ECONOMIA ITALIANA

Fondata da Mario Arcelli

La collocazione del sistema produttivo italiano nel contesto globale post covid

2022/1

Economia italiana

Fondata da Mario Arcelli

Sommario

La collocazione
del sistema produttivo italiano
nel contesto globale post covid

Measuring Italian firms' reaction to Big3s business cycle: a granular approach

Stefano Costa[*]
Federico Sallusti[*]
Claudio Vicarelli[*]
Davide Zurlo[*]

Abstract

In this work, we measure the reactivity of Italian firms value added to the dynamics of Germany, US and China's GDP during the 2005-2017 period. In particular, on the basis of "granular" approach recently developed in the empirical literature, we derive a firm-level measure of shock sensitivity, allowing to obtain the overall Italian business system's reactivity by merely adding up individual firm responses. Our results show that Italian internationalized firms were more sensitive to a GDP increase in the United States, rather than in Germany and China. In general, the contribution to overall reactivity derives predominantly from firms belonging to trade internationalization classes (Only importers, Only exporters, Two-way traders), while the contribution of firms with productive internationalization forms (Multinational linkages) appears to be very limited. There emerges a relevant contribution from Two-

---

∗   Istat − Italian National Institute of Statistics. Corresponding Author cvicarelli@istat.it

way traders, due to a higher concentration in this class of highly reactive firms, especially in industrial sectors deeply involved in GVCs. This result is more evident when we consider firms always present throughout the 2005-2017 period: two recessions affected more severely classes with the less advanced forms of internationalization, where the presence of highly reactive firms is lower.

Sintesi - La reazione delle imprese italiane al ciclo economico delle Big3: un approccio granulare.

In questo lavoro si misura la reattività del valore aggiunto delle imprese italiane alla dinamica del PIL di Germania, USA e Cina nel periodo 2005-2017. In particolare, sulla base dell'approccio "granulare" recentemente sviluppato nella letteratura empirica, per ogni impresa attiva sui mercati esteri si ricava una misura della sensibilità agli shock, che consente di ricostruire la reattività complessiva del sistema produttivo italiano come somma dei risultati individuali. L'evidenza mostra una maggiore sensibilità delle imprese ad un aumento del PIL negli Stati Uniti piuttosto che in Germania e Cina. In generale, il contributo alla reattività complessiva deriva prevalentemente dalle imprese appartenenti alle classi di internazionalizzazione commerciale (Solo importatori, Solo esportatori, Two-way traders), mentre il contributo delle imprese con forme di internazionalizzazione produttiva (Multinazionali) appare molto limitato. Emerge un contributo rilevante dei Two-way traders, dovuto ad una maggiore concentrazione in questa classe di imprese altamente reattive, soprattutto nei settori industriali più coinvolti nelle GVC. Questo risultato è evidente soprattutto se si considerano le imprese sempre presenti per tutto il periodo 2005-2017: le due recessioni hanno colpito più duramente le classi con forme di internazionalizzazione meno avanzate, dove è minore la presenza di imprese altamente reattive.

1. Introduction

In a context of strongly interconnected economies, the dynamics of countries' GDP and firms' value added increasingly depends on the growth of their foreign trading partners. As a result, national economies can be negatively or positively impacted by sector- or country-level shocks affecting partner countries. Furthermore, strong ties such as bilateral trade and multinational production linkages make business cycles more correlated to each other (Frankel and Rose, 1998).

This is all the more true for Italy, an export-oriented economy with a strong manufacturing base and close trade integration with several countries: as a matter of fact, foreign demand has always been a relevant factor for Italian growth in the last decades, making Italy business cycle tightly linked to the Euro area's one (Belke et al., 2017).

However, these ties have been weakened in the last 15 years, characterized by two different episodes of crisis, which made Italian business cycle deviate from the ones of other main advanced economies. After the GDP fall caused by the international trade collapse (2008-2009), Italy has experienced a brief recovery followed by a second period of recession (2011-2013), due to a crisis of confidence in its public debt sustainability. This trends led to a clear gap in the growth path of Italy with respect to those of main European (e.g. Germany) and non-European economies (United States and China).

Theoretical and empirical literature has deeply investigated how small shocks amplify and propagate through the economies causing sizable fluctuations. The view adopted has been mainly a macroeconomic one: among others, shocks can originate from, and be transmitted through, real channels (investments, capital accumulation, productivity, trade, technology) or finan-

cial ones (capital controls, liquidity, banking system, credit market friction), as well as changes in monetary policy. In this vein, we can just limit to recall some of main seminal works: Stock and Watson (1999) verified the empirical relationship, in the postwar US, between the aggregate business cycle and various macroeconomic variables, such as production, interest rates, prices, productivity, sectoral employment, investment, income, and consumption. Kydland and Prescott (1982) pointed out the investment and capital accumulation responses in real business-cycle models; Frankel and Rose (1998) investigated the relationship between international trade patterns and international business cycle correlations; Bernanke et al (1999) highlighted the role of credit market frictions facing firms, households and banks; Friedman and Schwartz (1971) analyzed the consequences of monetary policy on business cycle and shock transmission.

However, the "granularity" approach, originated by the seminal work of Gabaix (2011), has showed that the origins of business cycles may be traced back to micro disturbances, arising from idiosyncratic shocks to individual firms. In particular, this would occur in two cases: (a) when firms are large enough to significantly affect the dynamics of a country's GDP, value added or exports (Gabaix, 2011); (b) when the linkages among sectors are such as to allow for possible shocks occurring in a single industry — e.g. a significant change in the international trade relations of this sector — to spread to the rest of the business system (Acemoglu et al., 2012; Carvalho and Gabaix, 2013).

A large stream of literature has applied this intuition not only to the business cycle fluctuations but also to the volatility of other macroeconomic aggregates, including international trade flows (see, for example, di Giovanni et al., 2014 and 2018; Carvalho and Grassi, 2019). In this vein, di Giovanni et

al. (2018) look at the role of direct (export, import, cross-border ownership) and indirect (upstream and downstream relationships of domestic firms) linkages on co-movement between French economy and partner countries business cycle between 1993 and 2007 at the micro level. This approach has also been applied to Italian case (Costa et al., 2021), with a different time span, including two recessions (2008-2009 and 2011-2013) which heavily affected the economy.

In this work we apply the "granular" framework in a different way: rather than dealing with business cycles co-movements, we measure the reactivity (in terms of direction and intensity of reaction) of the Italian business system to the dynamics of its three main trading partners' GDP in a period (2005-2017) characterized by the aforementioned episodes of crisis. In particular, we derive a firm-level measure of shock sensitivity, allowing to obtain the overall Italian business system's reactivity to other advanced economies by merely summing up the individual firm responses. In other words, the objective is to measure, given the growth paths observed in the reference period, in which direction and to what extent a change in the GDP growth rate of partner countries would affect the dynamics of Italian firms' value added. This approach, to the best of our knowledge, is quite a novelty in the economic literature.[1]

The rest of the paper is organized as follows. Section 2 describes the dataset, the taxonomy of internationalization forms and the methodology adopted to derive a firm-level measure of reaction to foreign GDPs. Section 3 discusses the empirical findings. Section 4 concludes.

---

1 The only example of adoption of this approach we are aware of is Armenise et al (2021)'s work, which uses the same firm-level response index of ours for geographical analysis purposes, in particular to measure the reactivity of Italian territories (both at regional and sub-regional level) to foreign economies' growth.

2. Data and method

2.1. The dataset and the taxonomy of internationalization forms

We build our analysis on the universe of Italian firms in the period 2005-2017. In particular, we integrate the following three micro-databases:

a) the business register Frame-Sbs, which annually reports information on firms' structure (number of workers, business sector, location, age) and Profit and Losses account variables (value of production, turnover, value added, labour cost) for all of the over 4 million Italian firms operating in manufacturing and services (excluding agriculture, finance and public administration);

b) the business register "Asia Groups" which, on a census basis, indicates whether a firm operating in Italy belongs to a group, also specifying if the group has foreign headquarters or affiliates;

c) the Coe-Tec business register, which provides the annual value of bilateral foreign trade of all Italian exporting and importing firms, with specification about export destination and import origin countries.

Restrictions have been imposed to the dataset in order to focus on relevant firms. In particular, bearing in mind the structure of the Italian business system, characterized by an overwhelming presence of SMEs (in 2017 firms with less than 10 workers accounted for over 95% of total firms, 45% of total employment and 22% of total value added), we chose to consider only firms with more than 1 worker and positive value added. This generates an unbalanced panel dataset covering the universe of 1,974,400 firms operating in Italy for at least three years during the 2005-2017 period.

In this paper we consider only the sub-sample of internationalized firms, proxied by units having relationships with at least one of 10 Italy's main trading partners in 2017.[2] In particular, we are interested in the relationships between Italian firms and the three largest economies among these latters: Germany, the United States and China (Big3s).[3] In particular, we consider firms with links of import, export, inward or outward corporate relationships.[4] In this context two sets of enterprises are analyzed:

a) the "directly connected" firms, i.e. those with at least a direct link with Usa and/or Germany and/or China;

b) the "other internationalized", i.e. firms which, even though they do not have direct links with one of the Big3s, have direct links with at least one of the other nine foreign economies considered.

This entails further restriction to our dataset: ruling out domestic enterprises, we are left with the universe of nearly 300,000 firms which participated in international markets in the 2005-2017 period.

Moreover, the economic literature pointed out that the performance of firms and business systems on international markets also depends on the in-

---

2 The ten economies are Germany, France, Switzerland, the Netherlands, Spain, Belgium, Poland, the United States, China and United Kingdom, which in 2017 accounted for about 60% of total Italian export.

3 They represent three different typologies of market: two of them (Germany and US) are advanced countries and markets with which Italy has well-established bilateral trade, and they are very different in terms of geographical distance. China, on the other hand, is the main emerging economy and is geographically distant; in the last twenty years it has rapidly increased its role on global trade. The relevance of economy size and geographical distance in shaping bilateral trade flows between countries has been widely highlighted in theoretical and empirical literature since Tinbergen (1962), mostly based on gravity models. For a survey, see among others De Benedictis and Taglioni (2011).

4 In a previous work (Costa et al., 2021), we showed that in presence of a small group of internationalized firms and a large group of small and not internationalized ones, the co-movements between the Italian business cycle and those of its main trading partners are mostly explained by the former group, because of both their direct links and indirect activation effects (e.g. via transactions with domestic units) on the rest of the business system. When moving from the evaluation of co-movements to the study of reaction, the internationalized segment of the business system becomes the natural reference for the analysis.

ternationalization model that firms are able to adopt.[5] In this respect, it is possible to build a taxonomy consisting of five mutually exclusive classes, each of them indicating a different mode of operating in foreign markets.[6] The first three classes are related to "trade" internationalization, the other two are related to "productive" internationalization. In particular, for each one of the Big3s we consider:

1. *Only importers*: firms which import from the given Big3 but not export to it;
2. *Only exporters*: firms which export to the given Big3 but not import from it;
3. *Two-way traders*: firms both exporting/importing to/from the given Big3;
4. *Inward MNEs*: firms belonging to multinational groups headquartered in the given Big3;
5. *Outward MNEs*: firms belonging to multinational groups headquartered in Italy with affiliates in the given Big3.

Finally, there is a residual class, *Other internationalized*, including the units with direct linkages to countries different from the given Big3 (including the other two).

Every firm is assigned to a single class. If a firm has more than one characteristic among those selected for the assignment along the internationalization scale, it is attributed to the higher class (e.g. if a firm is controlled from abroad, does not have any import activity and only exports to the given Big3, then it is allocated to the *Inward MNEs* class, rather than among the *Only*

---

5 There is a systematic relationship between complexity of internationalization forms and productivity, due to the fact that more complex internationalization strategies entail higher costs that only firms that are sufficiently productive are able to bear. See Altomonte et al. (2012).
6 The taxonomy here adopted grounds on the ones used by Altomonte et al. (2012) and Costa et al. (2017).

exporters one).

Furthermore, in order to account for the role of "hard core" of Italian business system, we also consider the balanced version of the dataset, including only the firms always present in 2005-2017. In this way, the comparison between the results obtained from the two datasets can be interpreted as a proxy of the contribution of "persistent" firms on the reactivity of Italian business system to the Big3s' business cycles. This latter restriction leads to a new dataset of about 87,000 observations.

The characteristics of these two datasets are reported in Table 1, by class of internationalization form.

In the unbalanced panel, in the period 2005-2017 firms with direct linkages with Big3s were around 40% of the total. Among them, as expected, there is a large predominance of trade internationalization forms, confirming the marginal role of the productive internationalization. Outward and inward MNEs are relevant in terms of average size and per-unit value added but their contribution to the overall economic activity is limited, in terms of both value added (their share on total is 5.7%) and employment (less than 4%). It is worth noticing the role of Two-way traders: among firms with direct linkages to Big3s, they cover the most relevant share in terms of value added (42.4%) and employment (35.2%).

Firms always present in the 2005-2017 period – characterized, as previously described, by important episodes of crisis –, represent less than 30% of the panel as a whole. However, their distribution between the internationalization classes appears quite similar to that of the whole panel. Beyond the majority share of firms directly connected with countries other than the Big3s, Only importers keep being the most relevant group, followed by Two-way traders. This latter class continues showing the highest share of employment and value added.

Table 1 − **Summary statistics of Non balanced and balanced datasets, by class of internationalization**

Non balanced panel					
Internationalization forms	Units	Workers		Value added	
		Mean	Share in total	Mean (x 1000 €)	Share in total
Other internationalized	184,703	12.9	35.0	624.6	27.0
Importers	50,611	25.4	18.9	1,581.4	18.7
Exporters	28,467	17.0	7.1	932.8	6.2
Two-way traders	32,988	72.6	35.2	5,495.6	42.4
Inward MNEs	908	145.3	1.9	11,964.8	2.5
Outward MNEs	991	121.9	1.8	13,784.9	3.2
Total	**298,668**	**22.7**	**100.0**	**1,432.3**	**100.0**

Balanced panel					
Internationalization forms	Units	Workers		Value added	
		Mean	Share in total	Mean (x 1000 €)	Share in total
Other internationalized	49,914	15.3	32.5	789.6	23.1
Importers	14,991	28.1	17.9	1,924.3	16.9
Exporters	8,247	21.7	7.6	1,304.4	6.3
Two-way traders	13,258	65.8	37.2	5,865.9	45.5
Inward MNEs	254	142.5	1.5	13,966.4	2.1
Outward MNEs	401	190.1	3.2	26,023.8	6.1
Total	**87,066**	**27.0**	**100.0**	**1,961.4**	**100.0**

Source: authors calculation on Istat data

2.2. The firm-level reactivity indicator

The main goal of this paper is to measure the Italian firms' response to Big3s growth dynamics. With this aim, we run an exercise that quantifies the variation of the Italian firms' value added in reaction to a hypothetical +1% in the observed annual growth rates of Germany, the United States and China during the 2005-2017 period.

In particular we calculate the parameters (β) indicating the OLS marginal effects of GDP growth rates of Big3s on the Italian firms' value added. The parameters are obtained as follows.

The aggregate Italian value added growth rate is:

$$\gamma_{At} = \sum_f w_{t-1} \gamma_{ft} \tag{1}$$

where γ_{At} is the aggregate Italian value added and w_{t-1} is a system of weights defined by the share of each firm f value added on the Italian total value added; γ_{ft} is the growth rate of the value added of firm f.

The correlation between Italian value added growth rate and foreign country C's GDP growth rate is:

$$\rho(\gamma_{At}, \gamma_{Ct}) = \frac{\mathrm{cov}(\gamma_{At}, \gamma_{Ct})}{\sigma_A \sigma_C} \tag{2}$$

where ρ is the correlation, γ_{Ct} is the GDP growth rate of foreign country C; σ_A and σ_C are the respective standard deviations.

Substituting Equation (1) in Equation (2), we obtain:

$$\rho\left(\gamma_{At}, \gamma_{Ct}\right) = \frac{\mathrm{cov}\left(\sum_f w_{t-1} \gamma_{ft}, \gamma_{Ct}\right)}{\sigma_A \sigma_C} =$$
$$= \frac{\sum_f w_{t-1} \mathrm{cov}\left(\gamma_{At}, \gamma_{Ct}\right)}{\sigma_A \sigma_C} = \sum_f w_{t-1} \frac{\sigma_f}{\sigma_A} \rho\left(\gamma_{ft}, \gamma_{Ct}\right) \qquad (3)$$

where σ_f is the standard deviation of firm f's value added.

The last term of Equation (3) is valid because:

$$\mathrm{cov}\left(\gamma_{ft}, \gamma_{Ct}\right) = \rho\left(\gamma_{ft}, \gamma_{Ct}\right) \sigma_f \sigma_C \qquad (4)$$

In our case, parameter β of the marginal effects is:

$$\beta\left(\gamma_{At} \mid \gamma_{Ct}\right) = \frac{\mathrm{cov}\left(\gamma_{At}, \gamma_{Ct}\right)}{\sigma_C^2} \qquad (5)$$

where σ_C^2 is the variance of γ_{Ct} and where

$$\beta\left(\gamma_{At} \mid \gamma_{Ct}\right) = \frac{\mathrm{cov}\left(\sum_f w_{t-1} \gamma_{ft}, \gamma_{Ct}\right)}{\sigma_C^2} = \frac{\sum_f w_{t-1} \mathrm{cov}\left(\gamma_{ft}, \gamma_{Ct}\right)}{\sigma_C^2} \qquad (6)$$

However, since:

$$\mathrm{cov}\left(\gamma_{ft}, \gamma_{Ct}\right) = \beta\left(\gamma_{ft} \mid \gamma_{Ct}\right) \sigma_C^2 \qquad (7)$$

substituting Equation (7) in Equation (6) we obtain:

$$\beta\left(\gamma_{At} \mid \gamma_{Ct}\right) = \frac{\text{cov}\left(\sum_{f} w_{t-1}\gamma_{ft}, \gamma_{Ct}\right)}{\sigma_{C}^{2}} =$$

$$= \frac{\sum_{f} w_{t-1}\text{cov}\left(\gamma_{ft}, \gamma_{Ct}\right)}{\sigma_{C}^{2}} = \sum_{f} w_{t-1}\beta\left(\gamma_{ft} \mid \gamma_{Ct}\right) \tag{8}$$

In other terms, country $A's$ reactivity to country $C's$ GDP is the sum of country $A's$ firms' reactivity. It follows that $\beta\left(\gamma_{At} \mid \gamma_{Ct}\right)$ can be obtained by any aggregation of individual based on a combination of disjoint sets of firms:

$$\beta\left(\gamma_{At} \mid \gamma_{Ct}\right) = \sum_{f \in I_{C}} w_{t-1}\beta\left(\gamma_{ft} \mid \gamma_{Ct}\right) + \sum_{f \in I_{C}^{C}} w_{t-1}\beta\left(\gamma_{ft} \mid \gamma_{Ct}\right) \tag{9}$$

where I_C and I_C^C are two generic disjoint sets of firms.

3. Results

As showed in the previous section, we are able to obtain a measure of aggregated elasticity from firm-level response coefficients. After having calculated firm-level response to foreign shocks, we can obtain the aggregate response of Italian internationalized firms on foreign GDP changes by summing up the firm-level coefficients as in Equation (8).

Furthermore, following Equation (9) we separately consider the contribution of firms directly connected to Big3s and Other internationalized firms. Results are reported in Table 2.

Table 2 - **Contribution of directly and indirectly connected firms to Italy's reactivity to Big3s**
(increase in Italian firms' value added in response to an increase of 1% of GDP in the given Big3)

	Germany	USA	China
Other internazionalized	0.243	0.606	0.179
Directly connected	1.170	1.197	0.271
Total reactivity	**1.414**	**1.803**	**0.450**

Source: authors' calculation on Istat data

Between 2005 and 2017, Italian internationalized firms were more sensitive to a GDP increase in the United States, to an extent about a quarter higher than the reaction to Germany and about four times higher than that to China. In this context, the higher sensitivity to US with respect to Germany might be, a first sight, surprising. This result could be read in the light of two factors: a) the different stance of fiscal and monetary policies in Germany and US in the period considered; b) the heterogeneous cyclical dynamics of Italy compared to the Big3s' ones.

As for the first element, in the period observed, European countries, and Germany in particular, fiscal policy stance has been restrictive, due to the EMU rules aiming to deal with high levels of government debt and their dispersion across the euro area. This is not the case for US, where fiscal policy stance has generally been more accomodative, sustaining US domestic demand to a larger extent. Also monetary policy in US has had a more sustained pro-cyclical role than in EU, in particular after the financial crisis and the following trade collapse, when the US stance continued to be expansionary while in EU it became restrictive

As for the heterogeneity in business cycle dynamics, after the rebound following the 2009 recession, Germany (unlike Italy, see Section 1), while showing a rather marked slowdown, continued recording positive GDP growth

rates, subsequently showing a new acceleration path. After the recovery in 2010, however, US GDP growth rates were more dynamic and above all more stable, even in comparison with those of main European countries. Finally, in the same period, GDP growth rates in China experimented a progressive and constant deceleration trend of about three percentage points. These dynamics determined a greater volatility of the German business cycle, similar to that of China but much higher than that of the United States.[7] In the period characterized by the last recession and the first years of recovery, the Italian business system would therefore have had a stronger reaction to a stimulus coming from the country which, in the same years, experienced a more stable growth.

The higher reactivity to US GDP growth depends, to a large extent, on the contribution of Other internationalized firms, i.e. those not directly connected with the United States: the group of firms with a direct connection to the United States shows an elasticity of a similar magnitude to that which firms directly connected to Germany display with respect to the German GDP growth.

Following Equation (9), the overall reactivity can also be decomposed using the taxonomy presented in section 2.1. Results are reported in Table 3.

In general, the contribution to overall reactivity derives predominantly from trade internationalization classes (Only importers, Only exporters, Two-way traders), while the contribution of productive internationalization forms appears to be very limited. However, being the overall elasticity built by summing up the firm-level coefficients, this firstly reflects the number of firms in each class. In assessing the contribution of each internationalization class to Italy's overall reaction to the Big3s GDP, we therefore need to take this element into account.

---

7   In 2005-2017 the business cycle volatility, measured by standard deviation of real GDP growth rates, was 2.5 for Germany, 2.3 for China, and 1.5 for the United States.

Table 3 - **Reactivity to Big3s by internationalization classes (2005-2017)**

		Reactivity		Firms		Value added		Average size	Productivity	Industry	Services
		Value	%	N.	%	million €	%	Workers/ n. firms	Value added/ workers; €	%	%
Germany											
Other internationalized		0.243	17.2	142,209	47.6	69,008.8	16.1	10.7	45,256.4	41.8	51.6
Directly connected	Importers	0.312	22.0	76,298	25.5	103,912.1	24.3	23.6	57,766.8	16.9	31.6
	exporters	0.075	5.3	29,468	9.9	18,264.4	4.3	12.1	51,226.9	15.2	6.2
	2-way traders	0.699	49.5	48,070	16.1	207,144.9	48.4	58.6	73,488.2	25.3	9.7
	Inward MNEs	0.048	3.4	1,355	0.5	12,159.8	2.8	112.7	79,626.4	0.4	0.5
	Outward MNEs	0.036	2.6	1,268	0.4	17,283.9	4.0	109.7	124,208.0	0.5	0.4
Total		**1.414**	**100.0**	**298,668**	**100.0**	**427,773.9**	**100.0**	**22.7**	**62,993.0**	**100.0**	**100.0**
United States											
Other internationalized		0.606	33.6	202,328	67.7	128,479.1	30.0	13.3	47,636.0	56.8	75.3
Directly connected	Importers	0.194	10.8	25,242	8.5	51,540.0	12.0	29.7	68,774.1	6.3	9.9
	exporters	0.171	9.5	40,083	13.4	36,168.3	8.5	17.4	51,977.1	21.0	8.2
	2-way traders	0.728	40.4	28,376	9.5	171,727.1	40.1	78.9	76,722.5	15.0	5.7
	Inward MNEs	0.070	3.9	1,370	0.5	20,444.1	4.8	177.5	84,071.7	0.4	0.5
	Outward MNEs	0.033	1.9	1,269	0.4	19,415.2	4.5	131.6	116,265.6	0.5	0.4
Total		**1.803**	**100.0**	**298,668**	**100.0**	**42,7773.9**	**100.0**	**22.7**	**62,993.0**	**100.0**	**100.0**
China											
Other internationalized		0.179	39.7	209,571	70.2	148,588.3	34.7	13.9	51,131.2	62.6	75.4
Directly connected	Importers	0.094	21.0	50,293	16.8	84,662.5	19.8	25.9	65,041.2	15.9	17.5
	exporters	0.030	6.7	15,849	5.3	25,226.6	5.9	25.5	62,522.1	8.7	3.0
	2-way traders	0.141	31.4	22,518	7.5	164,999.3	38.6	94.3	77,707.0	12.7	4.0
	Inward MNEs	-	-	-	-	-	-	-	-	-	-
	Outward MNEs	0.005	1.2	437	0.1	4,297.2	1.0	128.8	76,342.2	0.2	0.1
Total		**0.450**	**100.0**	**298,668**	**100.0**	**427,773.9**	**100.0**	**22.7**	**62,993.0**	**100.0**	**100.0**

Source: authors' calculation on Istat data.

In fact, the contribution of Other internationalized is relevant in each Big3s, because of the high number of firms included in this group (i.e. all firms directly connected to at least one of the remaining nine Italy's trading partners). More in detail, their higher contribution on the total reactivity towards the United States and China (33.6 and 39.7%, respectively) with respect to Germany (17.2%) is attributable to a smaller share of directly connected firms, in line with the literature highlighting the role of geographical, currency and regulatory factors in determining markets entry costs.

On the other hand, the elasticity of Only importers is relevant in each Big3s. As far as Only importers from Germany are concerned, their high elasticity can partly be attributed to the high number of firms belonging to this class, equal to 1.5 times that of Only importers from China and 2 times that of Only importers from the United States. The contribution of productive internationalization forms to the overall reactivity is limited because of the low number of MNEs. As far as Outward MNEs are concerned, no significant differences emerge in the reactivity of Italian-controlled firms in Germany and the United States.

However, the high contribution of Two-way traders, a type of firms deeply involved in GVCs, (Giglioli et al. 2021), especially those connected with Germany and the United States, is not primarily due to the number of firms in this class, but it rather seems related to their relevance within the Italian business system. To take into account this aspect, Table 3 shows, alongside the degree of reactivity of these classes (expressed as a share of total reactivity), also their composition in terms of value added. A comparison between these two shares provides a first clue of a greater or lesser concentration of more reactive firms in these classes: a higher reactivity share compared to value added share indicates a relative concentration of more reactive firms.

In particular, as for Two-way traders with Germany, there is a significant concentration of reactive firms. Conversely, Two-way traders with China show a lower concentration of reactive firms, as does the class of Only importers from Germany. As regards MNEs, only in the case of German Inwards and China Outwards, the contribution to total elasticity is driven by the high average reactivity of these firms to the business cycle of those two countries.

Table 3 also allows to consider firms' characteristics along the different internationalization forms. In general, for each Big3, average size and productivity increase as complexity of internationalization forms increases (Two-way traders, MNEs). This is in line with similar evidences from other analyses applying this type of taxonomies to the study of the presence of Italian firms in the international markets (see Costa et al 2017; Istat 2017; Giglioli et al. 2021). Among the trade internationalization forms, Two-way traders show highest productivity and value added share. Furthermore, direct trade connections (Only importers, Only exporters, Two-way traders) with China and the United States involve a higher-than-average size and productivity with respect to direct relationships with Germany, confirming the role of geographical distance in determining the cost of accessing those markets.

Finally, results are shaped by a strong sectoral heterogeneity: more than 80% of firms operating in services are concentrated in the classes of Other internationalized and Only importers, confirming the structural low presence of exporters in Italian services (Istat 2017). Conversely, productive internationalization forms show a similar, albeit limited, presence in industry and services. Particularly, Two-way traders are relatively more present in industrial sectors deeply involved in GVCs: Motor vehicles, Electric and electronic equipment, Machinery, Chemicals and Pharmaceutics and, relating to Germany, Textiles, Paper and Metals. Concerning Only importers, which strongly

contribute to total reactivity for each Big3, the incidence of firms importing from the United States is by far higher in Broadcasting, Telecommunication, ICT and Professional services. The incidence of Only importers from China are instead higher in Pharmaceutics and Electric and Electronic equipment.

As already mentioned, the period under observation was characterized by two important episodes of economic crisis, which strongly affected the Italian economy. For this reason, we are interested in considering the "hard core" segment of Italian business system, whose role can be assessed by calculating firm elasticity on a balanced panel of units that were always present on foreign markets throughout the 2005-2017 period. Results for each class of internationalization are reported in Table 4.[8]

In this context, while stepping from unbalanced to balanced panel about two-third of units are lost (see also Table 1), the total reactivity decreases only by the half. This evidence highlights that persistent firms are, on average, more reactive with respect non-persistent ones to Big3s business cycle dynamics.

In particular, when we compare the reactivity of the internationalized firms in these two datasets, an increasing role of Two-way traders emerges; these latters, as previously seen, are the group with the highest concentration of the most reactive firms and they are presumably more involved in GVCs. Indeed, in the balanced panel, compared to the unbalanced one, their share in terms of units, as well as the contribution to reactivity and total value added, increases in each Big3. At the same time, the contribution of less advanced forms of internationalization decreases.

---

8 Note that since the number of firms considered is the same for each foreign country, the total incidence of "persistent" firms (i.e. units that were more resilient to the economic effects of the two recessions) on results is the same for each Big3, while the breakdown by internationalization class is different. In the face of a general fall in the number of firms in each class, the contribution of the different forms of internationalization to the total reactivity changes.

Table 4 **Reactivity to Big3s by internationalization classes, balanced panel (2005-2017)**

		Reactivity		Firms		Value added		Average size	Productivity	Industry	Services
		Value	%	N.	%	million €	%	Workers/ n. firms	Value added/ workers; €	%	%
Germany											
Other internationalized		0.077	11.6	33,289	38.2	21,019.1	12.3	12.9	49,011	34.3	42.3
Directly connected	Importers	0.116	17.4	25,019	28.7	34,595.4	20.3	23.3	59,348	20.2	37.5
	exporters	0.029	4.3	7,995	9.2	6,689.7	3.9	14.0	59,624	12.7	5.6
	2-way traders	0.391	58.4	19,857	22.8	89,933.7	52.7	54.4	83,255	31.9	13.5
	Inward MNEs	0.022	3.4	410	0.5	4,560.3	2.7	125.1	88,899	0.4	0.6
	Outward MNEs	0.033	4.9	496	0.6	13,975.6	8.2	190.1	148,191	0.6	0.5
Total		**0.668**	**100.0**	**87,066**	**100.0**	**170,773.6**	**100.0**	**22.7**	**72,676**	**100.0**	**100.0**
United States											
Other internationalized		0.240	27.1	56,759	65.2	44,896.3	26.3	15.6	50,740	56.2	74.5
Directly connected	Importers	0.093	10.4	7,071	8.1	18,669.1	10.9	34.5	76,605	6.5	9.8
	exporters	0.097	10.9	11,525	13.2	14,992.9	8.8	23.4	55,610	18.7	7.6
	2-way traders	0.409	46.1	10,850	12.5	71,158.9	41.7	72.5	90,402	17.6	7.2
	Inward MNEs	0.025	2.8	352	0.4	6,082.1	3.6	162.7	106,188	0.4	0.5
	Outward MNEs	0.023	2.6	509	0.6	14,974.2	8.8	210.7	139,629	0.7	0.4
Total		**0.886**	**100.0**	**87,066**	**100.0**	**170,773.6**	**100.0**	**27.0**	**72,676**	**100.0**	**100.0**
China											
Other internationalized		0.075	35.2	59,695	68.6	52,325.3	30.6	16.4	53,382	60.7	76.7
Directly connected	Importers	0.044	20.5	12,884	14.8	33,280.9	19.5	33.9	76,251	14.7	14.9
	exporters	0.015	6.9	5,222	6.0	10,591.7	6.2	29.5	68,666	8.9	3.0
	2-way traders	0.075	35.5	9,067	10.4	72,218.9	42.3	82.9	96,067	15.4	5.3
	Inward MNEs	-	-	-	-	-	-	-	-	-	-
	Outward MNEs	0.004	1.9	198	0.2	2,356.8	1.4	137.1	86,835	0.3	0.1
Total		**0.212**	**100.0**	**87,066**	**100.0**	**170,773.6**	**100.0**	**27.0**	**72,676**	**100.0**	**100.0**

Source: authors' calculation on Istat data.

4. Conclusions

In this paper we provide a first firm-level measure of the reactivity of Italian business system to the GDP growth of Italy's "Big3s" trading partners – i.e. Germany, United States and China –, in a period (2005-2017) in which the Italian economy was hit by two recessions, and partially deviated from the business cycle of main advanced countries. Our approach, grounded in the "granularity" framework (di Giovanni et al., 2018), is quite a new one in economics, and allows to measure to what extent an increase/reduction in the GDP growth rate of the Big3s would have changed the dynamics of Italian firms' value added.

Our results show that in the period 2005-2017, Italian internationalized firms were more sensitive to a GDP increase in the United States, to an extent of about a quarter higher than that with respect to Germany and about four times higher than that to China. In other terms, in this period the Italian business system would have been more responsive to a stimulus coming from the country which, in the same years, experienced a more stable growth, strongly sustained by domestic demand.

The contribution to overall reactivity predominantly derives from trade internationalization forms (Only importers, Only exporters, Two-way traders), while the contribution of productive ones (presence of foreign affiliates or headquarters) appears to be very limited. This reflects both the number of firms in each class and their relevance in the Italian business system.

In particular, the elasticity of Only importers is relevant in each Big3 and, especially with reference to the Italy-Germany relationships, can be attributed to the high number of firms belonging to this class. Conversely, the contribution of productive internationalization forms to the overall reactivity is scarce

because of the low number of MNEs, even though these latters are by far the larger and more productive class of internationalized firms.

Furthermore, among the Two-way traders with Germany there is a significant concentration of highly reactive firms. This can be partially due to the higher degree of participation in GVCs. Conversely, Two-way traders connected with China show a low concentration of more reactive firms.

In assessing the role of the "hard core" of Italian business system – i.e. the firms always present throughout the 2005-2017 period – total units decrease by about two-third, but the total reactivity decreases only by the half. This confirms that persistent firms are, on average, more reactive than non-persistent ones to Big3s' business cycle dynamics: two recessions affected more severely the less advanced forms of internationalization, where the presence of highly reactive firms is lower.

In particular, the role of Two-way traders now stands out in shaping the overall reactivity, as this is the group with the highest concentration of highly reactive firms. This result is relevant also because these firms are more present in industries deeply involved in GVCs.

References

[1] Acemoglu D, Carvalho VM, Ozdaglar A, Tahbaz-Salehi A (2012) The network origins of aggregate fluctuations. Econometrica 80:1977-2016.

[2] Altomonte, C., Aquilante, T. & Ottaviano, G. I. P. (2012). The triggers of competitiveness: The EFIGE cross-country report. Bruegel Blueprint n.17.

[3] Armenise M., Benassi F., D'Elia M., Mantuano M., Petrei F. (2021) The Exposure Geography of Italian Local Economies to Major Foreign Ones. Evidences from a Multiscale Spatial Experiment Based on Granularity. Journal of Economics and Statistics. https://doi.org/10.1515/jbnst-2020-0064

[4] Bernanke BS, Gertler M, Gilchrist S (1999) The financial accelerator in a quantitative business cycle framework. Elsevier, Handbook of Macroeconomics, vol 1, part C, pp.1341-1393.

[5] Carvalho VM, Gabaix X (2013) The Great Diversification and Its Undoing. American Economic Review 103 (5): 1697–1727

[6] Belke A. , C. Domnick, D. Gros (2017) Business Cycle Synchronization in the EMU: Core vs. Periphery. Open Economies Review, 28 (5): 863-92

[7] Carvalho VM, Grassi B (2019) Large firm dynamics and the business cycle. American Economic Review 109:1375-1425

[8] Costa S., Pappalardo C., and Vicarelli C. (2017), Internationalization choices and Italian firm performance during the crisis, Small Business Economics volume 48, 753–769.

[9] Costa S., Sallusti F., Vicarelli C., Zurlo D. (2021) From Micro to Macro: Micro-Foundations of the Italian Business Cycle Co-movements during the Crisis. Italian Economic Journal, hiips://doi.org/10.1007/s40797-021-00163-2

[10] De Benedictis, L. and D. Taglioni (2011), The Gravity Model in International Trade, in L. De Benedictis and L. Salvatici (Ed.), *The Trade*

Impact of European Union Preferencial Policies. Springer.

[11] di Giovanni J, Levchenko AA, Méjean I (2014) Firms, destinations, and aggregate fluctuations. Econometrica 82: 1303-1340.

[12] di Giovanni J., A.A. Levchenko and I. Méjean (2018) The micro origins of international business-cycle comovement. American Economic Review, 108(1): 82–108.

[13] Frankel J, Rose A (1998) The Endogeneity of the Optimum Currency Area Criteria. The Economic Journal 108 (449): 1009–25.

[14] Friedman M, Schwartz AJ (1971) A Monetary History of the United States, 1867–1960. Princeton, NJ: Princeton University Press.

[15] Gabaix X (2011) The granular origins of aggregate fluctuations. Econometrica 79:733-772.

[16] Giglioli, S., G. Giovannetti, E. Marvasi, and A. Vivoli, 2021. The resilience of global value chains during the Covid-19 pandemic: the case of Italy. *Working Papers - Economics* N. 7/2021, Universita' degli Studi di Firenze, Dipartimento di Scienze per l'Economia e l'Impresa.

[17] Istat (2017) Rapporto sulla competitività dei settori produttivi.

[18] Kydland F, Prescott E (1982) Time to Build and Aggregate Fluctuations. Econometrica 50:1345–1371.

[19] Stock JH, Watson MW (1999) Business Cycle Fluctuations in US Macroeconomic Time Series. Handbook of Macroeconomics, vol 1. Pp. 3-64, Elsevier.

[20] Tinbergen, J. (1962) *Shaping the World Economy: Suggestions for an International Economic Policy*. The Twentieth Century Fund, New York.

PARTNER ISTITUZIONALI

aeb
ASSONEBB

AIDC
Associazione Italiana
Dottori Commercialisti

1991
FONDAZIONE
DI PIACENZA E VIGEVANO

BUSINESS PARTNER

IMI | CORPORATE &
INVESTMENT
BANKING
INTESA nnn SANPAOLO

BAT
ITALIA

Deloitte.

Mercer

sara
ti assicura

SOSTENITORI

Aetos Partners	Investire SGR
Allianz Bank F.A.	ISTAT
Assonime	Kuwait Petroleum Italia
Banca Aletti	Leonardo
Banca d'Italia	Natixis IM
Banca Profilo	Oliver Wyman
Cassa Depositi e Prestiti	SACE
Confcommercio	Sisal
Confindustria Piacenza	TIM
CONSOB	Unicredit
Gentili & Partners	Ver Capital

Per attivare un nuovo abbonamento
effettuare un **versamento** su:

c/c bancario n. 10187 Intesa Sanpaolo
Via Vittorio Veneto 108/b - 00187 ROMA

IBAN IT92 M030 6905 0361 0000 0010 187

intestato a: **Editrice Minerva Bancaria s.r.l.**

oppure inviare una **richiesta** a:
amministrazione@editriceminervabancaria.it

Condizioni di abbonamento ordinario per il 2022

	Rivista Bancaria Minerva Bancaria bimestrale	**Economia Italiana** quadrimestrale	**Rivista Bancaria Minerva Bancaria + Economia Italiana**
Canone Annuo Italia	**€ 100,00** causale: MBI22	**€ 60,00** causale: EII22	**€ 130,00** causale: MBEII22
Canone Annuo Estero	**€ 145,00** causale: MBE22	**€ 80,00** causale: EIE22	**€ 180,00** causale: MBEIE22
Abbonamento WEB	**€ 60,00** causale: MBW22	**€ 30,00** causale: EIW22	**€ 75,00** causale: MBEIW22

L'abbonamento è per un anno solare e dà diritto a tutti i numeri usciti nell'anno.
L'abbonamento non disdetto con lettera raccomandata entro il 1° dicembre s'intende tacitamente rinnovato.
L'Amministrazione non risponde degli eventuali disguidi postali.
I fascicoli non pervenuti dovranno essere richiesti alla pubblicazione del fascicolo successivo.
Decorso tale termine, i fascicoli disponibili saranno inviati contro rimessa del prezzo di copertina.
Prezzo del fascicolo in corso **€ 25,00 / € 10,00** digitale
Prezzo di un fascicolo arretrato **€ 40,00 / € 10,00** digitale

Pubblicità

1 pagina **€ 1.000,00** - 1/2 pagina **€ 600,00**

ECONOMIA ITALIANA 2022**/1**

La collocazione del sistema produttivo italiano nel contesto globale post covid

Questo numero di Economia Italiana – editor i professori **Giorgia Giovannetti**, Università di Firenze, e **Paolo Guerrieri**, Sapienza e PSIA SciencesPO – fa il punto sul processo di globalizzazione e sulla relativa posizione dell'industria italiana. Nel 2021 commercio e investimenti internazionali hanno registrato tassi di espansione superiori alla media degli ultimi anni. Non si è verificata la fine della globalizzazione e un ritorno al protezionismo, prevista da molti. "*Anzi - secondo gli editor - le catene del valore sembrano aver funzionato più come ammortizzatori e strumenti di risposta alla crisi che come amplificatori della stessa, anche se non vanno trascurati i problemi e le strozzature ...*e in effetti "*L'internazionalizzazione è un canale importante per accrescere la produttività e la competitività ed è un fattore di crescita*".

L'Italia ha reagito meglio di altri paesi e sembra aver "difeso la propria posizione" nell'economia mondiale. **La reazione migliore rispetto alla pandemia sembra esser stata quella delle imprese internazionalizzate** – e in particolare di quelle partecipanti alle catene del valore - **che hanno reagito meglio delle imprese domestiche** in termini di minori perdite di fatturato, maggior usi di tecnologie digitali, e-commerce, etc.

Dai vari saggi contenuti nel fascicolo emerge con chiarezza il ruolo propulsivo delle grandi imprese italiane capaci di competere sui mercati. Tuttavia, queste non hanno un peso sufficiente a trainare il resto dell'apparato produttivo italiano. Da qui due implicazioni di policy: "il *ruolo delle imprese medio-grandi è e deve restare assai importante, sia quali attori in grado di competere nelle grandi catene del valore internazionali, sia quali potenziali locomotive dell'espansione del sistema produttivo*"; dall'altro "*è altrettanto importante favorire maggiori dimensioni e managerialità del folto gruppo di piccole e piccolissime imprese che tendono a frenare in molti casi la capacità di integrazione internazionale del nostro sistema produttivo*".

Il volume contiene i saggi di **Roberto Monducci e Stefano Costa** (rilevanza crescente delle imprese medio-grandi e multinazionali nei flussi di esportazione italiani). **Stefano Costa, Federico Sallusti, Claudio Vicarelli e Davide Zurlo** (l'internazionalizzazione per accrescere competitività e performance del sistema produttivo italiano). **Claudio Battiati, Cecilia Jona-Lasinio, Enrico Marvasi e Silvia Sopranzetti** (la concentrazione del potere di mercato potrebbe migliorare l'efficienza senza compromettere la concorrenza). **Luca Casolaro, Silvia Del Prete e Giulio Papini** (l'impatto dell'internazionalizzazione nel caso della Toscana). Completano il numero gli interventi di **Pierfrancesco Latini e Alessandro Terzulli** (il futuro possibile delle catene globali del valore) e di **Mariano Bella e Luciano Mauro** (le ricadute effettive della bolletta energetica).

ECONOMIA ITALIANA nasce nel 1979 per approfondire e allargare il dibattito sui nodi strutturali e i problemi dell'economia italiana, anche al fine di elaborare adeguate proposte strategiche e di *policy*. L'Editrice Minerva Bancaria si impegna a riprendere questa sfida e a fare di Economia Italiana il più vivace e aperto strumento di dialogo e riflessione tra accademici, *policy makers* ed esponenti di rilievo dei diversi settori produttivi del Paese.