BANCA D'ITALIA
EUROSISTEMA

Questioni di Economia e Finanza

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Number 903

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The series is available online at www.bancaditalia.it .

ISSN 1972-6643 (online)

Designed by the Printing and Publishing Division of the Bank of Italy

THE ROLE OF THE SUPERBONUS IN THE GROWTH OF ITALIAN CONSTRUCTION COSTS

by Francesco Corsello* and Valerio Ercolani**

Abstract

This paper examines the role played by a very large fiscal incentive for the renovation of residential buildings, the 'Superbonus', in the growth in construction costs observed in Italy during the post-pandemic period. These costs started to rise in 2021, as the Superbonus became more and more commonly used in building renovations. By estimating an empirical model, we find that about half of the total increase in Italian construction costs between September 2021 and December 2023 can be attributed to the Superbonus.

JEL Classification: C5, H2, H3, L74, R3.

Keywords: Superbonus, tax incentives, construction costs, time series analysis.

DOI: 10.32057/0.QEF.2024.903

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1. Introduction[1]

The "Superbonus" (henceforth SB) is one of the largest fiscal programme implemented in Italy after the pandemic outbreak. It consists of a generous tax credit (with a rate that in the past could be as high as 110%) for specific kinds of building renovations, related in particular to energy-efficiency and seismic resilience improvements. Until March 2024 – before the entry into force of the Decree Law 39/2024 – in many instances it could be used not only directly by beneficiaries as a discount on their tax liabilities, but also transferred to third parties or exercised as an invoice discount, making it in principle attractive even for individuals with relatively low tax liabilities or low liquidity. It could be assessed that its impact in terms of public costs accrued in the net borrowing stood at almost 1%, 3% and 4% of GDP in 2021, 2022, 2023, respectively (for an overall envelope of more than €150 billion). In fact, since April 2024 the use of the SB, at least for its largest component, related to energy efficiency improvements, has practically stopped.[2]

While the public debate about the macroeconomic effects of SB has been extremely lively in Italy, the number of empirical analyses is still limited. Moreover, most of the existing studies on this incentive quantify its effects on the volume of housing investment and, more generally, on real economic activity[3], while the impact on costs and prices, to the best of our knowledge, has not yet been systematically analyzed. Clearly, quantifying price effects is a necessary step for an overall assessment of the policy, for example, in terms of redistributive implications and welfare effects.

This study examines the impact of SB on input prices in the Italian construction sector, i.e., the construction costs, which are the direct costs (mainly for materials and labor) incurred by the firm in the construction of a residential building. There are reasons to expect a positive impact of SB on such prices: a large exogenous demand shock could in principle lead to an increase in input prices due to the impelling request of raw materials, intermediate goods and labor, especially in the context of both post-pandemic shortages and the aftermath of the war in Ukraine. Furthermore, existing firms that produce specific inputs, such as tiles or window hardware, might have some difficulty adjusting their supply quickly and the entry of new firms might be relatively slow. On the other hand, there could be supply factors able to absorb upward pressures to input prices: if the construction sector and its suppliers were operating below their capacity before the boost provided by the SB, the supply could have adjusted relatively easily to accommodate the increased demand. Ultimately, to what extent prices reacted to such a large fiscal measure is an empirical question, which we try to address in this study.

[1] We wish to thank Andrea Brandolini, Fabio Busetti, Fabrizio Colonna, Paolo Del Giovane, Elisa Guglieminetti, Elisabetta Olivieri, Fabrizio Renzi, Marianna Riggi, Marzia Romanelli, Luigi Federico Signorini, Martino Tasso, Pietro Tommasino, Roberto Torrini and Giordano Zevi for useful comments and suggestions. The views here expressed represent those of the authors and not necessarily reflect those of the Bank of Italy.

[2] For more details on SB developments over time, see Bank of Italy (2023, 2024a, 2024b).

[3] For example, Accetturo et al. (2024) show that the fiscal incentives for residential renovations, mainly the SB, are responsible for an increase in the dwelling investments up to roughly 65 percent at the end of 2023 and that the overall output multiplier is slightly below one. IMF (2024), considering only the increase in the value added of the construcion sector, reports an even lower multiplier, that is around one third. Looking ahead, Arcano et al. (2024) stress that the disappearance of the incentives associated with the SB represents a downside risk for the residential investments and, consequently, for economic activity.

Italian costruction costs started to rise significantly in 2021, on the eve of the inflationary cycle in the euro area and together with the rollout of the SB program; they increased by about 20 percent from late 2020 to the end of 2023. Somewhat surprisingly, we notice that, despite the implementation of such large fiscal programme, the growth of construction costs was lower in Italy than in other major euro area countries (like Germany). Though carefully explaining these cross-country differences is beyond the scope of this study, we illustrate some possible motivations. For example, we are aware that supply shortages were much more severe in the northern European countries than in Italy. In addition, labor cost dynamics in the construction sector was relatively flat in Italy over the period under scrutiny.

In our empirical model construction costs are driven by prices of raw materials and inputs, supply shortages, activity in the construction sector and also the amount of SB-eligible investments – proxied by the figures published monthly by the "*Italian National Agency for New Technologies, Energy and Sustainable Economic Development*" (ENEA) for the incentives related to energy-efficiency improvements – which is our key variable of interest. We find that the SB has a statistically significant and positive effect on the construction costs. We further show that about half of the total increase in these costs observed between September 2021 and December 2023 (amounting to an overall rise of about 13 percent) can be attributed to the SB. We finally provide several robustness analyses and also bring some evidence on the pass-through of the SB to the output prices of the construction sector (the construction producer prices index, PPI).

The paper is structured as follows. In Section 2, we review some stylized facts concerning construction sector developments in Italy since 2019, providing some descriptive evidence for the construction cost dynamics and the SB as well. In addition, we discuss the above mentioned cross-country heterogeneity for construction costs in the euro area. In Section 3, we present our empirical model for the Italian construction costs, and in Section 4 we provide the main results, quantifying the role of SB in explaining the post-pandemic growth in construction costs. In Section 5 we report the main robustness exercises and extensions. Section 6 concludes.

2. Some descriptive evidence

This section analyzes the dynamics of the two main variables of our analysis, namely the proxy used for the SB and the construction costs. We first focus on Italy. Then we discuss the heterogeneity of construction costs observed across the main euro area countries.

2.1. The Superbonus and the Italian construction costs

We proxy the incentives for building renovation with the monthly changes of the SB series published by ENEA. This series is available since September 2021 and includes only the incentives related to energy efficiency improvements, which however represent the majority of the total (Figure 1).[4] In particular, ENEA reports the amount of SB-eligible investments through two different series, one quantifying the "approved" works and the other identifying

[4] Although the use of the SB began as early as 2021, ENEA started to record its use – as a stock variable – only in August 2021. As we consider the monthly changes of such a variable, our series starts in September 2021.

the "completed" ones. Our selected policy variable is the former because, in principle, an investment that is approved can already exert price pressures before its actual completion. Despite this, the series of "completed" investments and the number of buildings that benefited from incentive renovations will be used as alternatives to produce robustness checks. Furthermore, it should be noted that the beneficiaries had up to 90 days to inform ENEA about the progress of the renovations related to the SB; therefore, although not necessarily the case, there could be a delay of up to three months in the recording process. The latter is also taken into account in the design of the robustness checks.

For construction costs, we use the Construction Cost Index (CCI), a monthly input price index computed and published by Istat, which represents the direct costs incurred by firms for the construction of a building for residential use. This variable is composed of four elements (which are not available separately): labor costs, materials' costs, hire and transport charges. Looking at the last decade, labor and materials have featured the largest weights, each accounting for about half of the CCI; the remaining two components have accounted for only about 5 percent. The labor component is represented by an aggregation of labor wages for different categories of workers within the construction sector; the materials' component is computed using prices of selected inputs for the construction sector, such as bricks and concrete products, window hardwares or floors (for more details see, Istat, 2024 and Eurostat, 2024). Figure 1 shows that the CCI grew by roughly 20 percent since the pandemic outbreak and by about 13 percent since September 2021, which is when the ENEA series on SB starts. Although the various components of the CCI are not available separately, it can be inferred that the growth in the CCI was mainly determined by the dynamics of the materials' costs; indeed, as shown in Section 2.2, labor costs of the construction sector remained relatively stable over the period under scrutiny.

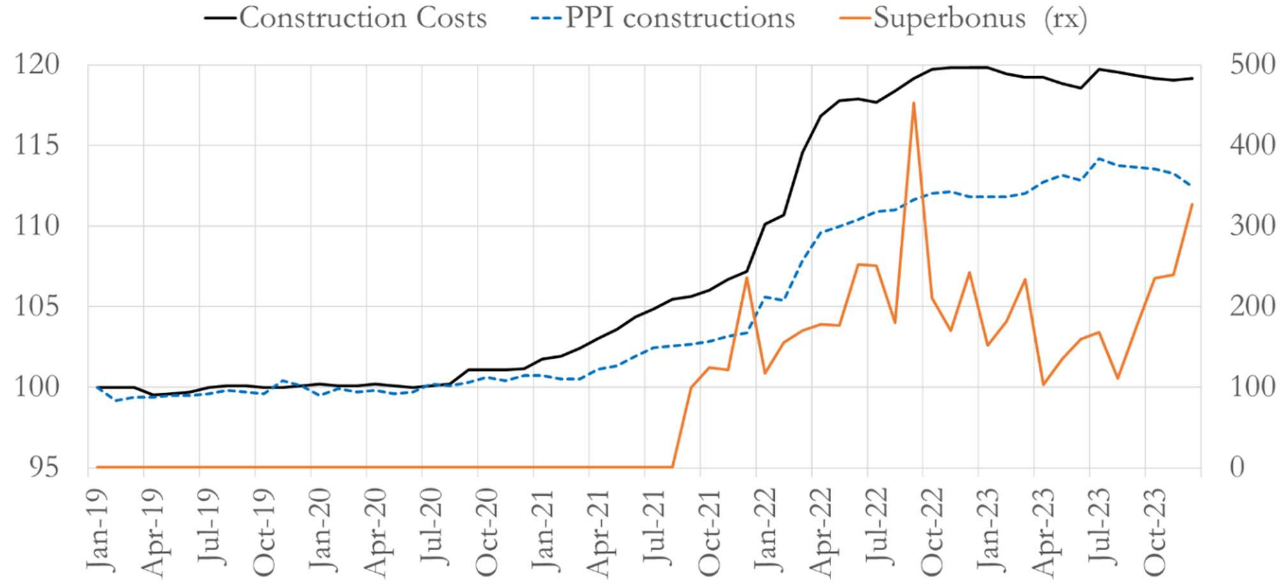
A comparison of the CCI with the producer prices of the construction sector (construction PPI) shows a similar dynamics for the two indices, although the latter grew at a slower pace (Figure 1). In fact, the PPI provides a measure for output price costs: they include the CCI, but also overheads costs – such as telecommunications services or legal and accounting services[5] – and profit margins. Focusing on the CCI allows us to capture the effects of the SB on the "core" costs of the construction sector, abstracting from its mark-up dynamics and other general costs. Studying the evolution of construction output prices would require a more general empirical model than ours, which should take into account construction firms' market power and that is beyond the scope of this study. However, as a simple extension of our empirical analysis, we also provide some evidence for the effects of the SB on the construction PPI in Section 5.

The first marked acceleration of the CCI occurred in the course of 2021, when the incentives for building renovation started to be used by the public in relevant amounts.[6] Moreover, the first half of 2022 saw a steep increase both in the CCI and in the SB. In Section 3, we analyze this comovement through the lenses of an econometric analysis.

[5] Overheads include also security and investigation services, postal and courier services, software production, data processing and other information services and, finally, cleaning services.

[6] Other than the SB, the 2020-22 period was influenced also by the so-called "Bonus facciate", a somewhat similarly generous incentive (up to 90 percent of expenses incurred in order to renovate the facade of a building) which amounted to roughly 20 billion and for which monthly data are not available.

Figure 1. Italian construction prices and costs, and the Superbonus
(monthly price indices: 2019-Jan=100; 2021-Sep=100 for the Superbonus)



Source: ENEA and Istat

2.2. A bird's eye view on construction costs across the euro area

During the post pandemic period, dwelling investments have remained relatively stable across the main euro area countries, with the notable exception of Italy (Figure 2). On the other hand, construction costs have markedly risen everywhere, with some cross-country heterogeneity. In particular, in Italy the rise was below the euro area average; this pattern holds even if we consider other related price indices, such as the construction PPI and the deflator of dwelling investments.[7] Given the strong expansion of residential investment, the fact that in Italy the dynamics of construction costs has been weaker than in other countries might appear puzzling.

In fact, several reasons may help explain the more contained dynamics of the CCI for Italy. First, the different severity of the bottlenecks across countries. European Commission's business surveys show that, on average, after the pandemic outbreak supply bottlenecks were not as tight in Italy as in the other euro area countries. This is shown, for example, by the percentage of manufacturing firms indicating the shortage of materials as a key element contributing to limit their own production (Figure 3, left panel). Further, the Purchasing Managers' Index (PMI) of the delivery times, that associates lower values to longer waiting times, provides a similar picture (Figure 3, right panel).[8] While the former index is

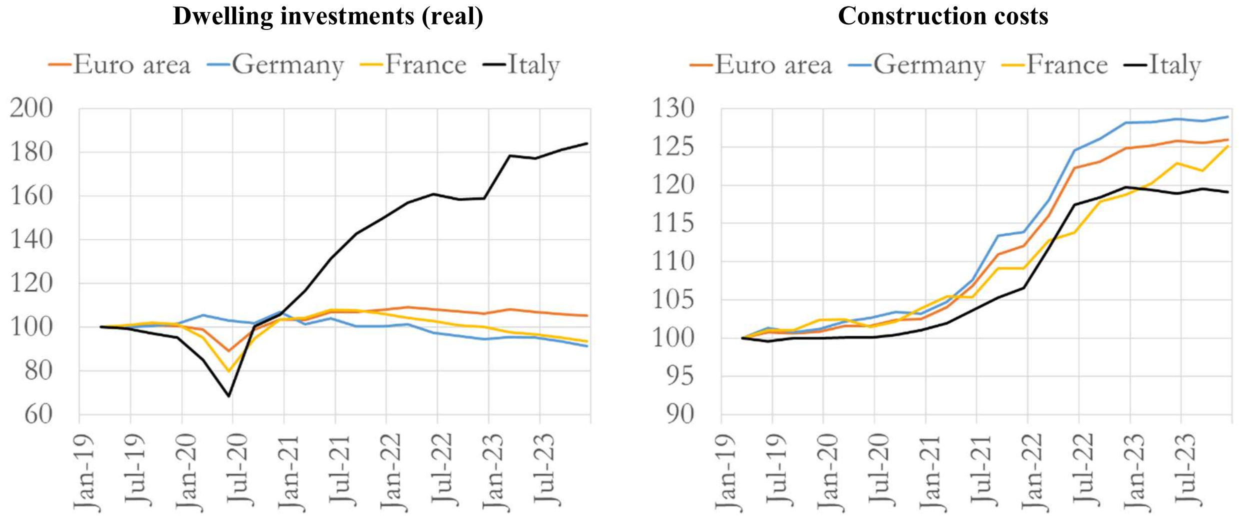
[7] Notice that part of the cross-country heterogeneity in terms of CCI can also be due to the fact that this index, though always embedding similar components such as costs for materials and labor, is not fully harmonized among european countries. In addition, the majority of the countries, including Germany and France, provide the CCI series at a quarterly frequency; Italy, together with few other countries, releases the CCI at a monthly frequency.

[8] Note that the PMI indices – that are built through surveys to managers responsible for the purchases of the company – vary between 0 and 100. If they are above 50 they indicate "expansion" or "improvement" of the respective sector, whilst if they are below 50 indicate "contraction" or "worsening". We normalize 50 to 0 in all the figures of the paper, so that positive numbers indicate expansion and negative numbers contraction.

unambiguously milder in Italy during the period under scrutiny, the PMI is less severe during 2021 which is when global supply bottlenecks started to manifest themselves. Notice that even surveys at constructions' firms – though less representative of their own sector due to small sample – provide the same message, that is supply shortages were milder in Italy. Aprigliano et al. (2021) explain how these differences may depend on some specific characteristics of the countries: the geographical position, the transportation framework, but also the industry composition and the input materials necessary for the production.

Figure 2. Dwelling investments and construction costs in the euro area

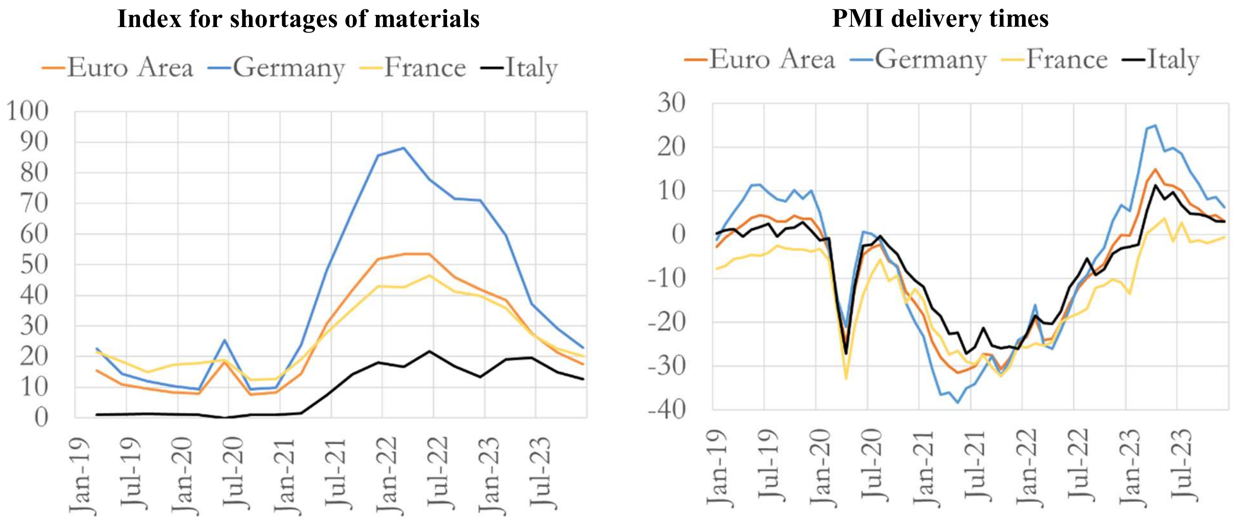
(quarterly indices: 2019-Q1=100)



Source: Eurostat and Insee

Figure 3. Supply bottlenecks in the euro area

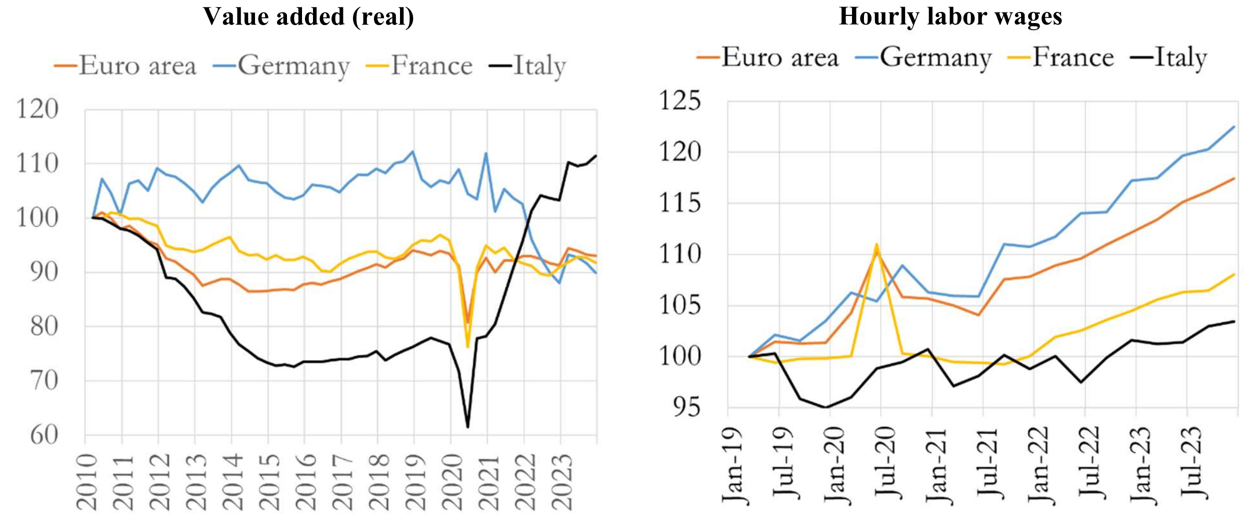
(quarterly indices for the shortages; monthly indices for the PMI delivery times)



Source: European Commission and S&P Markit. *Notes:* the left panel reports the percentage of firms in the manufacturing sector indicating the shortage of materials as a key element contributing to limit their own production. The right panel reports the re-scaled PMI delivery times – that associates lower values to longer waiting times – for which the typical central value of 50 is shifted to 0.

A second likely culprit was the depressed condition of the Italian construction sector during the years before the pandemic. Indeed, as the left panel of Figure 4 shows, the value added of the construction sector in 2019 was more than 20 percent below its level at the beginning of 2010, while it was just 4 percent below in France and almost 10 percent above in Germany. It is therefore reasonable to infer that the Italian construction sector was operating below capacity at the time the tax incentives for building renovation were introduced. Therefore constructions' firms could have adjusted their output quite rapidly to the increasing demand without, for example, facing significantly higher labor costs (Figure 4, right panel). Given that almost half of the Italian construction costs are formed by labor costs (Section 2.1), their milder dynamics is a key factor in explaining the lower growth of the CCI in Italy.[9]

Figure 4. Activity and wages in the euro area (construction sector)
(quarterly indices: 2010-Q1=100 for the value added; 2019-Q1=100 for hourly wages)



Source: Eurostat

3. The empirical model

We model the dynamics of the CCI, our dependent variable, as a function of the SB and some variables that, although not driven by factors specific to the Italian construction sector, could be arguably relevant. First, we include the amount of SB-eligible investments, the policy variable whose impact we are interested in.

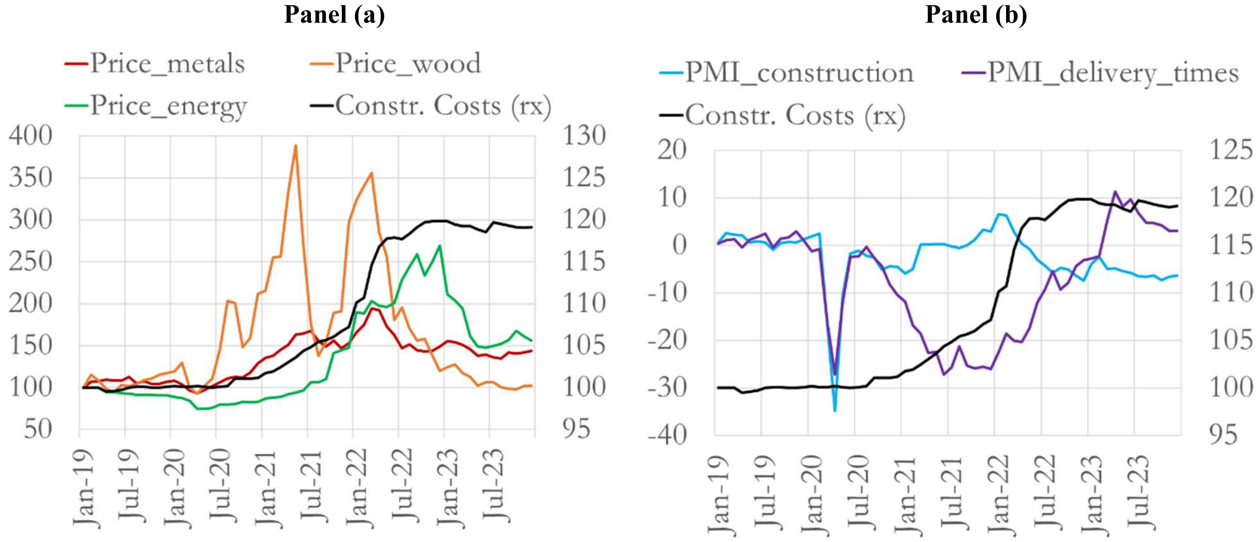
As controls, for the prices of raw materials we consider the price of wood (*Price_wood*) and of metals (*Price_metals*) at the euro area level; the former in particular started to fluctuate during the pandemic outbreak, reaching a first peak in mid-2021 and a second one in March 2022 after the Russian invasion of Ukraine (Figure 5.a). In addition, we include the PPI energy for Italy (*Price_energy*), which is an important input that reflects the large price fluctuations in electricity, gas and fuel prices observed in the post-pandemic period and

[9] The dynamics of the vacancy rate (in the construction sector) in the main euro area countries seems to be indeed in line with the evolution of labor costs. It is true that such a rate reached a very high level in Italy at the end of 2022 (almost 3.5 percent), but it is also the case that Germany and France recorded higher values at that time, namely 7.3 and 4.2 percent, respectively.

mainly driven by geopolitical developments. Given that the observed large swings occurred at a quite high frequency, the use of monthly data allows for a fairly precise identification of the pass-through of commodity prices to the CCI.

Figure 5. **The model's variables**

(monthly indices; 2019-Jan=100 for price indices)



Source: ECB, Eurostat and S&P Markit

As a proxy for supply shortages – which in fact particularly affected the construction sector – we use the PMI of the delivery times for Italy (*PMI_delivery_times*; see Section 2.2 and Figure 5.b); this index refers to the Italian manufacturing sector and not to the construction sector. Indeed, we use an Italian indicator for supply shortages because, as already mentioned, logistics, transportation and hence delivery times can also be driven by country-specific factors; however, we produce robustness exercises using also the PMI delivery times at the euro area level.

As a proxy for activity, we include the PMI of the euro area construction sector (*PMI_construction*) for two main reasons: (i) the Italian PMI is constructed using a limited sample of the firms operating in the construction sector; (ii) to avoid a variable that tracks too closely the activity of the Italian construction sector which could be overly influenced by the SB itself in the last part of the sample. Nevertheless, our results will prove to be robust to the inclusion of a counterfactual series of the Italian construction output (see Section 5), which arguably tracks only the sectoral activity not determined by the SB.

Note that our set of regressors does not include a proxy for the labor cost of the construction sector because – unlike the other independent variables – it is part of the CCI. Moreover, as shown in Section 2.2, Italian labor costs remained quite flat over the period under review, which would arguably add little explanatory power.

As econometric model, we follow an ARX framework, i.e., an autoregressive model with exogenous regressors. The estimated equation of this benchmark model is thus the following:

$$\Delta\ln CCI_t = c + \sum_{s=1}^{6} \alpha_s \Delta\ln CCI_{t-s} + \sum_{s=1}^{6} \beta_s X_{t-s} + \gamma \ln SB_{t-1} + \varepsilon_t,$$

where ln is the natural logarithm, Δ is the first-difference operator, $X = [\Delta\text{lnPrice\_metal} \quad \Delta\text{lnPrice\_wood} \quad \Delta\text{lnPrice\_energy} \quad \text{Pmi\_construction} \quad \text{Pmi\_delivery\_times}]$ and ε_t is the error term. Notice that all variables are in first-differences but the SB and the PMIs since they are already flows and do not need to be differenced.

We only use lagged variables (starting from the first lag, "t-1"), and not contemporaneous values ("t"), in order to have only predetermined variables and hence to reduce the risk of omitted variable bias, in a VAR fashion. The maximum lag of six months has been selected for two different reasons: (i) usually the pass-through from commodity prices needs up to two quarters to materialize and (ii) we performed some lag-selection procedure to minimize the bias-variance trade off. The estimation sample goes from January 2010 to December 2023. Both the number of the lags included in the estimation and the sample size have been subject to several robustness exercises.

4. Main Results

This section presents the results that highlight the role of SB in shaping the CCI dynamics. First, the coefficient associated with the SB (γ) is statistically significantly different from zero; its estimate is around 0.07 with an associated p-value below 1% (see column 1 of Table 1). In addition, the coefficients associated with commodity prices (such as energy, metals, and wood) are generally positive and significantly different from zero at several lags, with energy being the most important. Section 5 describes further results related to several modifications in the estimation setup (summarized by columns 2 to 8 of Table 1).

Table 1. The coefficient of the SB (γ) under different estimation specifications

benchmark	robustness on the independent variables					PPI construction as dep. variable	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
authorized works	completed works	recording lags	number of buildings	smoothed SB	"normal" construction output	authorized works	number of buildings
0.067***	0.062***	0.067***	0.075***	0.068***	0.068***	0.076***	0.091***

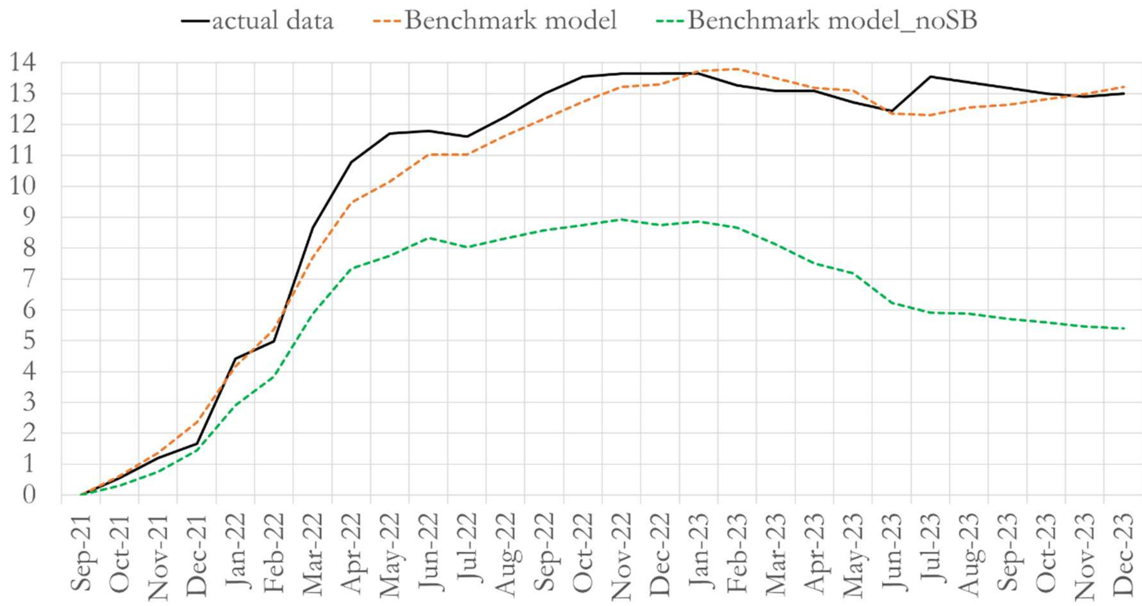
Source: authors' calculations. *Notes:* The estimation sample is 2010:Jan-2023:Dec, except in columns 7 and 8 for which it starts in 2012:Jan; *** stands for a p-value lower than, or equal to, 0.01.

In order to illustrate the magnitude of this effect, we construct (in-sample) conditional forecasts for the sample period since when SB data are available (Figure 6). We use the estimated coefficients (considering the full sample, 2010-2023) and condition upon actual observations for all the regressors when forecasting the CCI ahead from September 2021 to December 2023.

The CCI projection obtained from the benchmark model and conditioning on the observed SB (dashed orange line) fits quite well the dynamics of the actual CCI (black line). On the other hand, the model would have predicted a much smaller growth of the construction costs in absence of the SB, as shown by the dashed green line (obtained by setting the SB coefficient to zero). In particular, at the end of 2022, roughly 5 percentage points of the total growth in the CCI could be explained by the SB; at the end of 2023 this figure rises to about 7 p.p., which is roughly half of the overall increase in the CCI. The larger contribution of the SB may also depend on the gradually declining path of commodity and input prices from late 2022. Section 5 describes other projections obtained via a different econometric specification, confirming the role of the SB in shaping the CCI.

Figure 6. **The models' conditional forecast of Construction Costs**

(percent)



Source: authors' calculations. *Notes:* the graph shows the cumulated growth of construction costs since September 2021, using either actual data or several model's specifications.

5. Robustness checks and extensions

We here summarize further exercises in order to show that the results of our benchmark econometric specification are sufficiently robust. We also present a simple extension of the model in which the construction PPI is used as the dependent variable in place of the CCI. Finally, we evaluate the ability of our empirical framework to explain the pre-pandemic CCI dynamics and provide further evidence that the inclusion of the SB improves the fit when using the full sample.

As for the SB variable, we propose several variants for the model. First, column 2 of Table 1 reports the estimated coefficient associated to the SB policy variable when we proxy it with "completed" works rather than "approved" ones. Second, as already explained in Section 2.1, since there have been delays in recording the SB investments by ENEA, we lag our series by three periods, i.e., 90 days (column 3). Conversely, to capture even possibile anticipation effects, we forward the series by three months and the coefficient of interest remains pretty stable. Furthermore, to rule out the possibility that our result is at least partially driven by the impact of prices on the SB nominal amount (giving rise to a reverse causality problem), we use the number of buildings that benefited from the incentive renovations instead of the value of benefited investments (column 4).[10] Finally, given that the SB series is very volatile, we smooth it using a 3-months moving average (column 5).

We then check the robustness of our results to various controls. In particular, we replace the euro-area construction sector PMI with a variable that would have tracked the "normal" activity of the italian costruction sector, that is a proxy for the plausible dynamics of construction output that would have arguably occurred since 2020 in the absence of the SB (column 6).[11] As for the delivery times, we use the related PMI at the euro area level instead of the indicator for Italy as in the benchmark specification and the coefficient of interest remains similar.

We further estimate our equation including contemporaneous lags "t" of all the independent variables (instead of excluding them as in the benchmark specification); as described above, this specification could suffer from an omitted variable bias, however it gives us the sense of whether our results are robust to the occurrence of contemporaneous shocks.

Since the SB variable only varies towards the end of the sample we also check whether the sample length significantly affects our results, by changing the sample window: we changed, in turn, the starting point to January 2012, January 2014 and January 2016, instead of January 2010. The coefficient of interest remains statistically different from zero, with a value around that of the benchmark specification.

As a simple extension of the model, we perform some estimations using the costruction PPI as the dependent variable. As noted above, our model is not rich enough to capture its full dynamics, but this exercise can give us a sense of the likely pass-through of the SB to producer prices. The coefficient under scrutiny is only significant when our sample starts in 2012 (instead of 2010, as in the baseline specification; columns 7 and 8 of Table 1); this is probably due, among other things, to the fact that the PPI series is particularly volatile towards the end of 2011, which significantly hampers the precision of the regression estimates.

Finally, we produce alternative conditional projections for the CCI. In fact, we verify that the model without the SB variable is able to satisfactorily explain the dynamics of the construction costs when the SB did not exist, that is before the pandemic outbreak, suggesting that our approach is unlikely to omit relevant determinants of such costs, at least in normal times. Indeed, our ARX model (dashed gray line in Figure 7) – estimated using the sample from 2010 to 2019 – performs much better than a simple AR counterpart without exogenous regressors (dashed blue line). Furthermore, when we employ this ARX model with exogenous regressors to explain the recent CCI dynamics using the full sample (2010-2023), although the fit (dashed gray line in Figure 8) improves somewhat over the full sample projection obtained by setting the SB effect to zero (dashed green line), it still fails to fill the gap with the actual data (black line). These results further corroborate our conclusion about the importance of the SB in explaining the post-pandemic growth of the CCI.

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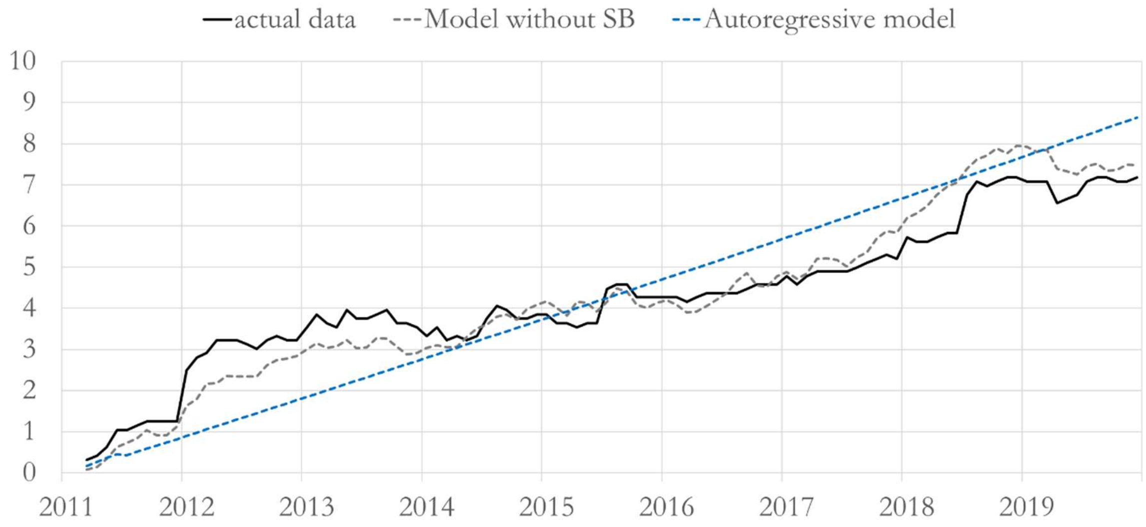
[10] As we did for the SB variable, we normalize the series of the number of buildings to 100 in September 2021, then we take the logs.

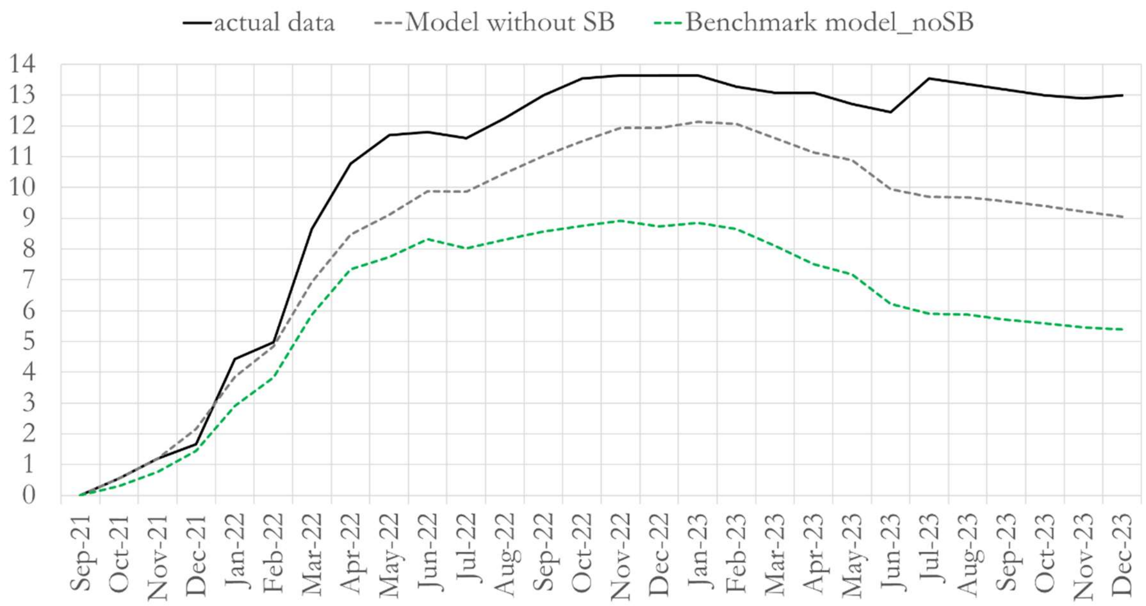
[11] Specifically, we calculate the average of the monthly growth rate for the output in the construction sector during the five years before the pandemic. We then project the construction activity series from January 2020 onwards using such a rate of growth.

Figure 7. **The models' conditional projection of Construction Costs in 'normal times'**
(percent)



Source: authors' calculations. *Notes:* the graph shows the cumulated growth of construction costs (from 2011 to 2019), using either actual data or several model's specifications.

Figure 8. **The models' conditional forecast of Construction Costs in 'SB times'**
(percent)



Source: authors' calculations. *Notes:* the graph shows the cumulated growth of construction costs since September 2021, using either actual data or several model's specifications.

6. Concluding remarks

The present work suggests a significant role of SB in explaining the growth of Italian construction costs in the post-pandemic period; more specifically, we document that such a large fiscal programme explains about half of the increase in these costs between September 2021 and December 2023. Our simple approach has the benefit of exploiting a straightforward channel for the impact of this specific policy measure on prices. Although there appears to be some evidence of the pass-through of the SB to the output prices in the construction sector, further analysis would be needed to obtain a more complete picture, for instance on the impact of the SB on house prices or on the GDP deflator: this is left for future research.

Our findings also have some implications for the distributional effects of the policy. The design of the incentive for building renovations, in the form of a very generous tax credit, clearly generated significant benefits for homeowners. In addition, as this policy appears to have raised the costs of construction inputs, firms in the upstream satellite activities of the construction sector may also have benefited. This element may be relevant in assessing the overall consequences of the SB and the design of possible future incentives for housing renovations. Regarding the normative perspective, De Blasio et al. (2024) investigate, among other things, on the desiderable design of fiscal incentives to cope with the green transition.

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