Synchronization vs. Transmission: The Effect of the German Slowdown on the Italian Business Cycle*

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This work studies the transmission of the business cycle across countries by analyzing the effects of the 2018 German slowdown on Italian activity. We apply a difference-in-differences strategy to expectations data from Banca d'Italia's Survey of Inflation and Growth Expectations (SIGE). Firms exporting to Germany had lower expectations for the Italian economy (sentiment) and for their own demand, investment, and employment (assessment) than firms exporting to other countries or not exporting at all. We quantify the response of key Italian macroeconomic aggregates to worsening sentiment and assessment of Italian firms using a forecasting model. A significant contemporaneous impact on Italian GDP highlights the role of the expectations of firms exposed to foreign markets in transmitting foreign business cycle.

JEL Codes: E2, E32, F15, F44, L6.

1. Introduction

The existence of business cycle synchronization, especially in a currency union, is extensively discussed in the economic literature. Despite the clear evidence that business cycle synchronization plays an essential role in the European economy, the relative degree of this

*I am indebted to Federico Cingano, Simone Emiliozzi, Marco Flaccadoro, Elisa Guglielminetti, Alberto Locarno, Claudia Pacella, Concetta Rondinelli, Stefano Siviero, Martin Uribe, Stefania Villa, Giordano Zevi, Roberta Zizza, Francesco Zollino, and five anonymous referees for their valuable comments. An earlier version of this paper circulated under the title "Business Cycle Synchronization or Business Cycle Transmission? The Effect of the German Slowdown on the Italian Economy." The views expressed do not necessarily reflect those of the Banca d'Italia. Author e-mail: alessandro.mistretta@bancaditalia.it.

varies over time. According to recent literature, there is no clear consensus about the degree of synchronization in the most recent period, especially after the double-dip recession: de Lucas Santos and Delgado Rodríguez (2016) and Gomez et al. (2017) report an increase in business cycle co-movement, while other authors show evidence of business cycle divergence (see, among others, Ferroni and Klaus 2015; Grigoraş and Stanciu 2016; Beck 2021). In particular, Beck (2021) suggests that the declining share of manufacturing in the European Union (EU) explains the increased divergence. However, there is no consensus on the determinants of business cycle co-movement that distinguish between the possibility of a common (namely determined by a common economic shock) and a transmitted business cycle (Garnier 2004; di Giovanni, Levchenko, and Mejean 2018).

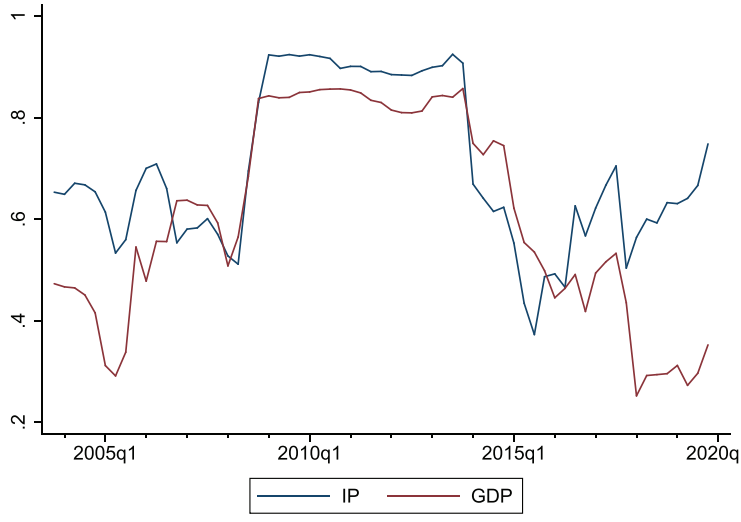
In this paper, given Germany's economic importance for the whole euro-area economy, we study the relationship between the German and Italian business cycles.

The relationship between the German business cycle and the Italian economic performance is likely to be significant, as the two countries are closely interconnected through trade. Germany and Italy have open economies, with exports representing a significant portion of their gross domestic product (GDP). In 2019, Germany was the EU's top exporter and Italy was the third, with exports accounting for 45 and 32 percent of their respective GDPs. Germany is the top sales market for Italian firms, accounting for 13 percent of Italian goods exports in 2019. Additionally, 17 percent of Italy's imported goods come from Germany.[1] These close ties are due to both countries being part of the euro area and having significant manufacturing sectors, which account for 23 and 17 percent of their respective GDPs.

The contemporaneous correlations between the key economic activity indicators (GDP and industrial production) of these economies were exceptionally high during the double-dip recession. The correlation for industrial production (IP) has remained relatively high. On the contrary, the correlation for GDP declined since 2014 and, after reaching a historical minimum in 2018:Q1,

[1]The share of goods originating in Germany is double those originating in France, which is Italy's second biggest trading partner.

Figure 1. Correlation between Italian and German Economic Indicators



Note: Rolling correlation (five year) on *q-o-q* growth rates; Eurostat data.

returned to growth, reaching a peak during the COVID-19 recession (Figure 1). On the whole, the German and Italian business cycles are closely synchronized.

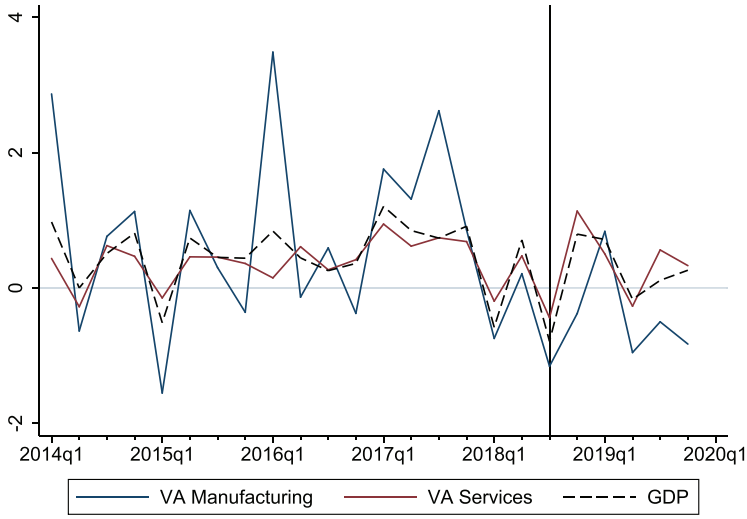
In this paper, starting from an important economic shock that hit the German economy in 2018, we analyze whether this negative shock affected the Italian economy.

The German economic cycle started slowing down in 2018:Q1; the weakening was particularly marked from 2018:Q3 in the manufacturing sector: the growth rate of manufacturing value-added has been subdued since then, while services have proved to be more resilient (Figure 2).

This slowdown has been caused by some country-specific shocks rather than common euro-area shocks. Differently from before, the German IP dynamic has been significantly worse since 2018, with respect to those recorded in Italy and the other euro-area countries (Figure 3).

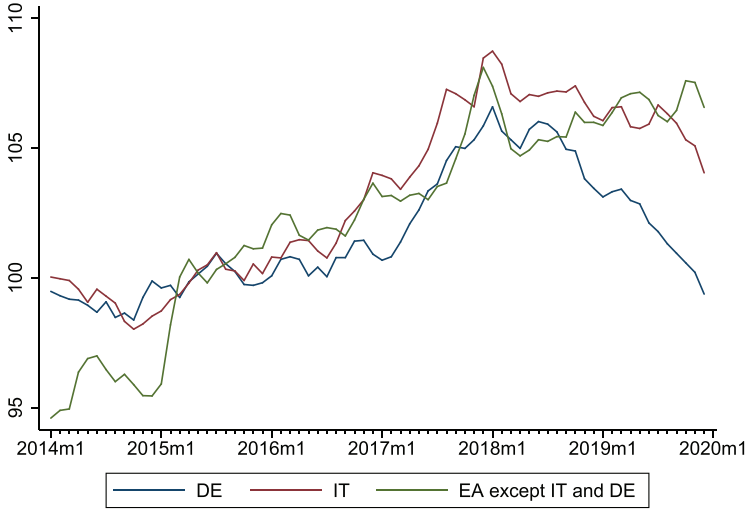
Several temporary factors have hampered German growth since the beginning of 2018, such as the high levels of sick leave due

Figure 2. Germany, Main Economic Indicators



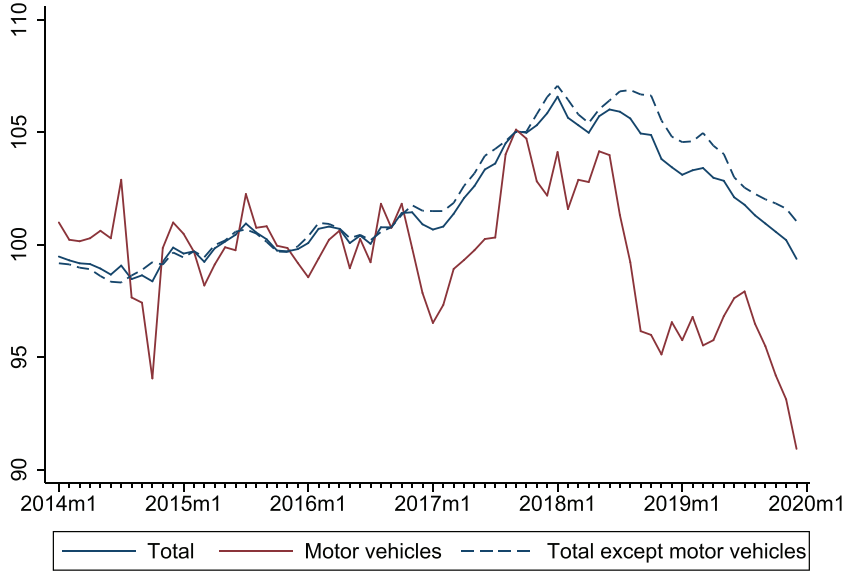
Note: q-o-q growth rates on Eurostat data.

Figure 3. Industrial Production, Main Euro-Area Economies



Note: MA(3), Indices 2015=100; Eurostat data.

Figure 4. German Industrial Production



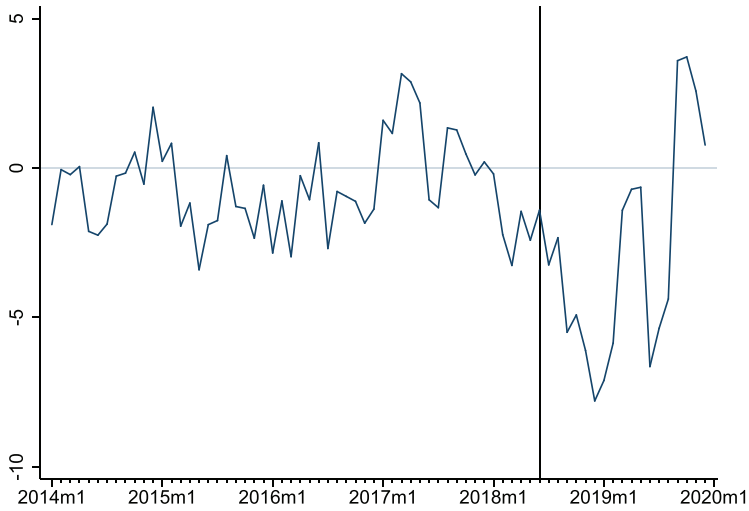
Note: MA(3), Indices 2015=100; Eurostat data.

to the unusually virulent influenza, the cold winter weather conditions, and industrial strikes; additionally, there was already growing evidence that the automotive sector may have reached its peak (Camba-Méndez and Forsells 2018).

During 2018, German growth was curbed by bottlenecks in the automotive sector: due to difficulties in the introduction of a new emissions testing procedure (the Worldwide Harmonised Light Vehicle Test Procedure, or WLTP), the production of motor vehicles fell sharply (see Figure 4); delays in obtaining certificates of compliance with these new standards led German manufacturers to suspend the production of many car models,[2] causing severe disruption to both delivery and sales (European Commission 2019).

[2]Some producers even waited to request WLTP approval for selected models at the end of their life cycle, thus effectively ceasing production until new models were introduced.

Figure 5. Economic Shocks in German Industry



Note: Difference between expected and effective production levels; deviation from historical mean. Business and consumer surveys—European Commission.

As a result, the decline in industrial production was not confined to the automotive sector but widespread across manufacturing and more persistent than previously expected.[3]

Finally, the difference between the actual and expected production levels became significant compared with the historical mean;[4] this suggests that the economic slowdown in industrial activity was unexpected (Figure 5).

Considering the nature of the German slowdown, which was exogenous to the Italian economy until 2020:Q1, in this paper we analyze whether there was a transmission of the economic shock to the Italian economy.

[3]According to the European Commission (2019), German GDP in 2018 would have been 0.6 percent higher without such a fall in the automotive sector. According to the national accounts, between 2014–17, manufacturing contributed, on average, to total German growth by about 0.8 percent per year; this contribution became modest in 2018 (0.2 percent) and negative in 2019 (–0.8 percent).

[4]The unexpected assessment error was more than twice its historical standard deviation.

We apply a difference-in-differences (diff-in-diff) strategy to expectations data from Banca d'Italia's Survey of Inflation and Growth Expectations (SIGE) to investigate if and how the slowdown in Germany is hitting the Italian economy. We focus on the "direct effect"—namely, the effect on the activity of firms exporting to the German market—as this approach does not enable us to identify "indirect effects" that may transit through other channels, such as global value chains or domestic demand. Therefore, this evaluation probably underestimates the effect of the decline in German manufacturing on the Italian economy.

Although many works have exploited this data set to study different issues relating to inflation expectations (see, among others, Bartiloro, Bottone, and Rosolia 2019; Coibion, Gorodnichenko, and Ropele 2020; Conflitti and Zizza 2021), to the best of our knowledge, only one paper uses this data set to analyze issues relating to the business cycle (Cesaroni and Iezzi 2017).

In 2019, the sentiment indicators were worse for Italian companies exposed to the German market. Expectations for demand and plans for investment and employment were significantly worse for these firms. The effects on investment and employment were also observed, but with a delay compared with the effects on demand. Additionally, the disagreement about the economic forecast increased for exporters to Germany, representing the main contribution to the increase in total uncertainty. After discussing how well the SIGE series mimics the national economic aggregate, we quantify the effect of the German slowdown on Italian GDP using a forecasting model. According to the estimates, the effect on GDP was about 1 percentage point, mainly concentrated in 2019; the negative effect is equal to 2.5 percentage points on firms' investment; conversely, we do not find any effect on employment.

This work's contributions are twofold: firstly, we address the macroeconomic issue using a microeconometric approach (and policy evaluation techniques in particular) to survey microdata; and secondly, we investigate the relationship between the German and the Italian business cycles from the standpoint of transmission rather than of "simple" synchronization.

The rest of the paper is structured as follows. Section 2 reviews the literature, and Section 3 describes the data set used. Section 4 proposes a microeconometric exercise to estimate the effect of

the German slowdown on Italian firms' economic activity, while Section 5 quantifies this effect from a macroeconomic point of view. Finally, Section 6 concludes.

2. Literature

Since Dellas (1986), a common business cycle across countries has been extensively studied from both a theoretical and an empirical point of view. Dellas (1986) proposed a model that predicts a positive and persistent co-movement in trade and gross national products (GNPs) across countries; he showed empirically that the primary source of this positive covariance is the existence of common shocks rather than trade interdependence. Canova and Dellas (1993) confirmed this view by finding a positive (moderate) effect of trade interdependence on the common business cycle, though it is not statistically significant.

The determinants of business cycle co-movements between countries were investigated by Baxter and Kouparitsas (2005), who found controversial results. Using a large data set with more than 100 countries, they showed empirically that (i) the correlation between business cycles is increasing in trade relationships; (ii) the industrial structure does not affect the business cycle's synchronization; and (iii) the existence of a currency union does not have a significant impact on the correlated business cycle.

The importance of a currency union for business cycle synchronization has been analyzed extensively since the late 1990s. Frankel and Rose (1998) studied the effects of a common currency area on the business cycle in their seminal paper. They argued that these effects are ambiguous: (i) on the supply side, by reducing trade barriers, a common currency union can lead to more industry specialization by a country and then to more asynchronous business cycles resulting from industry-specific shocks; and (ii) on the other hand, increased integration may result in more highly correlated business cycles because of demand shocks or intra-industry trade. However, this ambiguity was more theoretical than empirical since they found empirically that greater integration involves a more highly integrated cycle.

Many papers have analyzed the impact of adopting the euro on business cycle synchronization. Gonçalves, Rodrigues, and Soares

(2009) found that the euro increased the correlation among the economic cycles of euro-area members. Other studies have classified countries by their importance to the euro-area business cycle, distinguishing between *core* and *peripheral* countries (e.g., Ahlborn and Wortmann 2018). Enders, Jung, and Müller (2013) found that domestic shocks generate more significant cross-country spillovers under the European Monetary Union (EMU) than before the EMU was created. Campos, Fidrmuc, and Korhonen (2019) found that the correlation between business cycles across European countries has significantly increased since the introduction of the euro in 1999 (from an average of 0.4 to 0.6), confirming the view previously expressed by Frankel and Rose (1997). However, the business cycle correlation is lower than in the United States due to the existence of European national borders (Clark and van Wincoop 2001). Despite increased synchronization after the euro's adoption, recent papers have shown evidence of business cycle divergence in the EU, particularly after the double-dip recession (e.g., Ferroni and Klaus 2015; Grigoraş and Stanciu 2016; Beck 2021).

To summarize, the empirical literature explains the existence of business cycle synchronization because of (i) the presence of common shocks that hit different economies at the same time (Dellas 1986; Canova and Dellas 1993; Imbs 2004); and (ii) the possibility that shocks are transmitted through trade and multinational linkages (Frankel and Rose 1998; Eickmeier 2007; Burstein, Kurz, and Tesar 2008; Kleinert, Martin, and Toubal 2015; di Giovanni, Levchenko, and Mejean 2018).

From the theoretical point of view, the interconnection of the business cycle in a two-country model is extensively studied. A significant strand of literature explains the channels for and the persistence of business cycle synchronization (see, among others, Chiarella, Flasher, and Hung 2006). In this vein of literature, the model proposed by Charpe et al. (2016) is particularly relevant to the present work, in which the role of business confidence is exploited as an independent transmission channel for the business cycle in a two-country model. In particular, the state of confidence, which depends on the current state of the business cycle in the countries considered, would play a reinforcing effect through the expected profit and aggregate investment.

Due to the importance of the interconnection within the euro area in line with the transmission view, this paper investigates how the German business cycle affects the Italian one. As stated previously, we study the effects on the Italian economy of some country-specific shocks that occurred in Germany; this is particularly suited to investigating whether a negative German economic shock is transmitted to the Italian business cycle.

3. Data

In this paper, we use the Survey of Inflation and Growth Expectations (henceforth SIGE) carried out quarterly by Banca d'Italia, on a sample of about 1,000 industrial and service firms with more than 50 employees.[5] The survey collects, among other things, data regarding firms' expectations for consumer price inflation, developments in their own selling prices, and views on the broad macroeconomic outlook, as well on their own business.[6]

Questions regarding economic activity included in the SIGE can be broadly classified into two different groups: those aimed at assessing a firm's sentiment, both on the general economic situation and its own economic situation (henceforth *sentiment indicators*); and those that elicit firms' projections/assessments about their own decisions such as investment or employment plans or their economic total or external demand (henceforth *assessment indicators*).

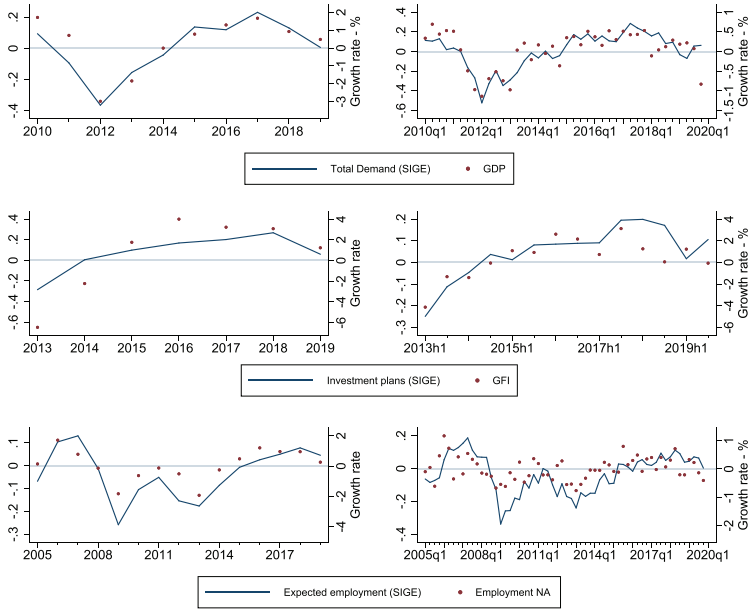
In this paper, we measure the impact of the German economy's slowdown on the following SIGE indicators:

- The *sentiment indicators* include firms' sentiment on the general Italian economic situation; opinions on the current conditions for investing; the probability of observing an

[5]The survey has been conducted since 1999; from 2019:Q4, the sample has been extended to 1,200 firms. The sample represents about 4 percent of the entire reference population (about 5 percent from 2019:Q4); however, the results refer to the reference population thanks to sampling weights (Banca d'Italia 2019).

[6]Like the typical diffusion indices, the question allows you to choose between three options that indicate an improvement, a worsening, or a stabilization in a specific aspect of a firm's activity. To derive a macroeconomic message, these responses are aggregated using the balances between the share of those companies that indicate an improvement and those that signal a worsening.

Figure 6. SIGE Balances and Corresponding Aggregates in the National Accounts



Note: Banca d'Italia SIGE and Istat National Accounts.

improvement in the Italian economy in the following three months; and sentiment indicators about companies' own expected business conditions in the following three months and over a three-year horizon;

- The *assessment indicators* include opinions on firms' current and expected demand for their products (both total and external); investment plans at different time horizons; and the number of employees in the next three months.

The information in the SIGE is very helpful for analyzing the business cycle, as it tracks the corresponding aggregates from the national accounts quite reliably (similar results hold for other business surveys; see, among others, Bachmann and Zorn 2020).

Figure 6 illustrates the close alignment between the SIGE's balances (blue lines) and national account aggregates (red dots). The

Table 1. Regressions

	(1) ΔGDP	(2) ΔIFL	(3) ΔEMPL
		y-o-y	
SIGE	7.924*** (0.00)	19.67*** (0.00)	8.498*** (0.00)
N	10	7	15
r2	0.835	0.909	0.831
	q-o-q	***hy-o-hy***	***q-o-q***
SIGE	2.650*** (0.00)	12.32*** (0.00)	1.906*** (0.00)
N	40	14	60
r2	0.713	0.624	0.300

Note: p-values in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

SIGE's total demand dynamic corresponds closely to GDP growth. Additionally, the SIGE's investment plans align well with the gross fixed investment (GFI) growth rate and the question on employment with employment growth.[7]

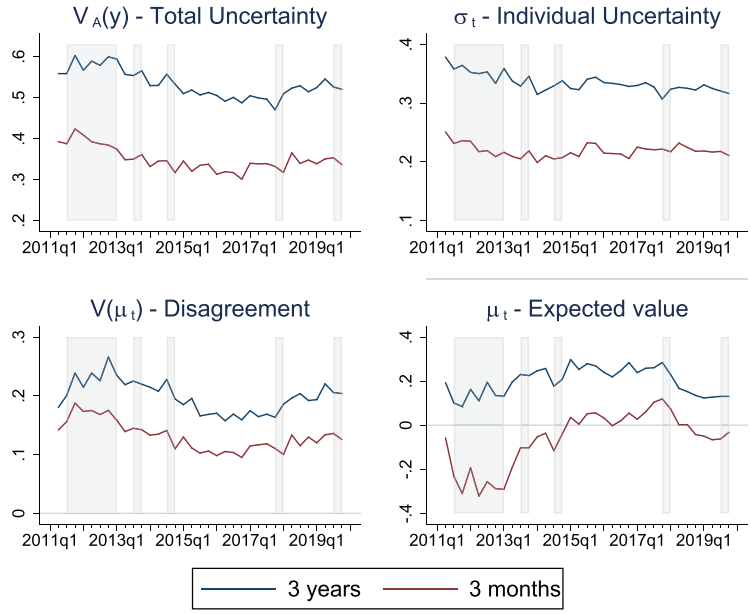
These graphical findings are corroborated by simple regression models where the national account series are regressed on the corresponding SIGE balances. As shown in Table 1, the SIGE balances seem to account for more than 80 percent of the variation in the response variable; this percentage appears to be higher when yearly data are considered (row 1).

Furthermore, we examine the impact on Italian firms' uncertainty by utilizing a simplified version of the measures proposed by Giordani and Soderlind (2003). These include individual uncertainty ($E(\sigma_i^2)$), aggregate uncertainty (V_A), and disagreement among firms' expectations ($V(\mu_{it})$).[8] Following a large body of literature

[7]In this work, employment growth is based on the number of *employees (domestic concept)* released by Eurostat.

[8]For more information, refer to Appendix A.

Figure 7. Uncertainty Measures



Note: Our calculations based on Banca d'Italia's SIGE survey.

that has investigated the effect of uncertainty on firms' activity, finding that (i) there is a negative relationship between demand uncertainty and firms' decisions (see, among others, Guiso and Parigi 1999; Bloom 2009) and that (ii) uncertainty itself rises sharply during recessions (Bloom et al. 2018), we investigate whether demand uncertainty could be an important channel to explain business decisions (such as investment end employment) for exporters to Germany.

According to our estimates, firms seem to have more optimistic expectations about their economic conditions in the medium run (three years) compared with the short run (three months); however, higher expectations are associated with higher uncertainty (see Figure 7). Disagreement is higher during recession periods, and this is the primary source of uncertainty at aggregate level, confirming the main findings of Giordani and Soderlind (2003).

The SIGE contains some additional structural information, such as a firm's export propensity, which is used to classify firms into four different classes.

3.1 Firms' Exposure to the German Market

The SIGE questionnaire (Appendix D) occasionally includes specific questions to address important issues from a policy perspective when the survey is conducted. In 2019:Q1 and 2019:Q3–2020:Q1, the survey included the following questions aimed at gauging firms' expectations on current and future external demand from Germany:

Comparedwith three months ago, is the foreign demand for your products . . . ?	*Higher*	*Unchanged*	*Lower*	*I do not export to this market*
In Germany	☐	☐	☐	☐
How will the foreign demand for your products vary **in the next three months?**	*Increase*	*No change*	*Decrease*	*I do not export to this market*
In Germany	☐	☐	☐	☐

Using these replies, firms are divided into three groups: exporters to Germany,[9] exporters to other markets, and non-exporters.[10] This division is key to implementing the empirical strategy.

Due to the data set's lack of information, we assume that exporters to Germany both in 2019:Q1 and in 2019:Q3 have been exporting to that country since 2014:Q1. This assumption is justified because decisions concerning destination markets are strategic, as entering a new market entails non-negligible initial costs.[11]

[9]Firms that declare that they export to Germany in at least two of three of the quarters in which they were interviewed are classified as exporters to Germany. Conversely, we exclude from our analysis firms that rarely declared that they export to Germany.

[10]The questionnaire includes a specific question to distinguish between exporters and non-exporters (see question A.2 in Appendix D).

[11]Indeed, according to official statistics (Istat and ICE 2019), the number of firms exporting to Germany remained roughly stable during the period considered: there were 25,024 in 2014 and 24,408 in 2018.

In our sample, about 49 percent of firms only sell in the domestic market; about 70 percent of the remaining firms export to Germany.

Additionally, in 2019:Q4, we asked for information about the propensity to export to the German market.

	Zero	*Up to 1/3 but more than zero*	*Between 1/3 and 2/3*	*Over 2/3 of export*
Considering your firm's total exports in 2019, please indicate the share of exports to the German market.	☐	☐	☐	☐

This information is crucial since it allows a proxy to be computed for the degree of the *German shock* that hits a specific firm according to its exposure to the German market.

We define the exposure as

$$Exposure_{it} = PropensityExport_{it} * ProportionExportGermany_{i}. \quad (1)$$

This represents the share of total sales from exports to the German market. Due to data limitations, we cannot obtain a continuous variable.[12] Additionally, we assume that the proportion of exports to the German market remains in the same range during the whole period.[13]

Using this strategy, we can define $Exposure_{it}$ for about 5,000 observations throughout the period (see Table 2). Those who export to Germany sell about 10 percent of their total sales in Germany on average; less than 1 percent of the observations are related to firms that export more than 60 percent of their sales to Germany (see Figure 8).

[12] For export propensity and proportion of exports to the German market, firms indicate a range instead of a precise number. To compute $Exposure_{it}$, we use the median value within the provided range.

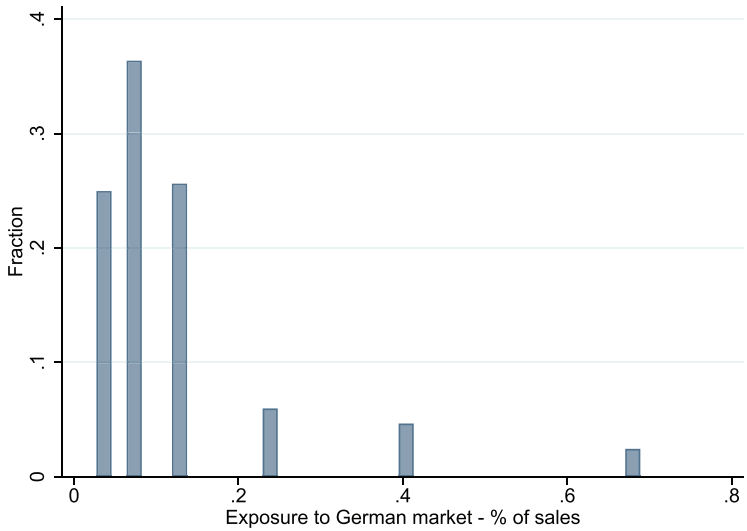
[13] We know that this assumption, namely a constant share of exports to Germany in a specific range during the time considered, is stronger than those about the decision to export to the German market. However, this is the best information we have, and we only use it in a robust exercise.

Table 2. Classification According to the Exposure to the German Market

Share of Exports to Germany Compared with Total Exports	Median	Share of Sales Exported				Total
		0	0–1/3	1/3–2/3	2/3–1	
		0	.165	.495	.83	
0	0	8,391	986	385	355	10,117
0–1/3	.165	0	1,222	1,692	1,271	4,185
1/3–2/3	.495	0	98	299	186	583
2/3–1	.83	0	2	47	122	171
Not Classified		0	445	403	377	1,225
Total		8,391	2,753	2,826	2,311	16,281

Note: Banca d'Italia SIGE.

Figure 8. Exposure to the German Market



Note: In this graph, firms with zero exposure to the German market are not considered. Banca d'Italia SIGE.

In the empirical analysis, we consider the period between 2014:Q1 and 2019:Q4[14] and exclude firms in the construction sector whose questionnaire does not include questions relating to the German market; non-respondents to those questions belonging to the remaining sectors were dropped.

Additionally, we excluded export-oriented firms that exited the sample before 2019:Q1, since we cannot identify those selling to the German market. At the same time, we keep the firms that are no longer in the sample but declared that they only sell to the domestic market, since they can be univocally classified as part of the control group.

These criteria exclude about 5 percent of the firms from the sample in recent waves (30 percent at the beginning of the sample period; see Table 3). We end up with a sample of about 16,300 observations.

4. The Effect of the German Slowdown: A Microeconometric Approach

4.1 Empirical Strategy

We use a diff-in-diff strategy to analyze the causal link between the German economic slowdown and Italian firms' sentiment and economic behavior.

Following the literature on diff-in-diff estimators (see, among others, Angrist and Pischke 2009; Imbens and Wooldridge 2009), we define the German slowdown as the *treatment*, which can be interpreted as an external shock to exporters to that market. Exporters to Germany thus comprise the treated group (henceforth *treated*), while the control group includes the rest of the sample (non-exporters and exporters to markets different from Germany; henceforth *control*).

As mentioned in the previous section, firms selling to Germany in 2019:Q1 and 2019:Q3 are assumed to have been exporting to that country throughout the whole sample period. According to this definition, the sample is classified as shown in Table 3. The treatment period is set to begin in 2018:Q3, the first quarter after the

[14]Since we observed exports to Germany in 2019 alone, using previous data might be less reasonable. Additionally, we decided to exclude data from 2020:Q1, since the common economic shock of COVID-19 could affect the results.

Table 3. Sample Composition

Quarters	Control		Treated	Not Classified	Total
	Non-exporter	Exporter to Other Countries	Exporter to Germany		
2014:Q1	363	33	193	240	829
2014:Q2	336	35	213	234	818
2014:Q3	327	43	207	226	803
2014:Q4	338	36	204	218	796
2015:Q1	349	43	215	218	825
2015:Q2	348	44	213	199	804
2015:Q3	314	44	223	205	786
2015:Q4	319	35	224	198	776
2016:Q1	331	41	227	192	791
2016:Q2	348	36	225	194	803
2016:Q3	344	43	249	191	827
2016:Q4	340	47	247	176	810
2017:Q1	328	46	252	162	788
2017:Q2	332	52	259	159	802
2017:Q3	348	62	277	134	821
2017:Q4	354	65	294	108	821
2018:Q1	375	80	320	126	901
2018:Q2	345	80	322	104	851
2018:Q3	366	78	326	89	859
2018:Q4	339	77	310	95	821
2019:Q1	365	84	351	42	842
2019:Q2	360	88	331	67	846
2019:Q3	377	92	352	45	866
2019:Q4	445	132	440	50	1,067
Total	8,391	1,416	6,474	3,672	19,953

Note: In this table, the observations used are classified according to their exposure to the external market. The construction sector is excluded from this paper. Banca d'Italia SIGE.

growth of German manufacturing value-added turned negative.[15] We know that different economic aggregates may have a different delay in responding to a similar shock. However, to avoid an arbitrary treatment period for the evaluated series, we chose to initiate

[15] As discussed in Section 1, since the beginning of 2018, some temporary factors have hampered the German economy; however, only after 2018:Q2 did the slowdown in manufacturing become evident and persistent.

the treatment period in the first quarter in which German manufacturing displayed consecutive negative quarter-on-quarter (q-o-q) fluctuations.

The estimated equation is the following:

$$y_{it} = \beta GER_i Treat_{t>2018Q2} + \alpha_1 GER_i + \alpha_2 Treat_{t>2018Q2} + \varphi_t + q_t + \varphi_i + \epsilon_{it}. \quad (2)$$

In this equation, y_{it} represents the outcome variable that may be affected by the German slowdown, GER_i is a dummy variable identifying the *treated* group (those who export to Germany), $Treat_{t>2018Q2}$ is the post-treatment dummy equal to one during the period of the German slowdown (from 2018:Q3 to 2019:Q4), and φ_i are (vectors of) fixed effects that may vary across specifications.

Since we are using quarterly data, seasonality must be taken into account. For this reason, we control for at least four seasonal dummies (q_t) in each regression.[16] Finally, to control for different cycles at the industry/area level, we interact time dummies with the area/industry ones.

The parameter of interest is β, representing the causal effect of the German slowdown shock on the different outcomes considered. This parameter assumes a particular relevance for the *assessment indicators* since they can be used as proxies for the national account aggregates.

This parameter represents the average causal effect over the period 2018:Q3–2020:Q1. However, depending on the length of exposure to the *treatment* (i.e., the German slowdown), the causal effect may change over time. For this reason, using a dynamic treatment effects model (Callaway and Sant'Anna 2021; Goodman-Bacon 2021), we explore time-varying diff-in-diff effects for a group of variables,[17] in which we estimate the dynamic effects of the treatment for each semester (Jacobson, LaLonde, and Sullivan 1993). The estimated equation changes as follows:

[16] Alternatively, 24 different dummies are used (φ_t, one for each quarter), which bundle trend and seasonal effects together.

[17] Notably total demand, investment plans, and the number of employees.

$$y_{it} = \beta GER_i Treat_{t>2018Q2} + \sum_{h=2018H2}^{2020H1} \beta_h \mathbb{1}_h GER_i + \alpha_1 GER_i + \alpha_2 Treat_{t>2018Q2} + \mu_t + q_t + \mu_i + \epsilon_{it}, \quad (3)$$

where the causal effect for a given semester h is equal to $\beta + \beta_h$.[18]

Finally, in a robustness exercise, we use the heterogeneity in treatment intensity, namely the exposure to the German market. Using the dose-response function (DRF) approach proposed by Cerulli (2015) based on Hirano, Imbens, and Ridder (2003), we can check whether the firms more exposed to German demand are those that recorded the worse effect.

4.2 Results

For the sake of robustness, we estimate several specifications for each variable of interest, differing as regards time and firm fixed effects. In column 1 (Table 4), we only control for seasonal effects using quarterly dummies, while in the second specification (column 2), we control for the sectors (at the two-digit NACE Rev. 2 level), geographical area (Northwest, Northeast, Center, South), and firm size ("50–200 employees," "200–1,000 employees," and "more than 1,000 employees"); this specification also includes a set of time dummies. In the third specification (column 3), in addition to firm size and geographical area, we control for sector-specific cycles, using ad hoc time-trend-seasonal dummies, while in column 4, we control for different time effects at the geographical level in addition to industry and size fixed effects. In the last two specifications, we use firm fixed effects, only considering quarterly seasonal effects (column 5) or both sector- and area-specific trends (column 6).

In all regressions, standard errors are clustered at the firm level, and the sample weights provided in the data set are used to obtain results referring to the underlying population as a whole. Econometric estimates are supplemented with graphical representations, with a twofold goal: first, to give an intuitive representation of the

[18]Data on 2020:H1 constitute the projection collected for some variables in 2019:Q4, before the COVID-19 disruption.

Table 4. Diff-in-Diff Exercise

	(1)	(2)	(3)	(4)	(5)	(6)
Sentiment Indicators						
SITGEN	–0.123***	–0.131***	–0.175***	–0.118***	–0.112***	–0.174***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
PROMIG	–1.842*	–2.270**	–3.793***	–2.017*	–1.767*	–3.603***
	(0.08)	(0.03)	(0.01)	(0.06)	(0.06)	(0.01)
SITINV	–0.148***	–0.163***	–0.198***	–0.154***	–0.146***	–0.190***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SITIMP5	–0.0916***	–0.0920***	–0.0938**	–0.0814***	–0.0659**	–0.0703*
	(0.00)	(0.00)	(0.01)	(0.01)	(0.03)	(0.06)
SIMP36M	–0.0657	–0.0645	–0.137**	–0.0595	–0.0445	–0.0955**
	(0.14)	(0.15)	(0.01)	(0.19)	(0.28)	(0.04)
Assessment Indicators						
DOMTOT	–0.314***	–0.301***	–0.282***	–0.292***	–0.314***	–0.239***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
PRETOT	–0.193**	–0.200***	–0.214***	–0.194***	–0.144*	–0.189***
	(0.02)	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)
DOMEST	–0.133***	–0.125**	–0.110*	–0.116**	–0.135***	–0.123**
	(0.01)	(0.01)	(0.06)	(0.02)	(0.01)	(0.03)
PREEST	–0.126	–0.0709	–0.0440	–0.0726	–0.100	–0.0719
	(0.14)	(0.30)	(0.51)	(0.28)	(0.18)	(0.21)
INVPRE	–0.150***	–0.180***	–0.166**	–0.166***	–0.118**	–0.113*
	(0.00)	(0.00)	(0.01)	(0.00)	(0.03)	(0.10)
INVSEM	–0.194***	–0.217***	–0.160***	–0.204***	–0.178***	–0.140**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)
OCCTOT	–0.0805***	–0.0899***	–0.0805**	–0.0901***	–0.0592**	–0.0486
	(0.00)	(0.00)	(0.02)	(0.00)	(0.05)	(0.21)
Uncertainty Measures: Three Months Ahead						
V_A	–0.00489	–0.00649	–0.0133	–0.00951	–0.00381	–0.00755
	(0.75)	(0.68)	(0.49)	(0.56)	(0.81)	(0.70)
$E(\sigma_i^2)$	–0.00980	–0.0159	–0.0191	–0.0169	–0.00604	–0.00880
	(0.34)	(0.13)	(0.18)	(0.11)	(0.51)	(0.47)
$V(\mu_{it})$	0.00491	0.00941	0.00580	0.00744	0.00224	0.00125
	(0.71)	(0.49)	(0.73)	(0.59)	(0.87)	(0.94)
μ_{it}	–0.0537***	–0.0559***	–0.0677***	–0.0507**	–0.0350*	–0.0499**
	(0.01)	(0.00)	(0.00)	(0.01)	(0.08)	(0.03)

(*continued*)

Table 4. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Uncertainty Measures: Three Years Ahead						
V_A	0.0232	0.0265	0.0342*	0.0224	0.0295*	0.0419**
	(0.16)	(0.12)	(0.07)	(0.19)	(0.07)	(0.02)
$E(\sigma_i^2)$	–0.0213*	–0.0269**	–0.0331**	–0.0303**	–0.0176*	–0.0181
	(0.06)	(0.02)	(0.03)	(0.01)	(0.08)	(0.12)
$V(\mu_{it})$	0.0445***	0.0533***	0.0673***	0.0527***	0.0471***	0.0601***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
μ_{it}	–0.0419	–0.0364	–0.0921***	–0.0332	–0.0336	–0.0712***
	(0.11)	(0.17)	(0.00)	(0.22)	(0.18)	(0.01)
FE						
Quarter	X				X	
Time		X				
Time × Industry			X			X
Time × Area				X		X
Firm					X	X
Industry		X		X		
Area		X	X			
Size		X	X	X		
N	15,891	14,517	14,322	14,517	15,507	13,948

Note: p-values in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$. Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

impact, and second, to show that the common trend assumption is fulfilled.[19]

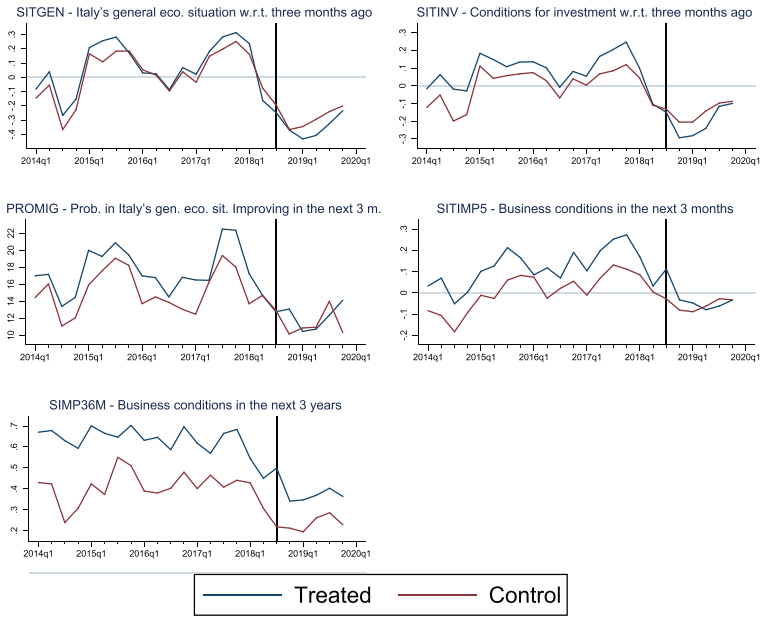
The results show that the German slowdown adversely affected Italian firms' sentiment and economic choices. The worsening is considerable for firms that export to Germany. The effects are, in most cases, statistically and economically significant. The results are shown in Table 4, where each parameter is estimated in a different diff-in-diff regression. (Table 5 provides more details on the variables used in the diff-in-diff exercise.)

[19]The graphs represent the averages for the seasonally adjusted variables belonging to the three groups. These variables usually have a range of responses between −1 and 1, where zero represents a neutral response. For some questions, to guarantee the possibility of distinguishing both the direction and the magnitude of the variation, the range is set between −2 and 2.

Table 5. Variables Used in the Diff-in-Diff Exercise

Acronyms		Question
		Sentiment Indicators
SITGEN	B2	Compared with three months ago, do you think Italy's general economic situation is . . . ?
PROMIG	B3	What do you think the probability is of Italy's general economic situation improving in the next three months?
SITINV	C7	Compared with three months ago, do you think conditions for investment are . . . ?
SITIMP5	C1	What do you think business conditions for your company will be like in the next three months?
SIMP36M	C2	What do you think business conditions for your company will be like in the next three years?
		Assessment Indicators
DOMTOT	C9	Change in demand for residential buildings compared with three months ago. . . ?
PRETOT	C10	How will the total demand for your products vary in the next three months?
DOMEST	C11	Compared with three months ago, is the foreign demand for your products. . . ?
PREEST	C12	How will the foreign demand for your products vary in the next three months?
INVPRE	F1	What do you expect nominal expenditure will be on (tangible and intangible) fixed investment in YEAR compared with that in YEAR?
INVSEM	F2	What do you expect nominal expenditure will be in the first half of YEAR compared with that in the second half of YEAR?
OCCTOT	E1	Your firm's total number of employees in the next three months will be. . .
		Uncertainty Measures
V_A		Aggregate Uncertainty
$V(\mu_{it})$		Disagreement
$E(\sigma_i^2)$		Average Individual Uncertainty
μ_{it}		Point Forecast

Figure 9. Sentiment Indicators



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

4.2.1 Sentiment Indicators

In the pre-treatment period, exporters to Germany had a very similar perception of Italy's current situation compared with that of the other firms (Figure 9). After the treatment, the former group's opinions became markedly worse, with the balance between expectations of improvement and worsening being lower by about 12 percentage points (see SITGEN in Table 4).

Concerning the probability of an improvement in Italy's general economic situation in the following three months,[20] the average for the replies of firms exporting to Germany before the treatment was

[20]For this question, firms can choose between different ranges of probability; we assign each firm the median value of the range chosen. Unlike the other questions, in this case, the results are in terms of probability points instead of balance.

higher than that of the other firms by about 3 points. This difference declined by about 2 points after the treatment (see PROMIG in Table 4 and Figure 9). Finally, when focusing on the opinions about the conditions for investing, while treated firms had a better assessment than the control group before 2019, the roles were reversed after the German slowdown (see SITINV in Table 4 and Figure 9). In this case, the negative effect is highly significant from both a statistical and an economic viewpoint: the balance between expectations of an improvement and a deterioration in conditions for investing is 14 points worse for treated firms with respect to the pre-treatment period; namely, the share of firms in favor of deterioration was greater than those in favor of improvement by about 14 percentage points. Focusing on firms' sentiments about their business situation, exporters to Germany are relatively more optimistic about their medium-run outlook than the short-term one, historically speaking. The German slowdown had a negative impact, particularly on the short-run opinions. Among treated firms, the (weighted balance of the) sentiment regarding their expected situation in the following three months is lower by about 8 percentage points (see SITIMP5 in Table 4 and Figure 9). Instead, no effect is found for the sentiment regarding the medium run (see SITIMP36M in Table 4 and Figure 9).

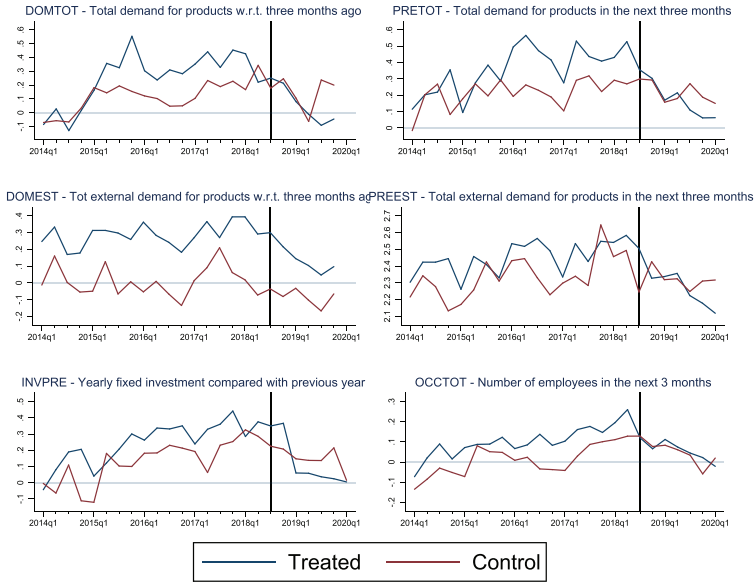
4.2.2 Assessment Indicators

The impact of the German slowdown is evident and significant for the variables included in the *assessment indicators*, namely those that track national accounts measures well.

With regard to firms' total current demand for their products, after the treatment, the opinions of the affected firms (those exporting to Germany) worsened significantly more than those of the firms in the control group, with a negative impact of approximately 30 points (as shown by DOMTOT in Table 4 and Figure 10). Weaker results were found for the expected demand in the next three months (with an average decrease of 20 points; PRETOT).

The German slowdown has hit total demand significantly since 2018:H2; the effect became greater in 2019 (see Table 6 and Figure 11).

Figure 10. Assessment Indicators



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D. When the questions refer to projections, the balances are plotted over the forecast period; for this reason, in some graphs there is one more observation than in the others.

The impact is also significant for the opinions relating to external demand: the negative effect of the German slowdown on external demand is negative and significant, amounting to approximately 13 points (DOMEST). However, there is no statistically significant evidence of an impact on expected external demand (PREEST).

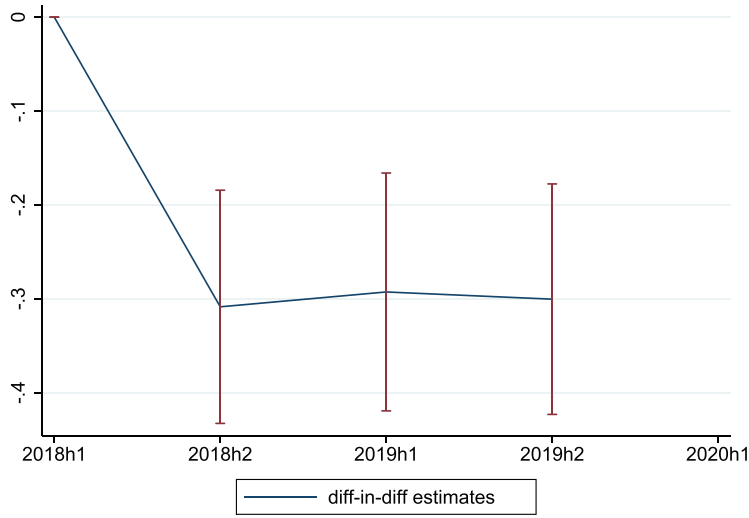
The effect on firms' investment plans for the current year is also sizable. Before 2019 the balance for exporters to Germany was higher on average by about 14 points; this gap turned negative after the treatment (–15 points on average) across all specifications (see INVPRE in Table 4 and Figure 10). Similar results are found for the capital accumulation planned for the current semester (INVSEM). In this particular case, the effect seems to be significant from 2019:H1

Table 6. Total Demand, Dynamic Effects

	(1)	(2)	(3)	(4)	(5)	(6)
2018:H2–2019:H2	–0.314***	–0.301***	–0.282***	–0.292***	–0.314***	–0.239***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
2018:H2	–0.211***	–0.241***	–0.289***	–0.230***	–0.214***	–0.253***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
2019:H1	–0.327***	–0.339***	–0.274***	–0.324***	–0.323***	–0.212***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
2019:H2	–0.390***	–0.318***	–0.283***	–0.319***	–0.399***	–0.252***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
FE						
Quarter	X				X	
Time		X				
Time × Industry			X			X
Time × Area				X		X
Firm					X	X
Industry		X		X		
Area		X	X			
Size		X	X	X		
N	16,053	14,681	14,478	14,681	15,665	14,099

Note: *p*-values in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Figure 11. Total Demand, Dynamic Effects



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

Table 7. Investment Plans, Dynamic Effects

	(1)	(2)	(3)	(4)	(5)	(6)
2018:H2–2019:H2	–0.150***	–0.180***	–0.166**	–0.166***	–0.118**	–0.113*
	(0.00)	(0.00)	(0.01)	(0.00)	(0.03)	(0.10)
2018:H2	0.061	–0.010	–0.105	0.001	0.105	–0.0721
	(0.33)	(0.88)	(0.20)	(0.99)	(0.11)	(0.41)
2019:H1	–0.200***	–0.250***	–0.178*	–0.243***	–0.173**	–0.150
	(0.00)	(0.00)	(0.06)	(0.00)	(0.01)	(0.12)
2019:H2	–0.275***	–0.285***	–0.232**	–0.264***	–0.256***	–0.179*
	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.08)
2020:H1	–0.197***	–0.150*	–0.127	–0.131	–0.174***	0.0372
	(0.00)	(0.06)	(0.22)	(0.11)	(0.02)	(0.76)
FE						
Quarter	X				X	
Time		X				
Time × Industry			X			X
Time × Area				X		X
Firm					X	X
Industry		X		X		
Area		X	X			
Size		X	X	X		
N	16,616	15,196	14,989	15,196	16,235	14,616

Note: *p*-values in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

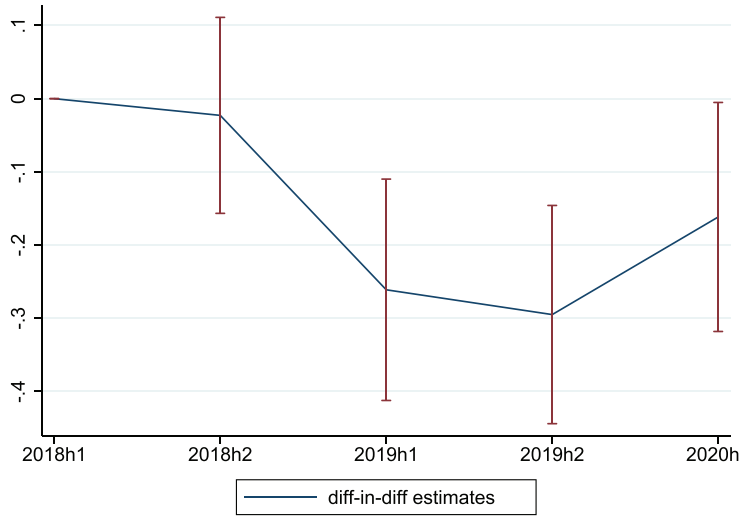
onwards and should be weakly significant from 2020:H1 (see Table 7 and Figure 12).[21]

The intention to hire new workers in the next three months also decreased more for treated firms by about 8 points (see OCCTOT in Table 4 and Figure 10). The causal effect on the intention to hire seems negative from 2018:H2 onwards; however, it became significant from 2019:H2 and, according to firms' expectations, it should be greater in 2020:H1.

Taking into account that these variables are reliable proxies for the corresponding national account aggregates (henceforth target variables), these results appear particularly important, suggesting that the German slowdown had a (contemporaneous) impact

[21]In addition, in this case, the effects on 2020:H1 are those relating to plans declared in 2019:Q4.

Figure 12. Investment Plans, Dynamic Effects



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

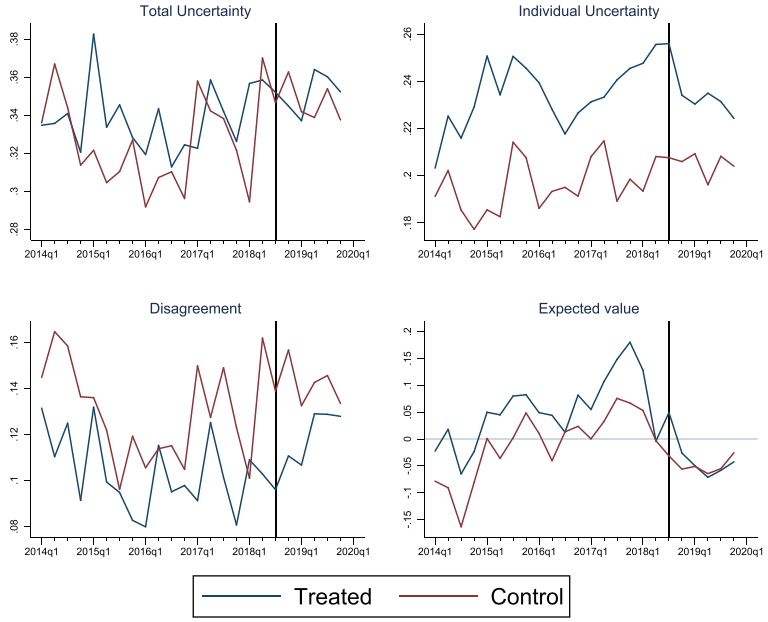
on total demand and (lagged) for investment plans and intention to hire.

4.2.3 Uncertainty Measures

According to the measures proposed in Section 3, firms' points forecast are historically higher for companies that export to Germany (Figure 13). At the same time, exporters to Germany are characterized by a higher level of individual uncertainty since, on average, they have a forecast distribution with fatter tails.

According to our model, the treated group reduced their short-term point forecast by about 0.05 points (μ_{it}; see Table 4 and Figure 13). The treatment seems to have no effect on individual uncertainty ($E(\sigma_i^2)$) in the short run, probably because the treated group had slightly more conservative expectations in favor of economic stability during the treatment period. We do not find any effect on disagreement on total uncertainty (V_A).

Figure 13. Uncertainty Measures, Short Term (Three Months Ahead)



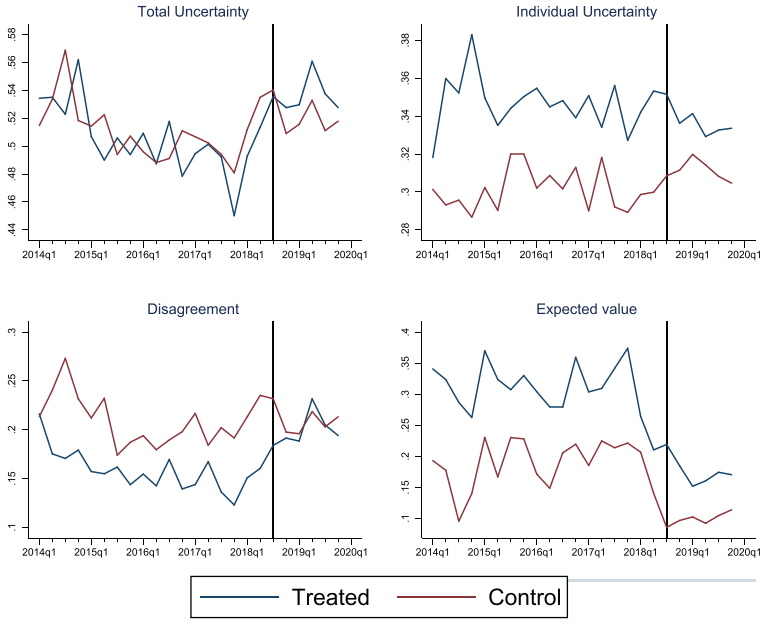
Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

In contrast, looking at the medium run (three years ahead), the causal effect on total uncertainty is weakly positive (see Table 4 and Figure 14). Although individual uncertainty seems to be negatively affected by the German slowdown (namely, the treated group becomes less uncertain with respect to the control one), disagreement ($V(\mu_{it})$) within the treated group increased after the German slowdown, representing the main contribution to the increment of total uncertainty. The effect on individual forecasts seems to be very weak.

4.3 Robustness

Since the share of the sample excluded by the analysis is greater for quarters further back in the past (see Section 3 and Table 3),

Figure 14. Uncertainty Measures, Medium Term (Three Years Ahead)



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

the results could be affected by a selection bias problem. To address this issue, we propose two different robust regressions: (i) we use a symmetric pre- and post-treatment period considering only the last 12 quarters (2017:Q1–2019:Q4; see column 2 of Table 8); and (ii) we only consider one balanced panel since 2016:Q1 (see column 3 of Table 8). Finally, we propose an additional specification considering both the symmetric period and the balanced panel (column 4). The results are confirmed in all three cases, suggesting that they are also robust for the selection process in the data.[22]

[22]In these specifications, several observations are dropped, suggesting that there is a trade-off between robustness and representativeness.

Table 8. Robustness Exercise

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sentiment Indicators							
SITGEN	−0.131***	−0.122***	−0.149**	−0.137*	−0.131***	−0.138***	−0.033
	(0.00)	(0.00)	(0.04)	(0.08)	(0.00)	(0.00)	(0.61)
PROMIG	−2.270**	−2.281**	−4.852**	−4.227**	−2.27**	−2.293**	−0.174
	(0.03)	(0.02)	(0.02)	(0.04)	(0.02)	(0.03)	(0.92)
SITINV	−0.163***	−0.152***	−0.162***	−0.164***	−0.163***	−0.182***	−0.074
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.12)
SITIMP5	−0.092***	−0.093***	−0.094*	−0.105*	−0.092***	−0.100***	−0.046
	(0.00)	(0.00)	(0.09)	(0.09)	(0.00)	(0.00)	(0.28)
SIMP36M	−0.065	−0.016	−0.025	−0.037	−0.065	−0.068	−0.061
	(0.15)	(0.71)	(0.67)	(0.60)	(0.15)	(0.15)	(0.41)
Assessment Indicators							
DOMTOT	−0.301***	−0.320***	−0.300***	−0.230***	−0.304***	−0.309***	−0.067
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.45)
PRETOT	−0.200***	−0.208***	−0.136***	−0.137***	−0.207***	−0.208***	−0.055
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.42)
DOMEST	−0.125**	−0.164***	−0.098	−0.128	−0.135***		
	(0.01)	(0.00)	(0.34)	(0.23)	(0.01)		
PREEST	−0.071	−0.057	−0.044	−0.058	−0.073		
	(0.30)	(0.41)	(0.49)	(0.36)	(0.31)		
INVPRE	−0.180***	−0.184***	−0.252**	−0.264**	−0.189***	−0.187***	−0.065
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.39)
INVSEM	−0.217***	−0.236***	−0.264***	−0.218**	−0.222***	−0.229***	−0.083
	(0.00)	(0.00)	(0.01)	(0.04)	(0.00)	(0.00)	(0.22)
OCCTOT	−0.090***	−0.092***	−0.055	−0.052	−0.094***	−0.099***	−0.065
	(0.00)	(0.00)	(0.26)	(0.32)	(0.00)	(0.00)	(0.13)
Uncertainty Measures: Three Months Ahead							
V_A	−0.006	0.003	−0.045	−0.050*	−0.006	−0.007	−0.006
	(0.68)	(0.84)	(0.14)	(0.10)	(0.73)	(0.68)	(0.79)
$E(\sigma_i^2)$	−0.016	−0.014	−0.005	−0.008	−0.016	−0.015	−0.015
	(0.13)	(0.18)	(0.72)	(0.57)	(0.13)	(0.17)	(0.38)
$V(\mu_{it})$	0.009	0.017	−0.040	−0.042	0.010	0.008	0.009
	(0.49)	(0.25)	(0.12)	(0.12)	(0.45)	(0.56)	(0.64)
μ_{it}	−0.056***	−0.059***	−0.071**	−0.082**	−0.056***	−0.061***	−0.024
	(0.00)	(0.00)	(0.03)	(0.03)	(0.00)	(0.00)	(0.38)
Uncertainty Measures: Three Years Ahead							
V_A	0.026	0.040**	0.032	0.035	0.030*	0.033*	0.034
	(0.12)	(0.01)	(0.23)	(0.19)	(0.09)	(0.07)	(0.17)
$E(\sigma_i^2)$	−0.027**	−0.022*	−0.013	−0.022	−0.027**	−0.022*	0.001
	(0.02)	(0.06)	(0.38)	(0.14)	(0.02)	(0.07)	(0.94)
$V(\mu_{it})$	0.053***	0.062***	0.045	0.056**	0.057***	0.055***	0.032
	(0.00)	(0.00)	(0.11)	(0.03)	(0.00)	(0.00)	(0.17)
μ_{it}	−0.036	−0.022	−0.046	−0.053	−0.041	−0.035	−0.000
	(0.17)	(0.40)	(0.23)	(0.20)	(0.13)	(0.22)	(1.00)

(*continued*)

Table 8. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
N	14,517	8,099	3,280	2,456	14,224	13,222	8,733
	Baseline: Specification (2) in Table 4	Symmetric around 2018:Q2 '17:Q1–'19:Q4	Balanced Panel Since 2016:Q1	Symmetric and Balanced '17:Q1–'19:Q4	Excluding Automotive Sector	Excluding Exporter to Other Markets	Falsification Test

Note: p-values in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. As in the baseline specification, all regressions consider industry, area, and size fixed effects; additionally, we include a set of time dummies. Errors are clustered at firm level. Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

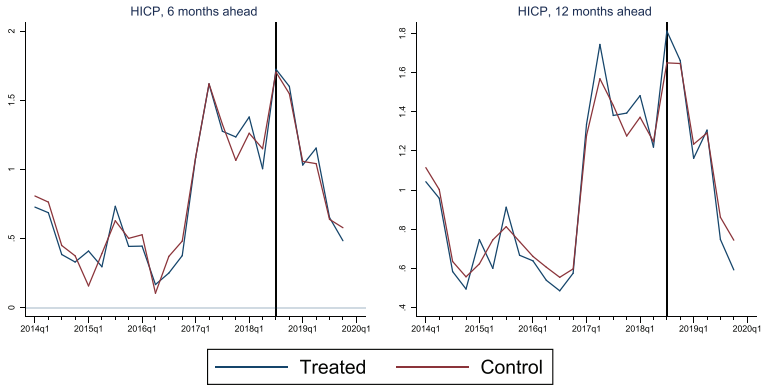
As argued in Section 1, a primary cause of the German slowdown was the bottlenecks in the German automotive sector that were significant and probably had spillover effects on the Italian one.[23] To prevent results from being driven by a specific economic issue relating to a particular sector, we exclude the automotive industry from the sample considered.[24] Results confirm previous estimations (see column 5 of Table 8), suggesting that the effect of the German slowdown was not confined to the Italian automotive sector alone but was widespread in the economy as a whole.

As an additional check, we exclude exporters to markets different from Germany from the control group (and then from the entire analysis; see column 6 of Table 8). This should reduce the possibility of the "second-order effect," relating to indirect global value chains, resulting in downward biases. The results are confirmed in this case too. Finally, to address the same issue, we propose a falsification test excluding exporters to Germany from the analysis. In this case, we designate the exporters to a country other than Germany as a treated group, while the control group is composed of firms that do not export. In this specification, we test the presence of a "secondary effect." Results suggest the irrelevance of this effect:

[23]The automotive sector in Italy accounts for about 4.3 percent of the IP index (of which 2.5 percent is component production). A considerable amount of (automotive component) producers export to Germany. Unlike before, during 2018, the German automotive cycle returned to leading the Italian one, supporting this hypothesis.

[24]We exclude firms belonging to the NACE two-digit 29 and 30 classifications.

Figure 15. HICP



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

the magnitude of the estimates is negligible, compared with the reference estimation, and not statistically significant (see column 7 of Table 8).

To ensure that both groups are comparable in their exposure to the German market, we test the effect of the treatment by applying the same modeling strategy to the firms' 6- and 12-month-ahead expectations for the year-on-year growth in the Italian Harmonised Index of Consumer Prices (HICP). These variables should not be affected by the German slowdown, as there is no reason for exporters to Germany to have different expectations for the Italian HICP due to their nominal nature. This implies that both groups should have similar expectations in both pre- and post-treatment periods.

The findings support this hypothesis: in neither case does the treatment have an effect (as shown in Figure 15 and Table 9). The expectations are roughly the same for both groups, both pre- and post-treatment, indicating that the two groups are comparable, except for their exposure to the German economic outlook.

Finally, the last robustness exercise tests how heterogeneity in treatment among exporters affects a firm's performance: we hypothesize that the firms most exposed to the German market should record a greater negative effect.

Table 9. Effects on HICP

	(1)	(2)	(3)	(4)	(5)	(6)
HICP 6 Months	0.0173	–0.0215	–0.0286	–0.0216	–0.0361	0.0288
	(0.81)	(0.66)	(0.47)	(0.65)	(0.65)	(0.53)
HICP 12 Months	–0.0301	–0.0392	–0.0782	–0.0250	–0.0191	0.0268
	(0.72)	(0.50)	(0.11)	(0.66)	(0.82)	(0.61)
FE						
Quarter	X				X	
Time		X				
Time × Industry			X			X
Time × Area				X		X
Firm					X	X
Industry		X		X		
Area		X	X			
Size		X	X	X		
N	10,184	9,262	9,000	9,262	9,852	8,665

Note: *p*-values in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

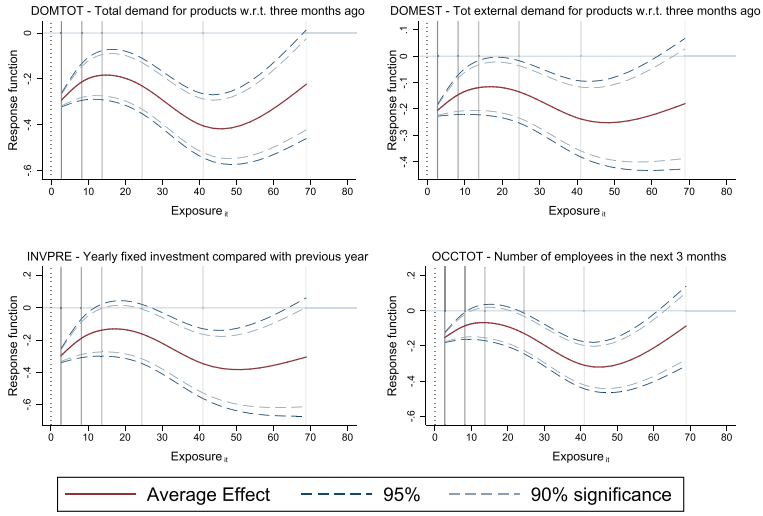
We test this hypothesis using the dose-response function approach with a third-order polynomial approximation.[25] The results support a negative relationship between the level of (treatment) exposure and the decline of sentiment indicators during the slowdown period. This means that firms with higher exposure experienced a more significant drop in demand and a stronger negative impact on investment decisions and future employment (as shown in Figure 16).[26]

In our view, this negative relationship between treatment intensity and causal effect is an additional finding that confirms our main argument, meaning that the German cycle is relevant and affects the Italian one.

[25] We use the Stata command *ctreatreg* proposed by Cerulli (2015), which estimates the causal effect according to treatment dose, namely the presence of heterogeneity treatment among the affected firms.

[26] Unfortunately, in our sample, only about 2.5 percent of firms export more than 40 percent of their total production to Germany; for this reason, the confidence interval becomes larger when there is a high degree of treatment.

Figure 16. Dose-Response Function Approach



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

5. A Proposal for the Macroeconometric Quantification

The SIGE *assessment indicators* (henceforth proxies) track some national account economic aggregates very well (GDP, GFI, and employment growth rates; henceforth target variables). Additionally, these proxies seem to have good out-of-sample forecasting accuracy for the corresponding target variables (for more details, see Appendix C; on the same argument, see, among others, Lahiri and Monokroussos 2013; Milani 2017).

Economic theory justifies these properties by using two different arguments: (i) the *"animal spirits" view* posits autonomous fluctuations in beliefs that, in turn, have causal effects on economic activity (Blanchard 1993; Hall 1993) and (ii) the *information view* points out that confidence measures contain essential information about the current and future states of the economy (Beaudry and Portier 2004, 2014; Barsky and Sims 2012). This paper focuses on the ability of these variables to mimic economic activity rather than analyzing the relevance of one point of view to the other.

Let's define y_t as the growth rate of the target variables and $\hat{Y}_t$ as the value predicted by the forecasting model, using the corresponding SIGE balances (proxy), as regressors.

$$\hat{Y}_t = \hat{\gamma} B_{Tot,t} + \hat{\alpha}_1 y_{t-1} \tag{4}$$

To quantify the economic loss (in terms of GDP, GFI, and employment) relating to the German slowdown, we calculate the unobserved counterfactual dynamics of proxy variables ($B^{UC}_{Tot,t}$; see Figure 17) and remove the effect of the German slowdown on the Italian economy (Angrist and Pischke 2009), as explained in Appendix C. The resulting counterfactual proxy variables show a more positive trend than the actual data (B_{Tot}), indicating that the economic shock in Germany had an impact on the Italian economy.

By incorporating these counterfactual balances into our forecasting model, we estimate the target aggregates ($\hat{Y_t^{UC}}$) without the effect of the German slowdown.

$$\hat{Y_t}^{UC} = \hat{\gamma} B^{UC}_{Tot,t}(\beta) + \hat{\alpha}_1 y_{t-1}, \tag{5}$$

where $\hat{\gamma}$ and $\hat{\alpha}_1$ are the parameters estimated according to the model selected in Appendix C that maximize the one-step-ahead out-of-sample accuracy.[27]

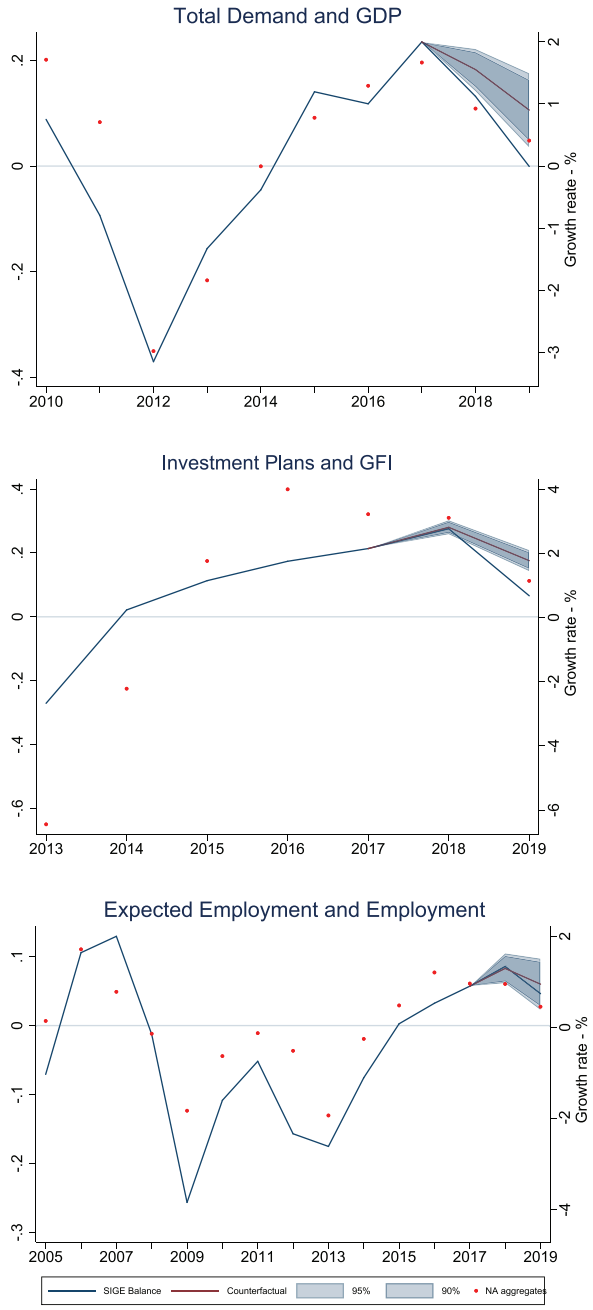
Then, we estimate the effect (E_t) of the German slowdown on the Italian economy as the difference between the growth rate, predicted by the model ($\hat{Y}_t$) using the real balances, and that ($\hat{Y_t}^{UC}$) obtained using the counterfactual proxies ($B^{UC}_{Tot,t}$) as a regressor.

$$E_t = \hat{Y}_t - \hat{Y_t}^{UC} \tag{6}$$

In Table 10, for each target variable, we show the real growth rate according to the national accounts data (y_t), the growth rate from our forecasting model ($\hat{Y}_t$), and, finally, the one estimated as the counterfactual measure ($\hat{Y_t}^{UC}$).

[27] In Equation (4), we use an ARX(1) model since the linear model is a particular case with $\alpha_1 = 0$. However, to quantify the effect, we use the best model chosen according to Appendix C.

Figure 17. Actual vs. Counterfactual Balances and National Account Aggregates



Note: Our calculations based on Banca d'Italia's SIGE survey.

Table 10. Estimated Effect

				$\widehat{Y}_t^{UC}$				$E_t = \widehat{Y}_t - \widehat{Y}_t^{UC}$			
Variable	**Year**	y_t	$\widehat{Y}_t$	**2.5%**	**Mean**	**Median**	**97.5%**	**2.5%**	**Mean**	**Median**	**97.5%**
GDP	2018	0.94	0.95	0.98	1.11	1.11	1.24	–0.03	–0.16	–0.17	–0.30
	2019	0.29	0.34	0.47	1.18	1.17	1.90	–0.13	–0.84	–0.83	–1.56
Investments	2018	3.11	4.17	4.07	4.55	4.55	5.03	0.11	–0.37	–0.37	–0.86
	2019	1.14	1.79	2.57	4.31	4.31	6.1	–0.78	–2.52	–2.52	–4.31
Employment	2018	0.95	1.4	1.33	1.4	1.4	1.47	0.07	0.00	0.00	–0.07
	2019	0.45	1.04	0.74	1.09	1.09	1.45	0.30	–0.06	–0.05	–0.41

As the latter itself depends on an estimation procedure, we propose a confidence interval.[28] Finally, we compute the effect E_t for the Italian economy deriving from the German slowdown based on Equation (6). We propose an average effect and the relative confidence interval in this case.

According to our estimates, the impact of the German slowdown may have been negative for Italian GDP growth by about 0.2 and 0.8 percentage point in 2018 and 2019, respectively, signaling that the German slowdown was immediate and significant for Italian GDP.

The effect on investment decisions may have been delayed: we do not find any significant effect on investment in 2018,[29] while the impact may have been about 2.5 percentage points in 2019.

Finally, we do not find any statistically significant effect on employment decisions, in line with the results shown in Table 11 and Figure 18, which only predict a significant effect for 2020:H1.[30]

6. Conclusions

The novelty of this work is twofold: (i) we study a macroeconomic issue using both micro- and macrotechniques, specifically by combining policy evaluation techniques with forecasting methods; and (ii) we show a transmission channel from the German cycle to the Italian one.

We investigate to what extent the German economic slowdown that occurred in 2018:Q2–2019:Q4 affected Italian firms using a diff-in-diff strategy, based on microdata from the Survey of Inflation and Growth Expectations, collected quarterly by Banca d'Italia. In particular, we study whether that external shock affected firms' opinions about the general Italian economic situation, their business situation, and their expectations for accumulation, hiring, and demand, which are good predictors of the corresponding national account aggregates. We find that since late 2018, the developments in the sentiment and assessment indicators, particularly for the short term,

[28] To obtain this measure, we use the confidence interval at 5 percent used in Figure 17 as input for our model.

[29] The related confidence interval includes 0.

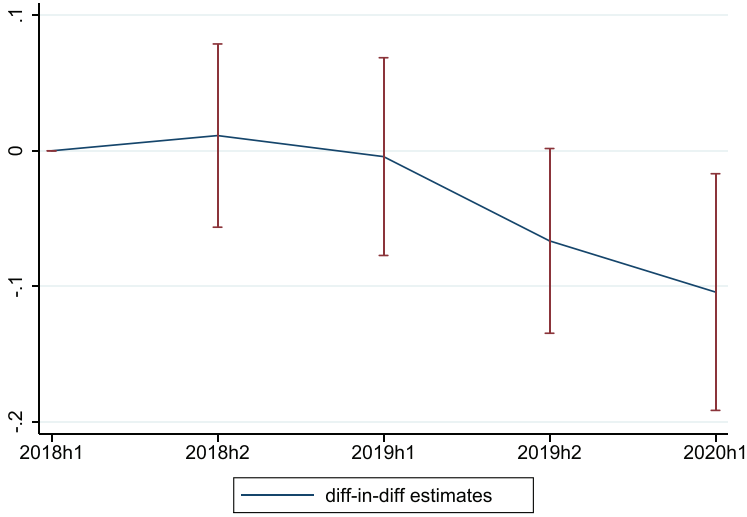
[30] As explained before, the results for 2020 are based on the assessment collected in 2019:Q4. We do not quantify the effect for 2020.

Table 11. Intention to Hire, Dynamic Effects

	(1)	(2)	(3)	(4)	(5)	(6)
2018:H2–2019:H2	–0.0899***	–0.0809***	–0.0805**	–0.0901***	–0.0596**	–0.0486
	(0.00)	(0.00)	(0.02)	(0.00)	(0.04)	(0.21)
2018:H2	–0.0458	–0.0580	–0.0911*	–0.0514	–0.0142	–0.0495
	(0.17)	(0.12)	(0.06)	(0.17)	(0.67)	(0.31)
2019:H1	–0.048	–0.065	–0.050	–0.073	–0.032	–0.034
	(0.18)	(0.11)	(0.30)	(0.07)	(0.38)	(0.49)
2019:H2	–0.116***	–0.110***	–0.0829	–0.114***	–0.0978***	–0.0553
	(0.00)	(0.00)	(0.11)	(0.00)	(0.00)	(0.23)
2020:H1	–0.137***	–0.153***	–0.114*	–0.144***	–0.138***	–0.067
	(0.00)	(0.00)	(0.07)	(0.00)	(0.00)	(0.36)
FE						
Quarter	X				X	
Time		X				
Time × Industry			X			X
Time × Area				X		X
Firm					X	X
Industry		X		X		
Area		X	X			
Size		X	X	X		
N	16,749	15,317	15,108	15,317	16,367	14,734

Note: *p*-values in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Figure 18. Intention to Hire, Dynamic Effects



Note: Our calculations based on Banca d'Italia's SIGE survey. For more details on the variables, see Table 5 and Appendix D.

were worse for the Italian companies exposed to the German market; firms' assessments for demand and plans regarding investment and employment were significantly worse as well.

Firms exposed to the German market declared the worst expectations for their activity in the short term (three months ahead); moreover, for the medium term (three years ahead), the German slowdown only slightly affected total uncertainty for the Italian economy because those exporters to Germany disagreed more with each other.

Our results demonstrate that the SIGE series can accurately predict the corresponding national account aggregates (GDP, total investment, and employment). By utilizing the diff-in-diff method, we remove the effect of the German slowdown from the SIGE assessments and obtain the unobserved counterfactual series. By using these series in a forecasting model in a partial equilibrium context, we can estimate the impact of the German slowdown on Italian GDP, investment, and employment growth. By comparing these counterfactual figures with those derived from the actual SIGE balances, we quantify the negative effect of the German slowdown on the Italian economy.

Our findings suggest that the German slowdown had a negative and contemporaneous impact on Italian GDP, estimated at about 1 percentage point over two years (2018–19). The effect appears to have been considerable and delayed for investment but negligible for employment, whose effects are not statistically different from zero for both years (2018–19). These results suggest transmission channels in these two economies where the commercial trade relationship plays an important role. The influence on the business climate could play an additional role by reinforcing the effect through its impact on the expected profit and, by extension, on aggregate investment (Charpe et al. 2016).

Appendix A. Uncertainty Measures

Following Giordani and Soderlind (2003), let's define μ_i as the point forecast of firm i about its future economic condition, namely the firm's expected value based on three possible states. Assuming that its subjective forecast distribution is known, we define a measure of individual uncertainty, which is informative about the distribution probability attached to the different states, as the standard deviation (σ_i) of this forecast distribution.

We compute a simple version of these measures thanks to the SIGE information.

In particular, in each quarter t, the SIGE questionnaire asks about the probability assigned by the firm i to better (p_b), worse (p_w), and unchanged (p_u) business conditions for the next three months and three years.

We assume a payoff scheme (π_j) for each of these three (j) states, in particular

$$\pi_j = \begin{cases} -1 \textit{ with probability } p_w; \\ 0 \textit{ with probability } p_u; \\ 1 \textit{ with probability } p_b; \end{cases}$$

Using this information, we define the individual point forecast as

$$\mu_{it} = \sum_{j=w,u,b} p_{ijt}\pi_{ijt} = -1 \cdot p_{iwt} + 0 \cdot p_{iut} + 1 \cdot p_{ibt} = -p_{iwt} + p_{ibt} \tag{A.1}$$

and the individual (forecast) uncertainty as

$$\sigma_{it}^2 = \sum_{j=w,u,p} p_{itj}(\pi_{itj} - \mu_{it})^2. \tag{A.2}$$

The average individual uncertainty ($E(\sigma_t^2)$) across firms contributes to determining a measure of aggregate uncertainty.

According to Giordani and Soderlind (2003), an additional source of uncertainty comes from differences between firms' expectations. In particular, they define disagreement with the variance of the point estimates across firms ($V(\mu_t)$).

Finally, aggregate uncertainty ($V_A(y)$) is equal to the sum of disagreement and the average individual uncertainty:

$$V_A(y) = V(\mu_t) + E(\sigma_t^2). \tag{A.3}$$

Appendix B. Counterfactual Balances

Let's define an aggregated balance B_{Tot} as the weighted average of the balances referring to the three different groups: treated firms (B_{tr}), those in the control group (B_{co}), and those excluded by our analysis (B_{NC}).

$$B_{Tot,t} = w_{tr,t}B_{tr,t} + w_{co,t}B_{co,t} + w_{NC,t}B_{NC,t} \tag{B.1}$$

Let's rewrite Equation (B.1) as

$$B_{Tot,t} = w_{tr,t}\underbrace{(B_{tr,t} - B_{co,t})}_{\alpha_1} + (w_{tr,t} + w_{co,t})B_{co,t} + w_{NC,t}B_{NC,t}. \tag{B.2}$$

Then define the unobserved counterfactual balance $B_{Tot,t}^{UC}$ as the weighted average of balances for the three groups where, for the treated firms, we subtract the time-varying effects as estimated in Section 4.2 from the actual balance.[31]

[31] The effects are estimated for each different semester h. To be conservative, we decided to correct the actual balances using the smallest causal effect estimated in the previous section; namely specification (3) of Table 5 and specification (2) for both investment (Table 6) and employment (Table 10).

$$B^{UC}_{Tot,t}(\beta) = w_{tr,t}(\alpha_1 - \overbrace{(\beta + \beta_h)}^{\text{Causal Effect}}) + (w_{tr,t} + w_{co,t})B_{co,t} + w_{NC,t}B_{NC,t} \tag{B.3}$$

Appendix C. A Simple Forecasting Model

In this appendix, we test the predictive properties of the SIGE balance for the corresponding variables in the national accounts.

We implement this test using two simple models: (i) a simple linear regression, where the SIGE series are regressors; (ii) an ARX(1) model that considers an autoregressive component.

Linear Model	*ARX(1)*
$y_t = \gamma B_{Tot,t} + \epsilon_t$	$y_t = \gamma B_{Tot,t} + \alpha_1 y_{t-1} + \epsilon_t$

These two models are estimated using quarterly[32] and annual data; however, since we focus on the effect over 2018 and 2019, when the quarterly model is used, we aggregate quarterly figures to obtain the annual frequency.

To analyze the forecasting performance, we split the sample into two subperiods and, starting from 2016:Q1, we estimate one-step-ahead (out-of-sample) forecasts. We obtain the relative forecasting performance using both average bias and the mean absolute forecast error (MAFE).

Let's define

$$Bias = \sum_{t=t_0}^{T} \frac{1}{T - t_0} \hat{e}_t = \sum_{t=t_0}^{T} \frac{1}{T - t_0} (y_t - \hat{y}_{(t|t-1)}) \tag{C.1}$$

and

$$MAFE = \sum_{t=t_0}^{T} \frac{1}{T - t_0} \mid \hat{e}_t \mid, \tag{C.2}$$

where y_t is the growth rate of the target variable considered in the forecast exercise and $\hat{y}_{(t|t-1)}$ is the one-step-ahead forecast for time t

[32] Half-yearly data in the case of investment.

Table C.1. Observations Used in the Forecast Exercise

	GDP	Employment	Investment
Period	2010:Q1–2019:Q4	2005:Q1–2019:Q4	2013:H1–2019:H2
Quarterly* Obs. (n)	40	60	14
Annual Obs. (n)	10	15	7
*For investments, we consider half-yearly instead of quarterly data.			

computed using the information at time $t-1$; finally, t_0 and T are the first and the last quarters involved in the out-of-sample prediction (2016:Q1 and 2019:Q4, respectively).

Due to the different data availability, the information considered in each model differs for different variables. See Table C.1.

Table C.2 shows statistics on forecast performance for both quarterly and annual growth rates. Since annual models are based on just a few observations, in order to guarantee more robust results, we also aggregate quarterly figures with two different procedures to obtain the annual frequency.

There is no particular advantage to using models with an autoregressive component: the relative coefficient is only statistically different from zero when regressions consider recent quarters, probably due to the procedure used to estimate provisional data.

Additionally, models based on annual data perform better with respect to quarterly models because they display lower volatility for dependent and regressor variables.

In general, models only based on SIGE (proxy) variables perform similarly to those usually used for the short-term forecast.

According to our results, models that minimize both bias and MAFE criteria are linear models based on annual data; however, they only consider a few observations. For this reason, Section 5 uses linear models[33] based on quarterly data and particularly those that quantify the annual figure, and aggregate quarterly data in the standard way.

[33]For reasons of consistency, we chose the same model for all target variables.

Table C.2. Forecast Performance

Growth Rate	Models		Statistics	Linear Model			ARX(1)		
				GDP	***INV****	***EMPL***	***GDP***	***INV****	***EMPL***
q-o-q	Quarterly		MAFE	0.231	1.421	0.338	0.219	1.421	0.344
			Bias	0.162	0.536	0.01	0.156	0.584	0.016
y-o-y	Quarterly	Simple Mean	MAFE	0.464	4.626	0.299	0.425	4.816	0.314
			Bias	0.43	4.626	–0.14	0.407	4.816	–0.115
		Standard	MAFE	0.545	1.626	0.285	0.526	1.649	0.296
			Bias	0.545	0.874	–0.078	0.526	0.965	–0.056
	Annual		MAFE	0.299	1.24	0.322	0.375	1.502	0.335
			Bias	0.282	–0.002	–0.085	0.346	1.502	–0.131

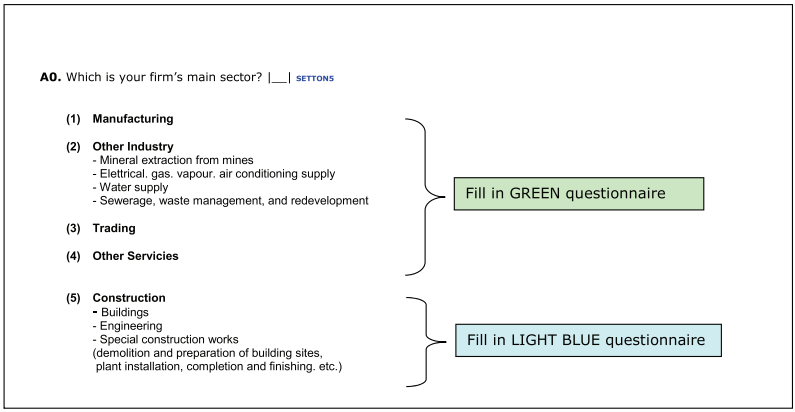
*For investments, we use half-yearly instead of quarterly data.
Note: To obtain annual figures, we aggregate quarterly data by using two different methods: (i) the standard one that uses a different weight for each *q-o-q* growth rate according to their realization during the year; and (ii) the simple average of the *q-o-q* growth rates, to prevent forecast bias from being amplified by the position of the quarters in which it is verified. The red box shows the best models for each NA aggregate based on annual data; the orange one shows those based on quarterly data.

Appendix D. Questionnaire

SURVEY ON INFLATION AND GROWTH EXPECTATIONS
BANCA D'ITALIA

December 2019

Company Name _____



A0. Which is your firm's main sector? |__| SETTONS

(1) Manufacturing

(2) Other Industry
- Mineral extraction from mines
- Elettrical. gas. vapour. air conditioning supply
- Water supply
- Sewerage, waste management, and redevelopment

(3) Trading

(4) Other Servicies

Fill in GREEN questionnaire

(5) Construction
- Buildings
- Engineering
- Special construction works

(demolition and preparation of building sites, plant installation, completion and finishing. etc.)

Fill in LIGHT BLUE questionnaire

INDUSTRY EXCLUDING CONSTRUCTION AND SERVICES

Firm
Instructions: For percentage changes, indicate the sign in the first box on the left (+ :for increases; —: for decreases).

SECTION A – General Information

A1. Number of employees : |__|__|__|__| ADD

A2. Share of sales revenues coming from exports: |__|
(1= more than 2/3; 2= Between 1/3 and 2/3; 3= Up to 1/3 and more than zero; 4=Zero) EXPORT4

SECTION B – General economic situation of the country

	…in June 2020? IT6	…in December 2020? IT12	…in December 2021? IT24	… on average between December 2022 and December 2024? IT48
B1a. (about 3/5 of the sample) In October consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was +0.2 per cent in Italy and +0.7 per cent in the euro area. What do you think it will be in Italy...	|__| |__|__|,|__|%	|__| |__|__|,|__|%	|__| |__|__|,|__|%	|__| |__|__|,|__|%
B1b. (about 1/5 of the sample) What do you think consumer price inflation in Italy, measured by the 12-month change in the harmonized index of consumer prices, will be…	|__| |__|__|,|__|%	|__| |__|__|,|__|%	|__| |__|__|,|__|%	|__| |__|__|,|__|%
B1c. (about 1/5 of the sample) The European Central Bank has as an objective the maintenance of the 12-month change in the harmonized index of consumer prices in the euro area close but below 2 per cent in the medium term. What do you think consumer price inflation in Italy, measured by the 12-month change in the harmonized index of consumer prices, will be…	|__| |__|__|,|__|%	|__| |__|__|,|__|%	|__| |__|__|,|__|%	|__| |__|__|,|__|%

B2. Compared with 3 months ago, do you consider Italy's general economic situation is …? SITGEN ☐ Better ☐ The same ☐ Worse

B3. What do you think is the probability of an improvement in Italy's general economic situation **in the next 3 months**? PROMIG
☐ Zero ☐ 1-25 per cent ☐ 26-50 per cent ☐ 51-75 per cent ☐ 76-99 per cent ☐ 100 per cent

SECTION C – Your firm's business conditions

How do you think business conditions for your company will be:

C1. in the **next 3 months**? ☐ Much better ☐ Better ☐ The same ☐ Worse ☐ Much worse SITIMP5

C2. in the **next 3 years**? ☐ Much better ☐ Better ☐ The same ☐ Worse ☐ Much worse SIMP36C5

For each of the above forecasts imagine there are 100 points available; distribute them among the possible forecasts according to the probability assigned to each one. How do you think business conditions for your company will be:

	Better SITM3M SITM3A			The same SITU3M SITU3A			Worse SITP3M SITP3A			Total		
C3. In the next **3 months**										**1**	**0**	**0**
C4. In the next **3 years**										**1**	**0**	**0**

Please indicate whether and with what intensity the following FACTORS will affect your firm's business **in the next 3 months.**

Factors affecting your firm's business In the **next 3 months**	***Effect on business***			***Intensity*** *(if not nil)*		
	Negative	*Nil*	*Negative*	*Nil*	*Negative*	*Nil*
C5. Changes in demand DISIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C6. Changes in your prices PRSIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7. Availability and the cost of credit CRSIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.1 Uncertainty due to econ. and political factors POLIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.2 Exchange rate dynamics TACAM	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.3 Oil price dynamics PRPET	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.4 Tensions on liberalization policies of international trade POLIB	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|

C8. Compared with 3 month ago, do you think conditions for investment are ... ? SITINV ☐ Better ☐ The same ☐ Worse

C9. What do you think your liquidity situation will be in the next 3 months. given the expected change in the conditions of access to credit?
☐ Insufficient ☐ Sufficient ☐ More than sufficient LIQUID

C10. Compared with three months ago, is the total demand for your products ... ? DOMTOT ☐ Higher ☐ Unchanged ☐ Lower

C11. How will the total demand for your products vary in the next 3 months? PRETOT ☐ Increase ☐ No change ☐ Decrease

(Answer to questions C12-C14.1 only if the share of sales revenues coming from exports is positive. otherwise go to C15)

Compared with three months ago, is the foreign demand for your products…?	*Higher*	*Unchanged*	*Lower*	*I do not sell in this market*
C.12 Total DOMEST	|__|	|__|	|__|	
C.12.1 In Germany RTEU_GE	|__|	|__|	|__|	|__|

(Please answer question C13 only if your answer to question C.12.1 was not 'I do not sell in this market')
C.13 Considering your firm's total exports in 2019, please indicate the share of exports to the German market. \|__\|
(1= Over 2/3 of turnover; 2= Between 1/3 and 2/3; 3= Up to 1/3 but more than zero; 4=Zero) EXPGE

How will the foreign demand for your products vary **in the next 3 months**?	*Increase*	*No change*	*Decrease*	*I do not sell in this market*
C.14 Total PREEST	|__|	|__|	|__|	
C.14.1 In Germany ETEU_GE	|__|	|__|	|__|	|__|

C15. Compared with three months ago, are credit conditions for your company ...? SITCRE ☐ Better ☐ Unchanged ☐ Worse

SECTION D – Changes in your firm's selling prices

D1. In the last 12 months, what has been the average change in your firm's prices? DPRE \|__\|__\|__\|.\|__\|%

D2. For the next 12 months, what do you expect will be the average change in your firm's prices? DPREZ \|__\|__\|__\|.\|__\|%

Please indicate direction and intensity of the following factors as they will affect your firm's selling prices **in the next 12 months**:

	Effect on firm's selling prices			***Intensity*** *(if not nil)*		
Factors affecting your firm's prices in the next 12 months	*Downward*	*Neutral*	*Upward*	*Low*	*Average*	*High*
D2.1. Total demand DPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D2.2. Raw materials prices MPPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D2.3. Intermediate Input IICT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D2.4. Labour costs CLPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D2.5. Pricing policies of your firm's main competitors PRPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D2.6 Exchange rate dynamics TCPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D2.7 Inflation expectations dynamics AINF	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D2.8 Financial conditions CFIN	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|

D3. In the last 12 months, what has been the average change in your firm's prices of goods and services bought in Italy and abroad ?
\|__\| \|__\|__\|.\|__\|% DPRE_INT

D4. In the next 12 months, what has been the average change in your firm's prices of goods and services bought in Italy and abroad?
\|__\| \|__\|__\|.\|__\|% DPREZ_INT

SECTION E – Workforce

E1. Your firm's total number of employees in the next 3 months will be: OCCTOT	*Lower*	*Unchanged*	*Higher*
	1|__|	2|__|	3|__|

SEZIONE F – Investment

F1. What do you expect will be the nominal expenditure on (tangible and intangible) fixed investment in 2020 compared with that in 2019?
☐ Much higher ☐ A little higher ☐ About the same ☐ A little lower ☐ Much lower INVPRE

F2. And what do you expect will be the nominal expenditure in the first half of 2020 compared with that in the second half of 2019:
☐ Much higher ☐ A little higher ☐ About the same ☐ A little lower ☐ Much lower INVSEM

NOTE: The responses "much higher" and "much lower" also apply when. in the two periods compared. investments are zero.

F3. Please rank in order of importance the following SOURCES OF INFORMATION choosing from those that you use the most to obtain financial information to support your business decisions (e.g. production, investments or entry into new markets).

(*Please indicate no more than 3*)

1. Newspapers (paper or online). 2. TV news. 3. Publications by public institutions (e.g. Bank of Italy, Istat or Ministry of the Economy and Finance) and business associations (e.g. Confindustria or Confartigianato). 4. Market consultancy and analysis services provided by private firms. 5. Direct contact with clients and/or suppliers. 6. Social media (e.g. Twitter or Facebook) ☐ FON1 ☐ FON2 ☐ FON3

CONSTRUCTION

Firm
Instructions: For percentage changes, indicate the sign in the first box on the left (+ :for increases; —: for decreases).

SECTION A – General Information

A1. Number of employees : |__|__|__|__| ADD

A2. Share of sales revenues coming from exports: |__|
(1= more than 2/3; 2= Between 1/3 and 2/3; 3= Up to 1/3 and more than zero; 4=Zero) EXPORT4

A3. Share of revenue from residential building: |__|
(1= more than 2/3; 2= Between 1/3 and 2/3; 3= Up to 1/3 and more than zero; 4=Zero) COMPRES4

SECTION B – General economic situation of the country

	…in June 2020? IT6	…in December 2020? IT12	…in December 2021? IT24	… on average between December 2022 and December 2024? IT48
B1a. (about 3/5 of the sample) In October consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was +0.2 per cent in Italy and +0.7 per cent in the euro area. What do you think it will be in Italy...	|__|__|__|,|__|%	|__|__|__|,|__|%	|__|__|__|,|__|%	|__|__|__|,|__|%
B1b. (about 1/5 of the sample) What do you think consumer price inflation in Italy, measured by the 12-month change in the harmonized index of consumer prices, will be…	|__|__|__|,|__|%	|__|__|__|,|__|%	|__|__|__|,|__|%	|__|__|__|,|__|%
B1c. (about 1/5 of the sample) The European Central Bank has as an objective the maintenance of the 12-month change in the harmonized index of consumer prices in the euro area close but below 2 per cent in the medium term. What do you think consumer price inflation in Italy, measured by the 12-month change in the harmonized index of consumer prices, will be…	|__|__|__|,|__|%	|__|__|__|,|__|%	|__|__|__|,|__|%	|__|__|__|,|__|%

B2. Compared with 3 months ago, do you consider Italy's general economic situation is …? SITGEN ☐ Better ☐ The same ☐ Worse

B3. What do you think is the probability of an improvement in Italy's general economic situation **in the next 3 months**? PROMIG
☐ Zero ☐ 1-25 per cent ☐ 26-50 per cent ☐ 51-75 per cent ☐ 76-99 per cent ☐ 100 per cent

SECTION C – Your firm's business conditions

How do you think business conditions for your company will be:

C1. in the **next 3 months**? ☐ Much better ☐ Better ☐ The same ☐ Worse ☐ Much worse SITIMP5

C2. in the **next 3 years**? ☐ Much better ☐ Better ☐ The same ☐ Worse ☐ Much worse SIMP36C5

For each of the above forecasts imagine there are 100 points available; distribute them among the possible forecasts according to the probability assigned to each one. How do you think business conditions for your company will be:

	Better SITM3M SITM3A	The same SITU3M SITU3A	Worse SITP3M SITP3A	Total
C3. in the next **3 months**				**1 0 0**
C4. in the next **3 years**				**1 0 0**

Please indicate whether and with what intensity the following FACTORS will affect your firm's business **in the next 3 months.**

Factors affecting your firm's business In the **next 3 months**	***Effect on business*** *Negative*	*Nil*	*Positive*	***Intensity*** *(if not nil)* *Low*	*Average*	*High*
C5a. Trend in new sites CNSIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C5b. Trend in existing sites CASIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C6. Changes in your prices PRSIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7. Availability and the cost of credit CRSIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.1 Uncertainty due to economic and political factors POLIT	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.2 Exchange rate dynamics TACAM	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.3 Oil prices dynamics PRPET	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
C7.4 Tensions on liberalization policies of international trade POLIB	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|

C8. Compared with 3 month ago, do you think conditions for investment are ... ? SITINV ☐ Better ☐ The same ☐ Worse

C9. What do you think your liquidity situation will be in the next 3 months, given the expected change in the conditions of access to credit?
☐ Insufficient ☐ Sufficient ☐ More than sufficient LIQUID

C10. Change in demand for residential building compared with 3 months ago... ? DOMTOT ☐ Higher ☐ Unchanged ☐ Lower

C11. How will the total demand for your products vary in the next 3 months? PRETOT ☐ Increase ☐ No change ☐ Decrease

(Answer to questions C12-C13 only if the share of sales revenues coming from residential building is positive, otherwise go to C14)

C12. Compared with three months ago, is the demand for residential building... ? DOMRES ☐ Higher ☐ Unchanged ☐ Lower

C13. How will the demand for residential building vary **in the next 3 months**? PRERES ☐ Increase ☐ No change ☐ Decrease

C14. Compared with three months ago, are credit conditions for your company ...? SITCRE ☐ Better ☐ Unchanged ☐ Worse

SECTION D – Changes in your firm's selling prices

D1. In the last 12 months, what has been the average change in your firm's prices? DPRE |__|__|__|.|__|%

D2. For the next 12 months, what do you expect will be the average change in your firm's prices? DPREZ |__|__|__|.|__|%

Please indicate direction and intensity of the following factors as they will affect your firm's selling prices **in the next 12 months**:

Factors affecting your firm's prices in the next 12 months	***Effect on firm's selling prices***			***Intensity*** *(if not nil)*		
	Downward	*Neutral*	Upward	*Low*	*Average*	High
D3. Total demand DPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D4. Raw materials prices MPPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D5. Intermediate input IITC	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D6. Labour costs CLPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D7. Pricing policies of your firm's main competitors PRPR	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D8. Inflation expectations dynamics AINF	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|
D9. Financial conditions CFIN	1|__|	2|__|	3|__|	1|__|	2|__|	3|__|

D10. In the last 12 months, what has been the average change in your firm's prices of goods and services bought in Italy and abroad? |_|_|_|.|_|% DPRE_INT

D11. In the last 12 months, what has been the average change in your firm's prices of goods and services bought in Italy and abroad? |_|_|_|.|_|% DPREZ_INT

SECTION E – Workforce

E1. Your firm's total number of employees in the next 3 months will be: OCCTOT

Lower	*Unchanged*	*Higher*
1|__|	2|__|	3|__|

SEZIONE F – Investment

F1. What do you expect will be the nominal expenditure on (tangible and intangible) fixed investment in 2019 compared with that in 2018?
☐ Much higher ☐ A little higher ☐ About the same ☐ A little lower ☐ Much lower INVPRE

F2. And what do you expect will be the nominal expenditure in the second half of 2019 compared with that in the first half of 2019:
☐ Much higher ☐ A little higher ☐ About the same ☐ A little lower ☐ Much lower INVSEM

NOTE: The responses "much higher" and "much lower" also apply when in the two periods compared investments are zero.

F3. Please rank in order of importance the following SOURCES OF INFORMATION choosing from those that you use the most to obtain financial information to support your business decisions (e.g. production, investments or entry into new markets).

(*Please indicate no more than 3*)

1. Newspapers (paper or online). 2. TV news. 3. Publications by public institutions (e.g. Bank of Italy, Istat or Ministry of the Economy and Finance) and business associations (e.g. Confindustria or Confartigianato). 4. Market consultancy and analysis services provided by private firms. 5. Direct contact with clients and/or suppliers. 6. Social media (e.g. Twitter or Facebook) ☐ FON1 ☐ FON2 ☐ FON3

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