009)	(0.012)	(0.0137)
North-High (non-green)	-0.069**	-0.021	-0.044	-0.032
	(0.028)	(0.0212)	(0.027)	(0.020)
South-Low (non-green)	-0.011	0.043	0.007	0.037
	(0.028)	(0.032)	(0.023)	(0.030)
South-High (non-green)	0.125**	0.035	0.051	0.194***
	(0.060)	(0.069)	(0.052)	(0.073)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations. *Note:* The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $abs\_corr_{i,t}$ is a continuous index between 0 and 1 that takes higher values for less pervasive corruption. $south_i$ is a dummy that takes value 1 for provinces in the following regions: Basilicata, Calabria, Campania, Molise, Puglia, Sardegna, Sicilia. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). The table reports the multipliers under four different scenarios: *i)*"North-Low", i.e. provinces in the rest of the country and in the last quartile of the absence of corruption index ($abs\_corr_{i,t} = 0.68$); *ii)* "North-High", i.e. provinces in the rest of the country and in the first quartile of the absence of corruption index ($abs\_corr_{i,t} = 0.93$); *iii)* "South-Low", i.e. provinces in the south and in the last quartile of the absence of corruption index; and *iv)* "South-High", i.e. provinces in the south and in the first quartile of the absence of corruption index. Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 20: Corruption and Regulatory Quality - North vs. South

	South				Rest of Italy			
	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year	(5) On impact	(6) 1 Year	(7) 2 Year	(8) 3 Year
(a) Total spending								
High $abs\_corr_{i,t}$ - High $regq_{i,t}$	-0.032	0.093	0.559	0.379	-0.056**	-0.010	-0.038	-0.026
	(0.607)	(0.641)	(0.451)	(0.618)	(0.025)	(0.022)	(0.031)	(0.018)
High $abs\_corr_{i,t}$ - Low $regq_{i,t}$	0.106	0.084	0.128	0.077	-0.188**	-0.100	-0.053	-0.034
	(0.192)	(0.208)	(0.195)	(0.213)	(0.075)	(0.073)	(0.147)	(0.097)
Low $abs\_corr_{i,t}$ - High $regq_{i,t}$	0.211	0.318	0.484*	0.428	-0.289****	-0.275***	-0.239*	-0.335***
	(0.320)	(0.337)	(0.271)	(0.332)	(0.073)	(0.088)	(0.144)	(0.109)
Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$	-0.340***	-0.162	-0.150	-0.334***	0.295****	0.160**	0.197*	0.339****
	(0.109)	(0.121)	(0.125)	(0.129)	(0.061)	(0.072)	(0.110)	(0.089)
(b) Green vs. non-green								
High $abs\_corr_{i,t}$ - High $regq_{i,t}$ (green)	-44.09***	-59.82****	-40.83***	-27.80	-0.119	-0.473	0.372	1.857
	(13.80)	(13.41)	(14.01)	(18.05)	(0.575)	(0.668)	(0.579)	(3.523)
High $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (green)	-10.62	-16.59**	-9.003	-16.011**	-5.604	-5.353	-10.041**	-3.257
	(7.233)	(7.611)	(6.303)	(7.912)	(5.178)	(5.773)	(4.340)	(5.398)
Low $abs\_corr_{i,t}$ - High $regq_{i,t}$ (green)	-9.655	-11.95	-16.86**	-14.46	1.377	-2.303	7.673	8.637
	(8.974)	(9.875)	(8.251)	(20.60)	(8.165)	(9.321)	(7.566)	(20.30)
Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (green)	-2.518	-0.819	-8.714****	3.426	-0.548	-4.616	3.426	-7.934
	(3.223)	(3.409)	(2.356)	(5.867)	(2.855)	(3.233)	(2.124)	(5.532)
High $abs\_corr_{i,t}$ - High $regq_{i,t}$ (non-green)	-0.027	0.194	0.609	0.454	-0.055**	-0.011	-0.040	-0.025
	(0.469)	(0.570)	(0.461)	(0.491)	(0.023)	(0.0198)	(0.029)	(0.018)
High $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (non-green)	0.088	0.093	0.157	0.196	-0.184**	-0.097	-0.052	-0.024
	(0.147)	(0.190)	(0.198)	(0.174)	(0.077)	(0.072)	(0.144)	(0.097)
Low $abs\_corr_{i,t}$ - High $regq_{i,t}$ (non-green)	0.181	0.336	0.489*	0.494*	-0.280****	-0.269***	-0.228	-0.337***
	(0.247)	(0.298)	(0.277)	(0.270)	(0.075)	(0.088)	(0.153)	(0.111)
Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (non-green)	-0.345****	-0.156	-0.129	-0.275**	0.293****	0.158**	0.188	0.349****
	(0.090)	(0.113)	(0.132)	(0.116)	(0.062)	(0.072)	(0.116)	(0.093)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lags	No	No	No	No	No	No	No	No
Controls	No	No	No	No	No	No	No	No
Obs.	612	612	612	510	612	612	612	510

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $abs\_corr_{i,t}$ is a continuous index between 0 and 1 that takes higher values for less pervasive corruption. $regq_{i,t}$ is a continuous index between 0 and 1 that takes higher values for higher values of regulatory quality. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). Columns (1)-(4) report results for the south, columns (5)-(8) for the rest of the country. The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). The table reports the cumulated multipliers under four scenarios: *i)* high absence of corruption and high regulatory quality ("High $abs\_corr_{i,t}$ - High $regq_{i,t}$"); *ii)* high absence of corruption and low regulatory quality ("High $abs\_corr_{i,t}$ - Low $regq_{i,t}$"); *iii)* low absence of corruption and high regulatory quality ("Low $abs\_corr_{i,t}$ - High $regq_{i,t}$"); and *iv)* low absence of corruption and low regulatory quality ("Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$"). High $abs\_corr_{i,t}$ corresponds to the first quartile of the absence of corruption index ($abs\_corr_{i,t} = 0.93$), Low $abs\_corr_{i,t}$ to the last ($abs\_corr_{i,t} = 0.68$). High $regq_{i,t}$ corresponds to the first quartile of the regulatory quality score ($regq_{i,t} = 0.68$), Low $regq_{i,t}$ to the last ($regq_{i,t} = 0.36$). Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 21: Corruption and Regulatory Quality - Quartile Analysis

	(1) On impact	(2) 1 Year	(3) 2 Year	(4) 3 Year
(a) Total spending				
High $abs\_corr_{i,t}$ - High $regq_{i,t}$	-0.053	-0.022	-0.040	-0.024
	(0.038)	(0.025)	(0.031)	(0.019)
High $abs\_corr_{i,t}$ - Low $regq_{i,t}$	-0.030	-0.055	-0.047	0.025
	(0.054)	(0.043)	(0.042)	(0.058)
Low $abs\_corr_{i,t}$ - High $regq_{i,t}$	-0.036	-0.019	-0.021	-0.042
	(0.030)	(0.016)	(0.023)	(0.034)
Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$	-0.016	-0.024	-0.017	-0.000
	(0.026)	(0.019)	(0.021)	(0.028)
(b) Green vs. non-green				
High $abs\_corr_{i,t}$ - High $regq_{i,t}$ (green)	0.016	-0.275	-0.234	-1.317***
	(0.221)	(0.254)	(0.192)	(0.404)
High $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (green)	-3.100	-3.052	-5.852**	-11.35****
	(2.663)	(3.047)	(2.467)	(2.885)
Low $abs\_corr_{i,t}$ - High $regq_{i,t}$ (green)	1.467	-1.084	-0.403	-0.664
	(1.025)	(0.969)	(0.658)	(0.603)
Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (green)	0.177	-0.740	-1.986***	-2.477**
	(0.943)	(0.873)	(0.752)	(1.188)
High $abs\_corr_{i,t}$ - High $regq_{i,t}$ (non-green)	-0.052	-0.023	-0.044	-0.027
	(0.038)	(0.024)	(0.030)	(0.019)
High $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (non-green)	-0.006	-0.031	-0.019	0.098**
	(0.055)	(0.047)	(0.051)	(0.045)
Low $abs\_corr_{i,t}$ - High $regq_{i,t}$ (non-green)	-0.037	-0.017	-0.017	-0.029
	(0.028)	(0.016)	(0.022)	(0.026)
Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$ (non-green)	-0.003	-0.011	-0.004	0.041**
	(0.026)	(0.021)	(0.023)	(0.020)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Lags	No	No	No	No
Controls	No	No	No	No
Obs.	612	612	612	510

Source: BDAP MOP database, ARDECO, IQI data from Nifo and Vecchione (2014), and own calculations.
Note: The $surprise_{i,t}$ measure is computed as the change from year $t-1$ to year t of the difference between actual and expected per capita spending in current euros, expressed in terms of per capita GDP in current euros in year $t-1$. $abs\_corr_{i,t}$ is a continuous index between 0 and 1 that takes higher values for less pervasive corruption. $regq_{i,t}$ is a continuous index between 0 and 1 that takes higher values for higher values of regulatory quality. Panel (a) reports the results for total spending surprise, which is decomposed into green and non-green spending surprise in panel (b). The dependent variable is the growth rate of per capita GDP. All regressions include year and province fixed effects. The sample includes 106 provinces for the time period 2013-2019 (IQI data are not available after 2019 and for the Sud Sardegna province). The table reports the cumulated multipliers under four scenarios: *i)* high absence of corruption and high regulatory quality ("High $abs\_corr_{i,t}$ - High $regq_{i,t}$"); *ii)* high absence of corruption and low regulatory quality ("High $abs\_corr_{i,t}$ - Low $regq_{i,t}$"); *iii)* low absence of corruption and high regulatory quality ("Low $abs\_corr_{i,t}$ - High $regq_{i,t}$"); and *iv)* low absence of corruption and low regulatory quality ("Low $abs\_corr_{i,t}$ - Low $regq_{i,t}$"). High $abs\_corr_{i,t}$ corresponds to the first quartile of the absence of corruption index ($abs\_corr_{i,t}$ = 0.93), Low $abs\_corr_{i,t}$ to the last ($abs\_corr_{i,t}$ = 0.68). High $regq_{i,t}$ corresponds to the first quartile of the regulatory quality score ($regq_{i,t}$ = 0.68), Low $regq_{i,t}$ to the last ($regq_{i,t}$ = 0.36). Standard errors clustered at province level are provided in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

References

Acconcia, A., G. Corsetti, and S. Simonelli (2014). Mafia and Public Spending: Evidence on the Fiscal Multiplier from a Quasi-Experiment. *American Economic Review 104*(7), 2185–2209.

Acemoglu, D., S. Johnson, and J. A. Robinson (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review 91*(5), 1369–1401.

Adelino, M., I. Cunha, and M. A. Ferreira (2017). The economic effects of public financing: Evidence from municipal bond ratings recalibration. *The Review of Financial Studies 30*(9), 3223–3268.

Akcigit, U., S. Baslandze, and F. Lotti (2023). Connecting to power: political connections, innovation, and firm dynamics. *Econometrica 91*(2), 529–564.

Auerbach, A. J. and Y. Gorodnichenko (2012). Fiscal multipliers in recession and expansion. In *Fiscal policy after the financial crisis*, pp. 63–98. University of Chicago Press.

Avellán, L., A. J. Galindo Andrade, and J. León-Díaz (2020). The role of institutional quality on the effects of fiscal stimulus. Technical report, IDB Working Paper Series.

Barone, G. and G. Narciso (2015). Organized crime and business subsidies: Where does the money go? *Journal of Urban Economics 86*, 98–110.

Barro, R. J. and C. J. Redlick (2011). Macroeconomic effects from government purchases and taxes. *The Quarterly Journal of Economics 126*(1), 51–102.

Batini, N., M. Di Serio, M. Fragetta, G. Melina, and A. Waldron (2022). Building back better: How big are green spending multipliers? *Ecological Economics 193*, 107305.

Braccioli, F. (2023). The institutional role of the italian mafia: Enforcing contracts when the state does not. *Working Paper available at https://www.eeassoc.org/awards/young-economist-award*.

Brückner, M., E. Pappa, and A. Valentinyi (2022). Geographic cross-sectional fiscal spending multipliers and the role of local autonomy: Evidence from european regions. *Journal of Money, Credit and Banking*.

Brückner, M. and A. Tuladhar (2014). Local government spending multipliers and financial distress: Evidence from japanese prefectures. *The Economic Journal 124*(581), 1279–1316.

Cerrato, A., F. Filippucci, and S. Valle (2023). Balanced budget requirements and local austerity multipliers. *Available at SSRN 4536889*.

Chen, Z., G. Marin, D. Popp, and F. Vona (2020). Green stimulus in a post-pandemic recovery: the role of skills for a resilient recovery. *Environmental and Resource Economics 76*(4), 901–911.

Chodorow-Reich, G. (2019). Geographic cross-sectional fiscal spending multipliers: What have we learned? *American Economic Journal: Economic Policy 11*(2), 1–34.

Chodorow-Reich, G., L. Feiveson, Z. Liscow, and W. G. Woolston (2012). Does state fiscal relief during recessions increase employment? evidence from the american recovery and reinvestment act. *American Economic Journal: Economic Policy 4*(3), 118–45.

Conley, T. G. and B. Dupor (2013). The american recovery and reinvestment act: solely a government jobs program? *Journal of monetary Economics 60*(5), 535–549.

Corbi, R., E. Papaioannou, and P. Surico (2019). Regional transfer multipliers. *The Review of Economic Studies 86*(5), 1901–1934.

Deleidi, M. (2022). Quantifying multipliers in italy: does fiscal policy composition matter? *Oxford Economic Papers 74*(2), 359–381.

Deleidi, M., D. Romaniello, and F. Tosi (2021). Quantifying fiscal multipliers in italy: A panel svar analysis using regional data. *Papers in Regional Science 100*(5), 1158–1177.

Di Cataldo, M. and N. Mastrorocco (2022). Organized crime, captured politicians, and the allocation of public resources. *The Journal of Law, Economics, and Organization 38*(3), 774–839.

Dube, A., T. Hegland, E. Kaplan, and B. Zipperer (2018). Excess capacity and heterogeneity in the fiscal multiplier: Evidence from the recovery act. Technical report, Working Paper.

Dupor, B. and P. B. McCrory (2018). A cup runneth over: Fiscal policy spillovers from the 2009 recovery act. *The Economic Journal 128*(611), 1476–1508.

Dupor, B. and M. S. Mehkari (2016). The 2009 recovery act: Stimulus at the extensive and intensive labor margins. *European Economic Review 85*, 208–228.

Feyrer, J. and B. Sacerdote (2011). Did the stimulus stimulate? real time estimates of the effects of the american recovery and reinvestment act. Technical report, National Bureau of Economic Research.

Garrett-Peltier, H. (2017). Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model. *Economic Modelling 61*, 439–447.

Hall, R. E. (2009). By how much does gdp rise if the government buys more output? Technical report, National Bureau of Economic Research.

Haque, M. E., R. Kneller, et al. (2008). *Public investment and growth: The role of corruption.* Centre for Growth and Business Cycle Research, Economic Studies, University of Manchester.

Hasna, Z. (2021). The grass is actually greener on the other side: Evidence on green multipliers from the united states. *Mimeo*.

Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American economic review 95*(1), 161–182.

Kaufmann, D. and S.-J. Wei (1999). Does "grease mone"' speed up the wheels of commerce?

Nifo, A. and G. Vecchione (2014). Do institutions play a role in skilled migration? the case of italy. *Regional Studies 48*(10), 1628–1649.

Owyang, M. T., V. A. Ramey, and S. Zubairy (2013). Are government spending multipliers greater during periods of slack? evidence from twentieth-century historical data. *American Economic Review 103*(3), 129–34.

Pereira dos Santos, J., J. Tavares, and M. Thomas (2021). Does organized crime attract eu funding? evidence from the sicilian mafia.

Piacentini, P., S. Prezioso, and G. Testa (2016). Effects of fiscal policy in the northern and southern regions of italy. *International Review of Applied Economics 30*(6), 747–770.

Porcelli, F. and R. Trezzi (2014). Reconstruction multipliers. Technical report, Board of Governors of the Federal Reserve System (US).

Ramey, V. A. (2016). Macroeconomic shocks and their propagation. *Handbook of macroeconomics 2*, 71–162.

Ramey, V. A. (2020). The macroeconomic consequences of infrastructure investment. Technical report, National Bureau of Economic Research.

Ramey, V. A. and S. Zubairy (2018). Government spending multipliers in good times and in bad: evidence from us historical data. *Journal of political economy 126*(2), 850–901.

Rodrik, D. (2008). Second-best institutions. *American economic review 98*(2), 100–104.

Shoag, D. (2010). The impact of government spending shocks: Evidence on the multiplier from state pension plan returns. *Unpublished paper, Harvard University*.

Suárez Serrato, J. C. and P. Wingender (2016). Estimating local fiscal multipliers. *NBER Working Paper* (w22425).

Wilson, D. J. (2012). Fiscal spending jobs multipliers: Evidence from the 2009 american recovery and reinvestment act. *American Economic Journal: Economic Policy 4*(3), 251–82.