BANCA D'ITALIA
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Questioni di Economia e Finanza

(Occasional Papers)

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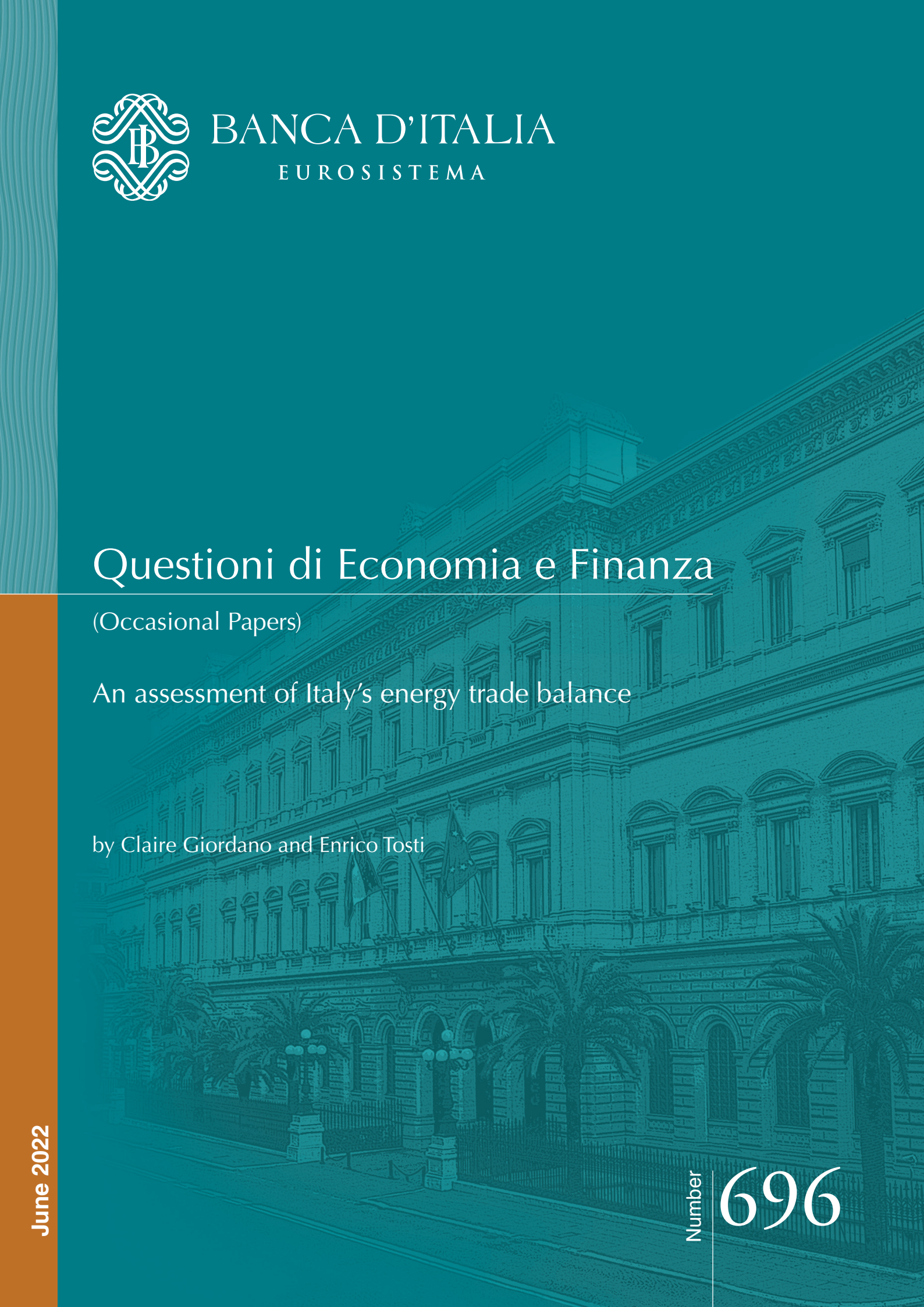
by Claire Giordano and Enrico Tosti



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AN ASSESSMENT OF ITALY'S ENERGY TRADE BALANCE

by Claire Giordano* and Enrico Tosti*

Abstract

As the global economy faces a new, sharp energy shock amplified by the war in Ukraine, this study analyses developments in Italy's energy trade balance, both in the long run and from a comparative perspective, in order to appraise any noteworthy changes in the country's external dependence. Using data from 1970 to 2021, the analysis shows that the country's energy deficit peaked at almost 6 per cent of GDP in 1981 after the second oil shock at the end of the 1970s. In 2021, it amounted to 2.4 per cent of GDP, double that of the previous year; this value, which is relatively low from a historical perspective, is slightly higher than that of the other main euro-area countries. The geographical concentration of Italy's energy imports, though declining over the past two decades, remains high, especially for natural gas. The 2021 deterioration in Italy's cyclically-adjusted current account surplus is more than fully explained by the rise in energy import prices.

JEL Classification: F00, F18, O13.
Keywords: energy trade balance, energy import prices, current account balance, cyclically-adjusted current account.
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Contents

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1. Motivation and main findings[1]

A strong energy price surge is under way, tracing its roots back initially to demand- and supply-side factors in 2021 (linked to the various phases of the COVID-19 pandemic), and then to rising geopolitical tensions; the latter then degenerated, at the end of February 2022, into the conflict in Ukraine.

Historically, Italy meets its energy needs via imports; hence, its energy trade balance strongly depends on global energy price cycles and supply. This study analyses developments in Italy's energy trade balance, in the long run and then in a comparative perspective with respect to its main euro-area peers over a more recent period. The analysis does not take into account early 2022 events since it is based on national accounts and balance of payments data, currently jointly available until the last quarter of 2021; however, it contributes to the understanding of the degree and nature of Italy's external dependence for energy commodities right at the start of the warfare and assesses the sustainability of the energy trade balance in the light of exceptionally high prices.

The main findings are the following. Italy's energy deficit peaked at almost 6 per cent of GDP in 1981 after the second oil shock at the end of the 1970s. In 2021 it amounted to 2.4 per cent of GDP, a relatively moderate level in historical perspective but slightly larger than that of the other main euro-area countries, due to higher energy imports as a percentage of GDP.

The geographical concentration of Italy's energy imports, although declining over time mainly as a result of OPEC countries' lower incidence, remains high, especially for natural gas, with Russia accounting for the lion's share of nearly 47 per cent in 2021.

If energy import prices had remained stable at the low 2020 levels, last year Italy's cyclically-adjusted current account balance would have improved, instead of deteriorating. In other terms, rising energy prices more than fully explained the 2021 decrease in the country's cyclically-adjusted current account surplus.

2. A long-term overview of Italy's energy trade balance

The past fifty years have been marked by several global energy shocks, traditionally linked to oil shocks, the predominant source of energy once coal was replaced (Hamilton, 2011). As a net importer of energy products,[2] the magnitude of Italy's energy trade deficit has been strongly affected by the severity of these shocks.

Figure 1 (left-hand side panel) reports the energy trade external flows as a ratio of GDP since 1970, based on our calculations at current prices on Banca d'Italia balance of payments data and on Istat international merchandise trade statistics (IMTS). From a level just above 1 per cent of GDP in the early Seventies, the energy deficit jumped to almost 4 per cent right after the 1973-74 OPEC embargo, when Arab countries deliberately cut oil production and raised its price (Fig. 1, right-hand side panel), forcing substantial adjustments in net importer countries such as Italy.[3] It further increased due to the 1978-80 oil crises, connected to the Iranian revolution and subsequently to

[1] The authors thank Silvia Fabiani, Stefano Federico and Alberto Felettigh for comments and discussions. This analysis is based on data available on 22 April 2022.

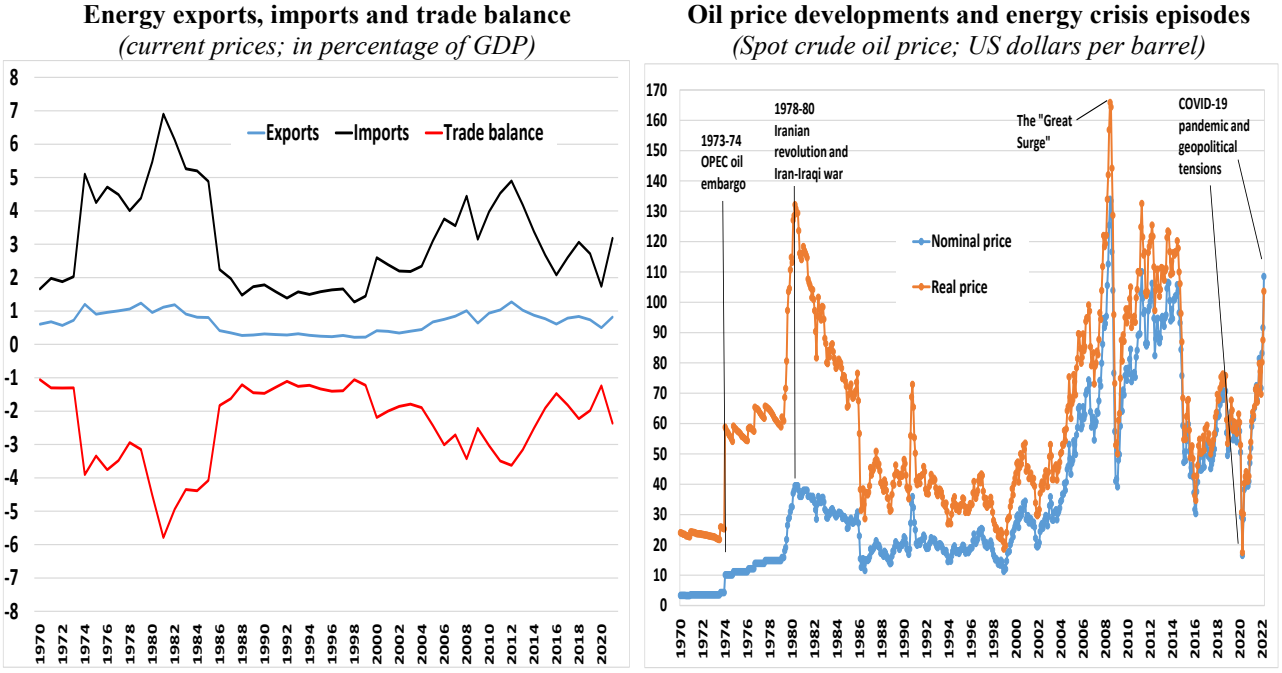
[2] Energy products include (Ateco2007 classification): B05 (Mining of coal and lignite), B061 (Extraction of crude petroleum), B062 (Extraction of natural gas), CD19 (Manufacture of coke and refined petroleum products) and DD35 (Electricity, gas, steam and conditioning supply).

[3] Arab OPEC countries cut their oil production by 5 per cent starting on October 16, 1973, ten days into the Arab-Israeli War, while raising the posted price of their oil, followed by the announcement of an additional 25 per cent production cut on November 5.

the Iran-Iraq war,[4] reaching a peak of 5.8 per cent in 1981. The subsequent energy trade balance improvement was followed by a rough stability until the early 2000s, when the deficit began to expand again during the so-called "Great Surge" (Baumeister and Kilian, 2016), peaking in 2012. The following downward trend led to a minimum being achieved in 2020 (1.2 per cent of GDP), in connection with the outbreak of the COVID-19 pandemic and the initial contraction in oil prices. In 2021 the energy deficit doubled relative to the previous year, to 2.4 per cent of GDP.

These fluctuations almost entirely mirrored those in energy imports, as energy exports (mainly of refined oil products) have been much more stable over time, their value reaching at most 1 per cent as a share of GDP. Developments in Italy's energy imports as a share of total merchandise imports are very similar to those as a ratio of GDP (Fig. A1 in Annex A), reaching the highest value, of around one third, in 1981 and last year amounting to 12.8 per cent.

Figure 1 – Italy's trade in energy products and oil price



Source: Authors' calculations on Bank of Italy's balance of payments data, Istat's international merchandise trade statistics, Istat's national accounts and Baffigi (2015), FRED for oil prices.
Notes: Oil prices refer to West Texas Intermediate (WTI); real prices are obtained by deflating the nominal series by the U.S. consumer price index (average price in 2021 as base year).

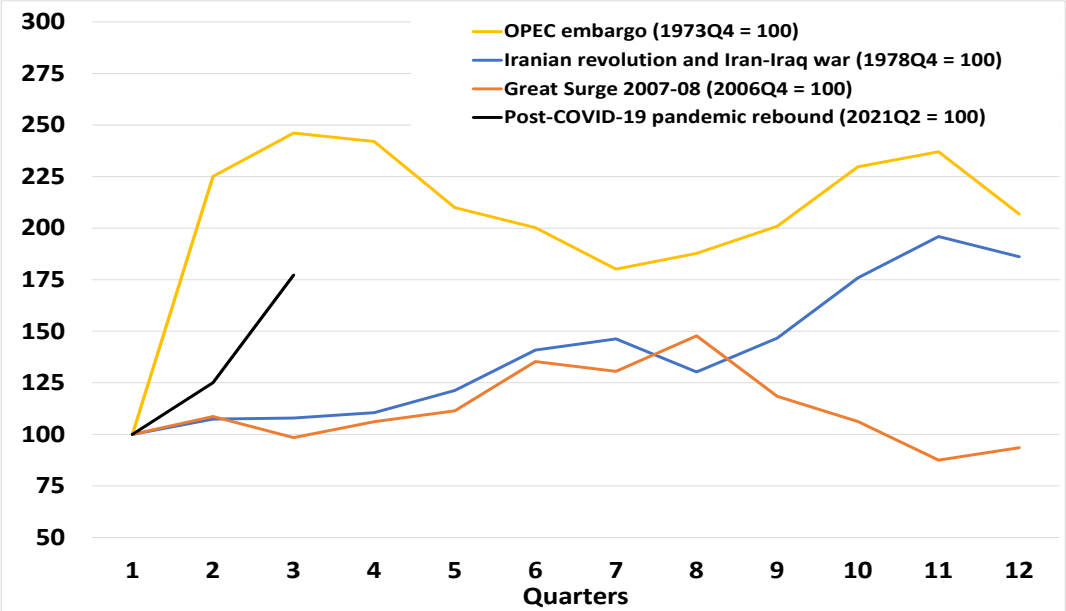
In addition to energy price shock episodes, some long-run structural factors need also to be taken into account in assessing Italy's energy trade balance over the last five decades. Indeed, the energy intensity of Italy's GDP – the ratio between gross domestic consumption of energy in tonnes of oil equivalent and real GDP, as measured by Istat's energy balance accounts – has steadily decreased since the early Seventies (Fig. A2, panel A in Annex A). This development is the result of several factors, such as the gradual decline in energy use by the agricultural and industrial sectors (Fig. A2, panel B), due to the shift of the country's productive system towards the less energy-intensive tertiary sectors, and a general increase in efficiency in energy use, also thanks to specific policies implemented since the 2000s (Bernardini *et al.*, 2021). Import dynamics in terms of gross consumption of energy are also broadly comparable to those as a share of GDP (Fig. A2, panel C).

[4] The Iranian revolution, preceded by strikes in the oil sector in Autumn 1978, led to the Shah fleeing in January 1979, and Sheikh Khomeini seizing power in the following month. Iraq then launched a war against Iran in September 1980.

In terms of its impact on the value of Italy's energy imports (as a share of GDP), thus far the 1973-74 OPEC embargo has dwarfed all subsequent energy shocks, both in size and duration (Figure 2).[5] However, the current trajectory of Italy's energy imports, ignited by the rebound of both oil and natural gas prices started in the third quarter of 2021, is worryingly converging to that observed after the 1973-74 crisis, especially if energy prices were to remain at high levels or even increase further due to protracted warfare in Ukraine.

Figure 2 – The impact of different energy crisis episodes on Italy's energy imports

(indices on energy imports in percentage of GDP)



Source: authors' calculations on Bank of Italy's balance of payments data, Istat's international merchandise trade statistics and Istat and Baffigi (2015) national accounts.

Italy's energy imports have generally been driven by (oil) price fluctuations as proven by the comovement of the corresponding series in the two panels of Figure 1. In Figure 3 we zoom into the 2020-21 COVID-19 shock and decompose imports into quantities and prices ("average unit values").[6] In 2020 the exceptional contraction in energy prices was compounded by the fall in volumes, especially in the case of oil and of coke and petroleum imports. The subsequent pick-up of energy imports in 2021 was instead largely due to price increases (55 per cent relative to 2020 for oil and 118 for natural gas, according to import average unit values).

However, the pick-up in the second half of 2021 of import unit values of natural gas in particular was significantly weaker than that of spot prices (Fig. 4). Differently than for oil, import unit values and spot prices of natural gas have generally recorded diverging dynamics, yet the disconnect since mid-2021 has been particularly striking. Indeed, the unit value of gas increased by about 150 per cent between June 2021 and January 2022 (last month for which these data were available at the time of writing), whereas the gas spot price on European markets rose by nearly 200 per cent. This is likely due to the contract structure of natural gas supply via pipelines in Europe (Gazzani and Veronese, 2022): in ordinary circumstances, long-term contracts with indexed prices agreed on a bilateral basis between suppliers and European midstream companies,

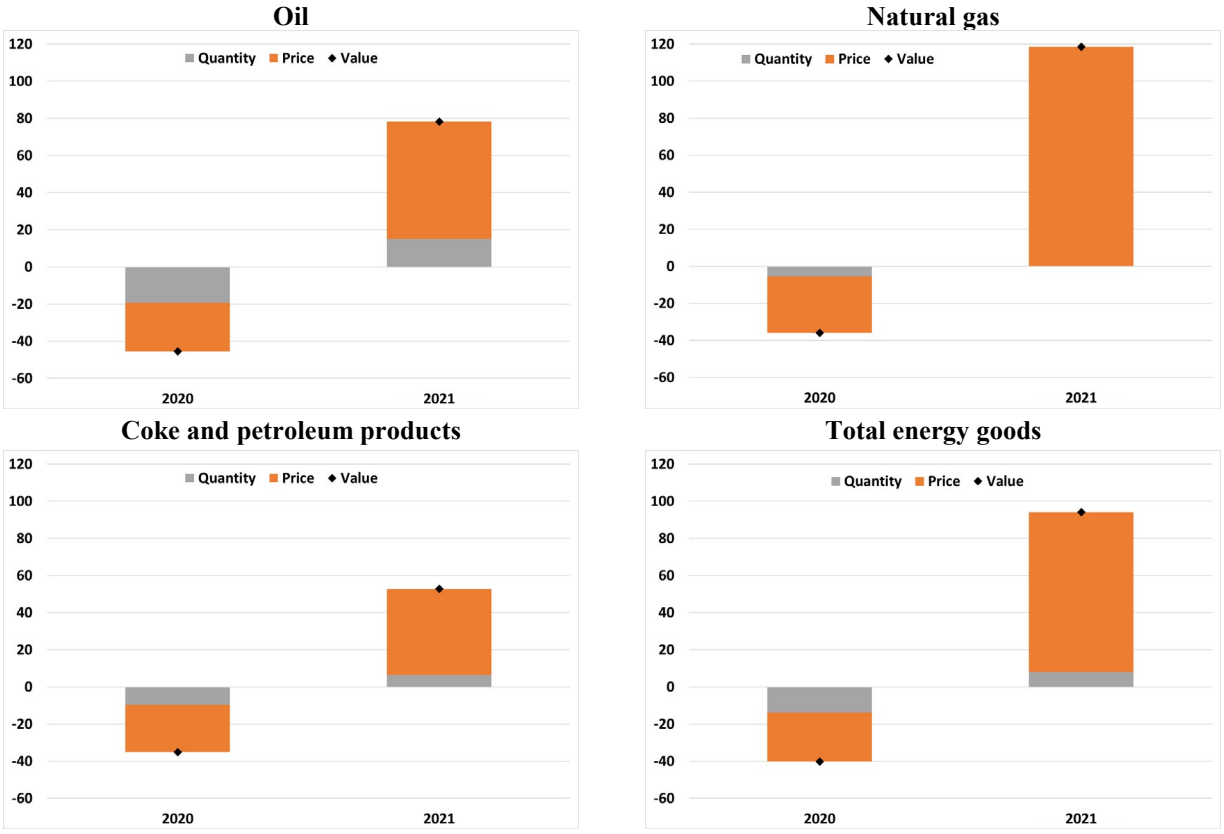
[5] This comparison is obtained by setting Italy's energy imports as a ratio of GDP to 100 in the quarter preceding significant fluctuations in energy prices or quantities.

[6] These computations, based purely on IMTS and not also on balance of payments data, are not strictly comparable to those underlying the rest of the note. In Figure 3 the "price" variable is obtained by dividing reported values by reported quantities (expressed in kilograms).

generally defined for more than a decade, are limitedly affected by spot market fluctuations in prices.[7] Alternatively, gas is traded on market platforms and gas hubs in order to satisfy peaks in demand, also linked to seasonality, and to build-up inventories; liquefied natural gas (LNG) is generally traded in this manner (but, at least for Italy, its share is quite small, accounting for about 15 per cent of total imported gas quantities in 2021, albeit increasing in the first months of 2022). These features of the European natural gas market entail that for the moment the hike in spot prices recorded in the second semester of last year has not entirely fed through to import prices.

Figure 3 – A decomposition of the value of Italy's energy imports

(percentage changes)

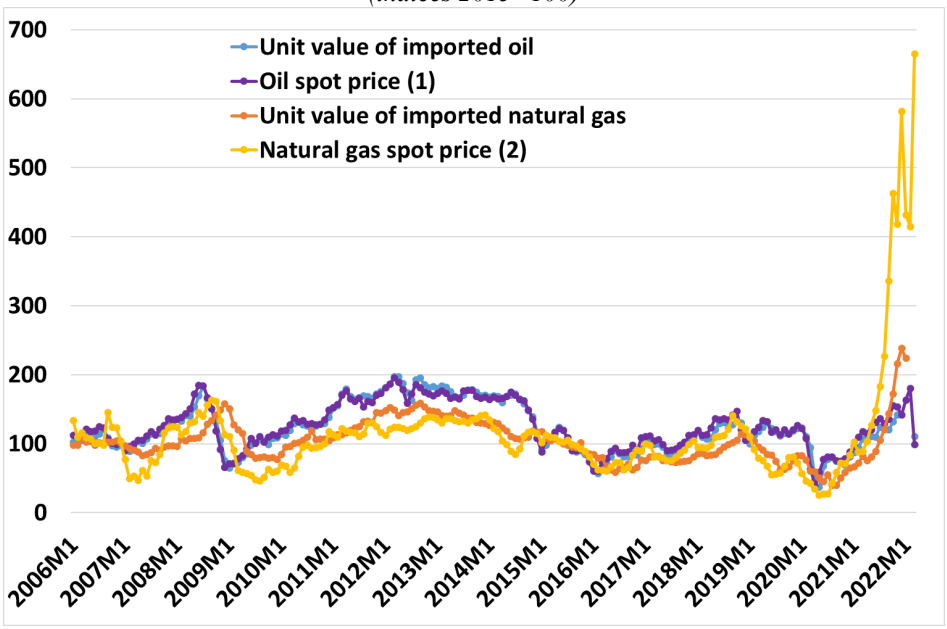


Source: Authors' calculations on Istat international merchandise trade statistics.
Notes: Quantity data are expressed in kilograms for all energy goods. Changes in prices are derived from the changes in values and quantities.

[7] Moreover, these long-term contracts generally include "take-or-pay" clauses, such that the buyer has to take and pay a pre-determined amount of gas at the fixed prices or anyway pay the agreed price for the gas not taken. According to the data published by the Italian Regulatory Authority for Energy, Networks and Environment (ARERA), in 2020 approximately three quarters of gas contracts had a duration that was higher than 10 years (Fig. A4 in Annex A).

Figure 4 - A comparison across oil and natural gas prices for Italy

(indices 2015=100)



Source: Istat for unit values and producer prices; ICE and Refinitiv for oil and natural gas spot prices.
Notes: (1) The oil spot price refers to the average across the Brent, WTI and Dubai oil spot prices per barrel, converted into euros. (2) The natural gas spot price refers to the European benchmark, expressed in euros per megawatt-hour.

3. A breakdown of Italy's energy imports

Considering the composition of Italy's energy imports by product over the past three decades for which data are available (Figure 5, left-hand side panel), oil is the main component although over time its incidence, similarly to that of coal, has decreased in favour mainly of natural gas; the weight of the latter has doubled with respect to the early Nineties, thanks partly to the expansion of transportation infrastructure (i.e. pipelines). In 2021 oil represented about 42 per cent of the total value of Italy's energy imports, compared with 32 per cent for gas, 15 percent for refined petroleum products, 9 percent for electricity and a residual share for coal.[8]

As regards the breakdown by geographical area (Figure 5, right-hand side panel), the share of OPEC countries declined from 54 per cent in 1991 to 35 per cent in 2021, in favour of Russia and two other countries belonging to former USSR (Azerbaijan and Kazakhastan), whose cumulative share was about 36 per cent last year.

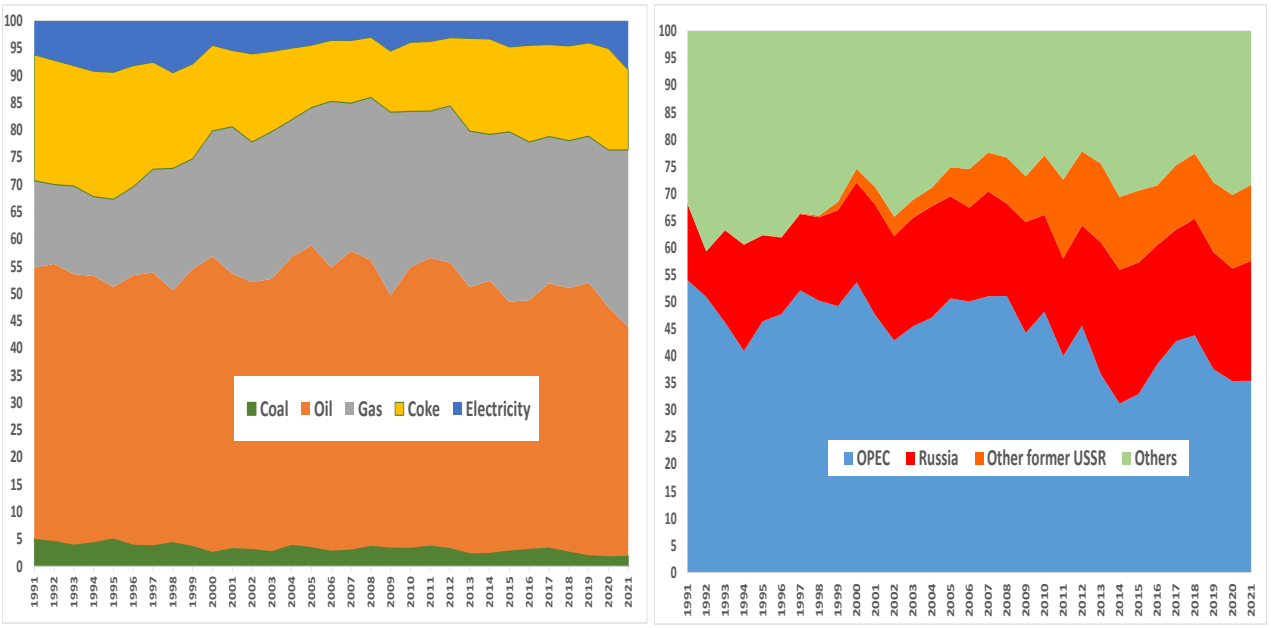
Italy's oil imports are quite concentrated (Figure 6, left-hand side panel and Table A1 in Annex A): in 2021 the first eight foreign suppliers summed up to 85 per cent. The degree of concentration has decreased over time, but with a recovery in the last three years (Figure 7). The share of OPEC countries was negatively affected by the onset of warfare and geopolitical tensions (the civil war in Libya from 2011 and the economic embargoes involving Iran in 2013-5 and then again as of 2019).[9] The shares referring to Azerbaijan and, more recently, United States have been strongly increasing, in the latter case due to imports of shale oil.

[8] Italy mainly imports electricity from France (47 per cent of the total on average in 2020-21, likely produced by nuclear energy) and Germany (about one third of the total in the same period).
[9] The decline of Russia's share over time may also be linked to its high sulfur content, which makes it less attractive and less in demand.

Figure 5 – Italy's energy imports by product and by origin area

(percentage shares)

By product **By origin area**

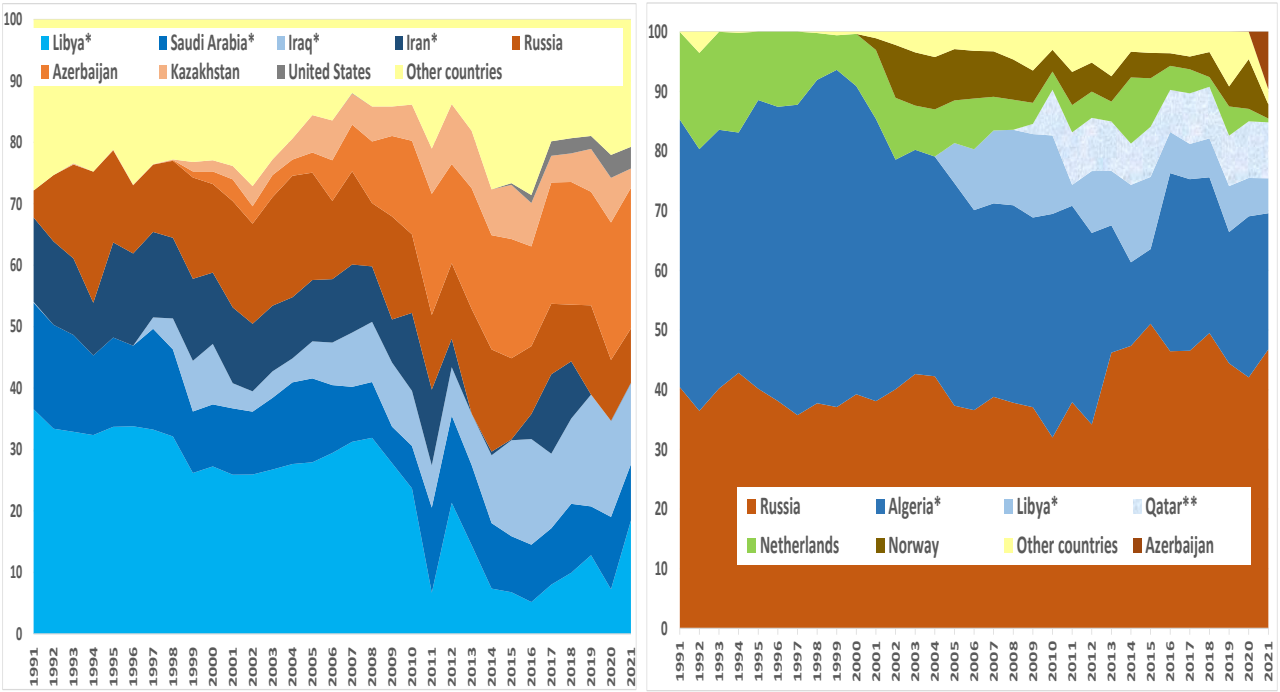


Source: Istat's international merchandise trade statistics.
Notes: Data for 2021 are preliminary estimates. OPEC countries are defined in changing composition. "Other former USSR" includes Azerbaijan and Kazakhstan.

Figure 6 – Italy's oil and natural gas imports by main origin country

(percentage shares)

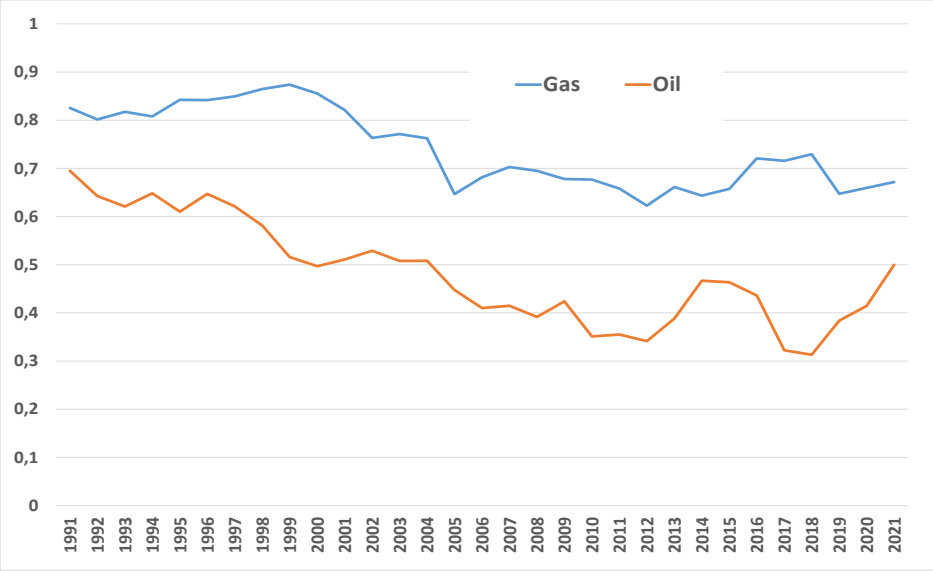
Oil **Natural gas**



Source: Eurostat (for oil) and Istat (for natural gas) international merchandise trade statistics.
Notes: (*) OPEC countries; (**) OPEC country until 2018.

Figure 7 – The geographical concentration of Italy's oil and natural gas imports

(Gini index)



Source: Authors' calculations on Eurostat (for oil) and Istat (for natural gas) international merchandise trade statistics.

The degree of concentration of Italy's natural gas imports is even higher (Figure 7), with the first eight countries accounting for over 98 per cent in 2021 (Figure 6, right-hand side panel and Table A2). The geographical concentration of gas remained broadly stable from 2005. The main supplier is Russia, with an average share of 41 per cent over the last three decades, which rose to nearly 47 in 2021[10], overwhelming the overall incidence of OPEC countries, also in this case penalized in recent years by Libya's warfare. In 2021, thanks to the opening up of the Trans-Adriatic Pipeline, nearly 10 per cent of imports of natural gas were sourced from Azerbaijan. Purchases from other European economies (the Netherlands and Norway) have displayed a declining trend, linked to environmental and/or depletion issues, whereas the share of LNG transported by ship (mainly from Qatar, but also from the United States, here not explicitly depicted) has risen over time.[11]

4. Energy trade balances within the euro area in recent years

Historically, all the main euro-area countries are net importers of energy products and developments in energy trade balances are quite similar across the board (Figure 8 and Figure A2 in Annex A).

According to our calculations on ECB balance of payments data and on Eurostat IMTS, amongst the four main euro-area countries France displays the smallest energy trade deficit, standing at 1.5 per cent of GDP in 2021, against Italy's 2.4 per cent and the other two economies falling in between. Both Germany and France rely on imports to meet most of their oil and natural gas consumption, yet whereas Germany is one of the world's largest producers of brown coal, France is a net exporter of electricity and the world's second largest producer of nuclear power generation after the United States. The COVID-19 outbreak contributed to narrow down energy trade deficits in 2020 in all the four economies; however, pre-pandemic values were exceeded (except in France)

[10] In the first quarter of 2022, however, such share seems significantly lower, around 27-28 per cent in volume terms (data collected from the website of SNAM, the Italian company in charge of managing the national network of gas pipelines: https://www.snam.it/it/trasporto/dati-operativi-business/2_Andamento_dal_2005/).

[11] Amongst other suppliers of LNG, in 2021 Italy imported 0.3 per cent of its total gas imports from Egypt and none from Australia.

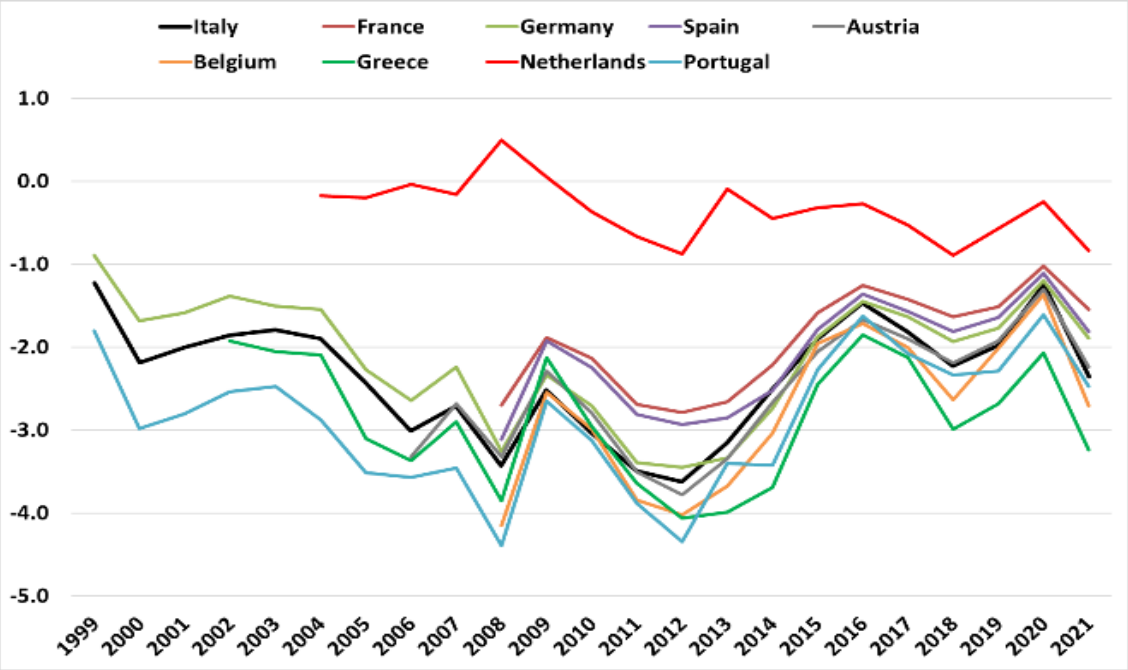
by 2021, confirming the temporary nature of the reduction in energy imports in the first year of the pandemic.

Enlarging the focus to other euro-area countries, the Netherlands' energy trade deficit is the smallest (in absolute value) across the board, measuring 0.8 per cent of GDP last year. This economy is indeed a net exporter of natural gas (even to Italy, albeit with a declining share over time). It is, however, also an important transit and trade hub for natural gas, oil, electricity and coal, such that pass-through transactions are picked up by IMTS (the statistics we employ to compute energy trade shares), hence potentially biasing both exports and imports upwards.[12]

At the other extreme, Greece displays the most pronounced energy trade deficit, which reached -3.2 per cent of GDP last year; while energy exports are boosted by the country's strong hydro and renewable (wind and solar) power generation,[13] they are more than offset by imports of most other energy products (Fig. A4 in Annex A). Finally, Belgium's high export share reflects its (mainly offshore) renewable energy generation and output from its nuclear-generating facilities (which, however, are being phased out), but also for this country energy imports more than counterbalance foreign sales.

Figure 8 – Energy trade balances within the euro area

(current prices; in percentage of GDP)



Source: Authors' calculations on Banca d'Italia and ECB balance of payments data and on Istat and Eurostat international merchandise trade statistics and on Istat and Eurostat national accounts.
Notes: Data for 2021 for Greece are partially estimated.

5. Energy deficits and the cyclically-adjusted current account balance

CA balance developments have empirically been found to be driven by manifold factors, which in the literature have often been grouped into fundamentals, policy variables and cyclical variables.[14] The cyclically-adjusted CA balance nets outs the cyclical component from the headline CA balance, thus allowing an assessment of its medium-term "fundamental" level and dynamics, key

[12] This same statistical caveat applies, in general, to all countries here considered.
[13] Greece's energy exports also include international marine (and aviation) bunkers.
[14] See Della Corte and Giordano (2022) for a survey.

indicators of external sustainability. In algebraic terms, the cyclically-adjusted CA balance as a percentage of GDP is defined as:

(1) $CACA_{it} = CA_{it} - \mu_{it}$

where CA_{it} is the CA balance of a given country *i* in year *t* as a percentage of GDP and μ_{it} is the (estimated) cyclical adjustment as a ratio of GDP. The cyclically adjusted CA balance corrects the CA balance for the country's position in the business cycle relative to that of its main trading partners. In other words, it measures the CA balance that would prevail if the output gaps of the country and of its trade partners were zero, i.e. if both domestic and foreign demand were at their potential, and exports and imports of goods and services responded proportionately.[15] Indeed, if CA surpluses are driven by cyclical slumps in domestic demand, which usually result in low imports, they could turn out to be short-lived and be reabsorbed with economic recovery. Similarly, an export-led rebalancing of the CA, stimulated by a favourable global cycle and hence a boom in demand from foreign partners, could be easily reversed. Banca d'Italia (Fabiani, Federico and Felettigh, 2016) and the European Commission (EC; Coutinho *et al.*, 2018) employ a largely similar methodology to estimate the cyclically-adjusted CA balance of a given country.[16]

The cyclically-adjusted CA balance does not control for fluctuations in energy prices, even if they strongly affect energy imports and exports and hence the overall trade balance.

To isolate the role of energy price developments in determining the CA balance, we follow the same approach as in Fabiani et al. (2016) and net (cyclically-adjusted) energy imports out from the cyclically-adjusted CA balance, by assuming that the energy share in total cyclically-adjusted imports is the same as that in total unadjusted imports (or, in other terms, that energy and residual imports move at the same rate when closing the output gap). In algebraic terms, we estimate:

(2) $CACA_{it}^{NOENEM} = (TB_{it} - \mu_{it} + M_{it}^{ENE*}) + IB_{it}$

where $TB_{it} \equiv (X_{it} - M_{it})/Y_{it}$, X_{it} and M_{it} are total goods and services exports and imports, respectively, Y_{it} is nominal GDP, IB_{it} is the sum of the primary and secondary income balances as a percentage of GDP, and M_{it}^{ENE*} are cyclically-adjusted energy imports, computed as the energy share in total imports multiplied by cyclically-adjusted total imports. For simplicity, we do not adjust energy exports, which, as seen in Figure 1 (left-hand side panel), account for a small share of GDP. Moreover, we disregard the pass-through of energy prices to manufacturing prices and the impact of energy price fluctuations on non-energy exports (due to the possible shift in foreign demand as a result of a transfer of purchasing power from energy-exporting to energy-importing economies, and vice versa).[17] Finally, the cyclically-adjusted CA estimates for 2021 are provisional at the time of writing, due to upcoming standard revisions to Italy's output gap.

Since the inception of the euro and until 2010, developments in Italy's cyclically-adjusted CA balance net of energy imports were similar, yet smoother, than those in the purely cyclically-adjusted figures (Fig. 9). Thereafter, had Italy's energy import prices remained stable at 2010 levels (instead of declining by 26 per cent over the 2010-20 period), the cumulative improvement in Italy's cyclically-adjusted CA balance by 2020 would have been of 3.1 percentage points of

[15] In all existing methodologies to our knowledge, the effect of the business cycle on the CA is assumed to be reflected solely in the trade balance ($TB_{it} \equiv (X_{it} - M_{it})/Y_{it}$), where X_{it} and M_{it} are total goods and services exports and imports, respectively, and Y_{it} is nominal GDP), hence implying that the primary and secondary income balances (IB_{it}, as a percentage of GDP) are invariant to cyclical fluctuations: $CACA_{it} = (TB_{it} - \mu_{it}) + IB_{it}$.

[16] The Bank of Italy's methodology is the slightly more refined of the two, in that it takes into account the fact that imports react differently to the two main components of aggregate demand, namely exports and domestic demand. A summary of this methodology is found in Annex B.

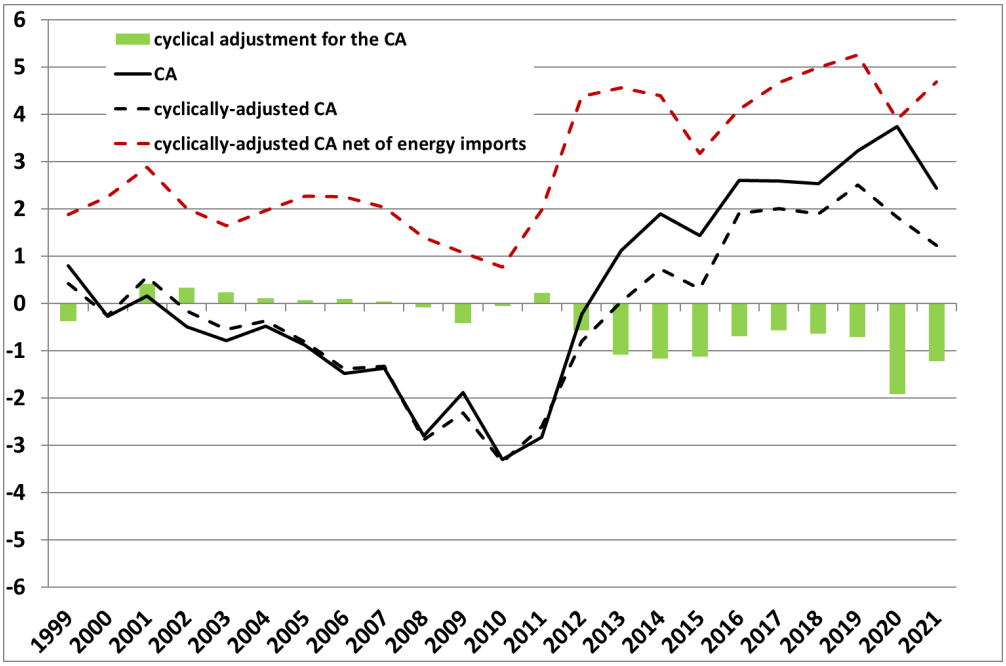
[17] Furthermore, we do not compute the long-run component or "equilibrium" energy prices, such that these estimates cannot be interpreted as the CA balance corrected for both the business and the energy price cycles, nor can we predict the evolution of future equilibrium energy prices.

GDP, instead of 5.2 points; the fall in energy prices hence explained over one third of this improvement.

In 2021 Italy's headline CA balance decreased to 2.4 per cent of GDP (from 3.7 per cent in 2020). The country's cyclically-adjusted CA balance also deteriorated, but to a lesser extent (i.e. by 0.6 percentage points of GDP, down to 1.2 per cent). Had energy import prices remained at their low 2020 levels, instead of rising by over 40 per cent, Italy's cyclically-adjusted CA balance last year would have improved by nearly one percentage point of GDP, instead of declining by over half a point. These estimates imply that rising energy prices in 2021 more than fully explained the deterioration in Italy's cyclically-adjusted CA surplus in that year.

Figure 9 – Correcting Italy's current account (CA) balance for the business cycle and for energy imports

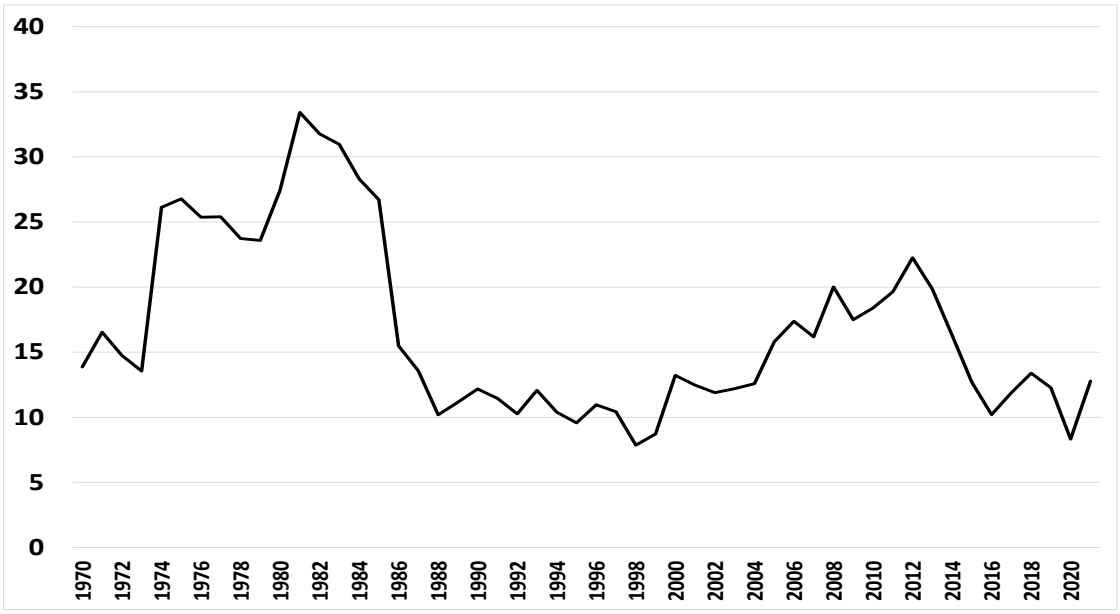
(current prices; in percentage of GDP)



Sources: Estimations on Banca d'Italia, European Commission (Ameco), IMF (WEO and ESR), Istat and OECD data.

Annex A. Additional charts and tables

Figure A1 – Italy's imports of energy products in percentage of total goods imports

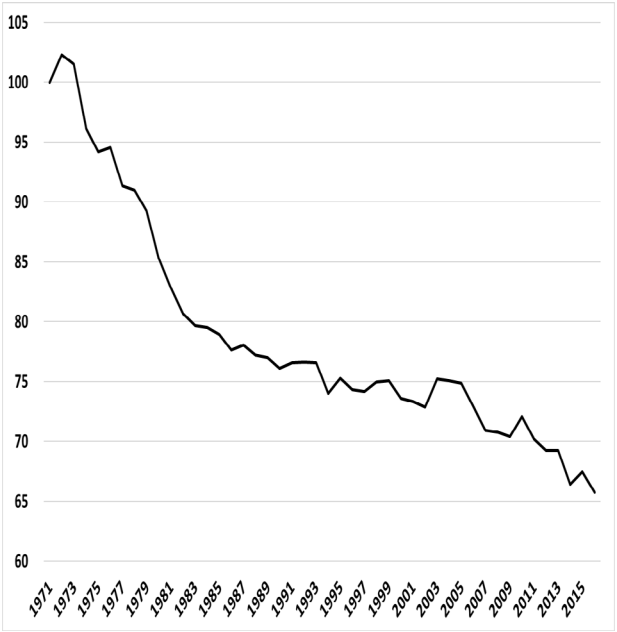


Source: Authors' calculations on Istat's international merchandise trade statistics.

Figure A2 – An overview of Italy's energy intensity, sources and uses

A. Energy intensity of GDP

(index 1971=100; gross domestic consumption of energy as a ratio of 2010 chain-linked GDP)



B. Energy use by destination

(percentage shares)

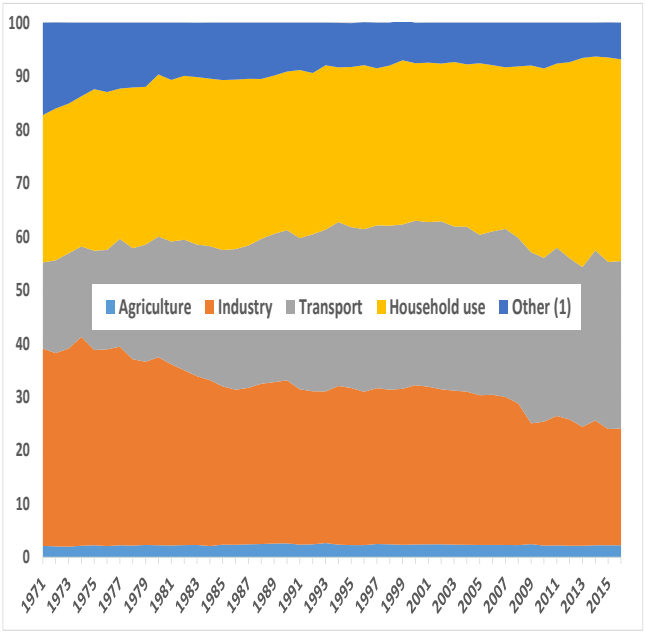
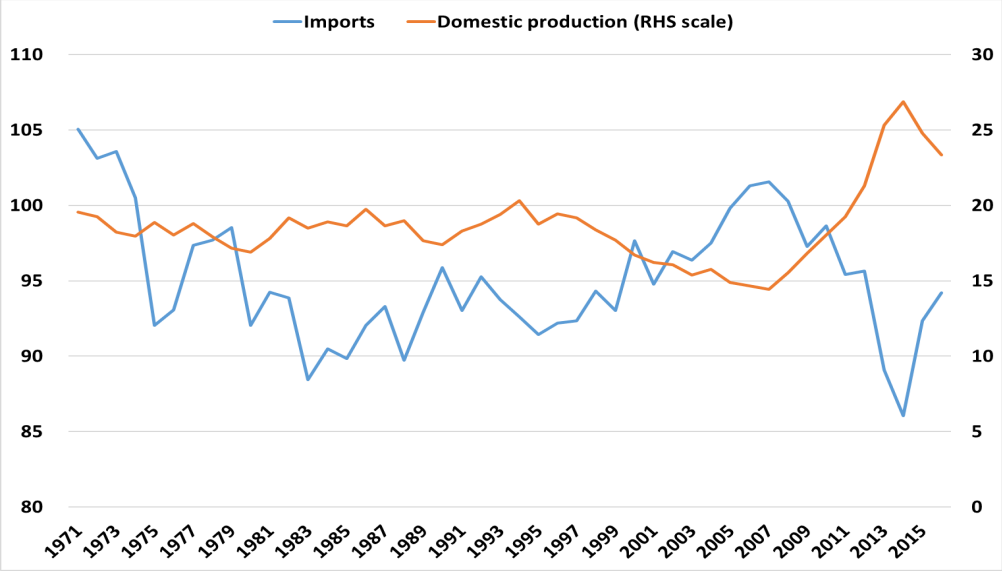


Figure A3 – Imports and domestic production of energy

(in percentage of gross domestic consumption of energy)



Source: Istat, energy balance accounts and Istat, national accounts and Baffigi (2015) for GDP.
Notes. Data are currently available only until 2016. (1) "Other" includes non-energy uses and bunkering.

Table A1 - Italy's oil imports by main origin country

(percentage shares)

	Libya*	Azerbaijan	Russia	Saudi Arabia*	Iraq*	Iran*	Kazakhstan	United States	Other countries
1991	36.6	0.0	4.4	17.3	0.2	13.7	0.0	0.0	27.8
1992	33.4	0.0	10.8	16.9	0.0	13.6	0.0	0.0	25.3
1993	32.9	0.0	15.3	15.8	0.0	12.4	0.1	0.0	23.4
1994	32.3	0.0	21.3	13.0	0.0	8.6	0.0	0.0	24.8
1995	33.7	0.0	15.0	14.5	0.0	15.5	0.1	0.0	21.2
1996	33.8	0.0	11.1	13.1	0.0	15.0	0.1	0.0	26.9
1997	33.3	0.0	11.0	16.4	1.8	13.9	0.1	0.0	23.6
1998	32.1	0.1	12.5	14.2	5.1	13.1	0.1	0.0	22.8
1999	26.2	1.0	16.5	10.0	8.3	13.4	1.5	0.0	23.2
2000	27.3	2.0	14.4	10.1	9.8	11.6	1.8	0.0	22.9
2001	25.9	3.5	17.3	10.8	4.1	12.4	2.2	0.0	23.8
2002	25.9	2.8	16.3	10.2	3.3	11.0	3.3	0.0	27.1
2003	26.7	3.6	17.7	11.7	4.3	10.7	2.5	0.0	22.8
2004	27.6	2.6	19.8	13.3	3.9	10.0	3.4	0.0	19.4
2005	27.9	3.3	17.5	13.7	6.1	10.0	6.1	0.0	15.6
2006	29.4	6.6	12.7	11.0	6.9	10.3	6.5	0.0	16.5
2007	31.3	7.6	15.2	8.9	8.9	11.1	5.1	0.1	12.0
2008	31.9	10.0	10.3	9.1	9.8	9.0	5.7	0.0	14.2
2009	27.8	13.1	16.8	5.9	10.5	7.0	4.8	0.0	14.2
2010	23.7	15.2	12.8	6.9	9.0	12.7	5.9	0.0	13.9
2011	6.7	19.7	12.2	13.8	6.9	12.3	7.4	0.0	21.0
2012	21.3	16.2	12.3	14.2	7.9	4.6	9.8	0.0	13.8
2013	14.4	19.6	17.1	13.1	8.4	0.0	9.4	0.0	18.1
2014	7.4	18.6	16.6	10.6	11.0	0.6	7.5	0.0	27.7
2015	6.8	19.4	13.2	9.1	15.6	0.1	8.8	0.3	26.6
2016	5.2	16.2	11.0	9.3	17.2	4.1	7.1	1.3	28.6
2017	8.0	19.8	11.5	9.2	12.2	12.9	4.3	2.4	19.8
2018	9.9	20.0	9.2	11.2	13.9	9.3	4.6	2.5	19.3
2019	12.8	18.5	14.5	7.9	18.2	0.0	7.0	2.1	19.0
2020	7.3	22.4	9.9	11.8	15.7	0.0	7.3	3.7	22.1
2021	18.5	22.9	8.8	9.2	13.3	0.0	3.1	3.5	20.7

Notes: (*) OPEC countries.

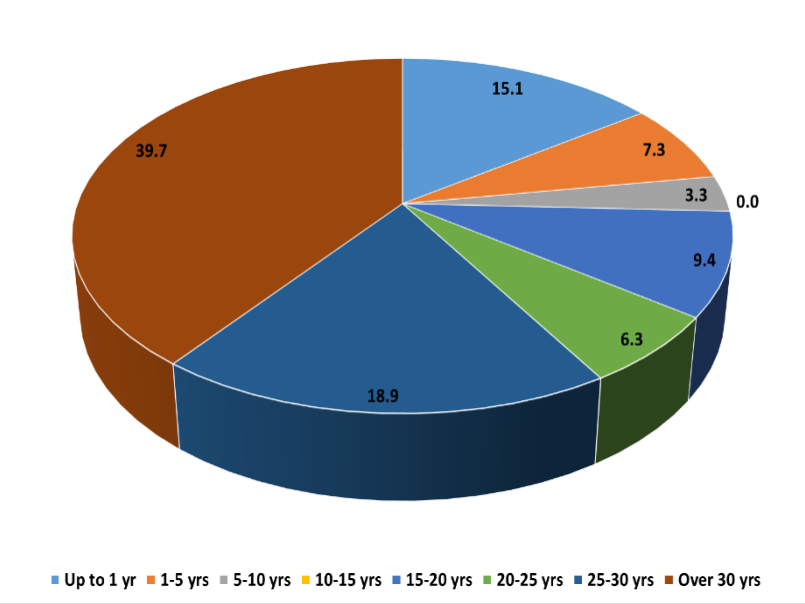
Table A2 - Italy's natural gas imports by main origin country

(percentage shares)

	Russia	Algeria*	Libya*	Netherlands	Norway	Qatar**	Other countries
1991	40.4	44.9	0.0	14.7	0.0	0.0	0.0
1992	36.5	43.9	0.0	16.1	0.0	0.0	3.6
1993	40.2	43.4	0.0	16.4	0.0	0.0	0.0
1994	42.8	40.3	0.0	16.7	0.0	0.0	0.2
1995	40.2	48.4	0.0	11.5	0.0	0.0	0.0
1996	38.1	49.3	0.0	12.6	0.0	0.0	0.0
1997	35.7	52.0	0.0	12.2	0.0	0.0	0.0
1998	37.7	54.2	0.0	7.8	0.0	0.0	0.2
1999	37.1	56.5	0.0	5.8	0.0	0.0	0.6
2000	39.2	51.7	0.0	8.7	0.0	0.0	0.4
2001	38.1	47.3	0.0	11.5	2.0	0.0	1.1
2002	40.1	38.5	0.0	10.4	8.8	0.0	2.2
2003	42.6	37.6	0.0	7.4	8.9	0.0	3.5
2004	42.2	36.8	0.0	7.9	8.8	0.0	4.2
2005	37.3	37.3	6.7	7.1	8.6	0.0	2.9
2006	36.6	33.5	10.2	8.5	8.0	0.0	3.2
2007	38.8	32.4	12.2	5.7	7.6	0.0	3.3
2008	37.8	33.1	12.7	5.0	6.7	0.0	4.7
2009	37.1	31.8	14.0	3.5	5.4	1.7	6.5
2010	32.0	37.4	13.2	3.1	3.6	7.7	3.0
2011	37.9	32.9	3.5	4.6	5.6	8.8	6.7
2012	34.2	32.1	10.4	4.4	4.9	8.9	5.2
2013	46.2	21.3	9.1	3.3	4.3	8.3	7.5
2014	47.3	14.0	13.0	11.1	4.3	6.9	3.4
2015	51.0	12.5	12.1	8.1	4.2	8.4	3.6
2016	46.4	29.8	6.9	4.0	2.1	7.1	3.6
2017	46.5	28.8	5.9	4.0	2.1	8.5	4.2
2018	49.5	26.1	6.5	1.6	4.2	8.7	3.4
2019	44.4	22.0	7.7	4.9	3.4	8.5	9.2
2020	42.1	27.0	6.4	2.1	8.4	9.5	4.6
2021	46.8	22.8	5.9	0.6	2.4	9.4	12.2

Notes: (*) OPEC countries; (**) OPEC country until 2018.

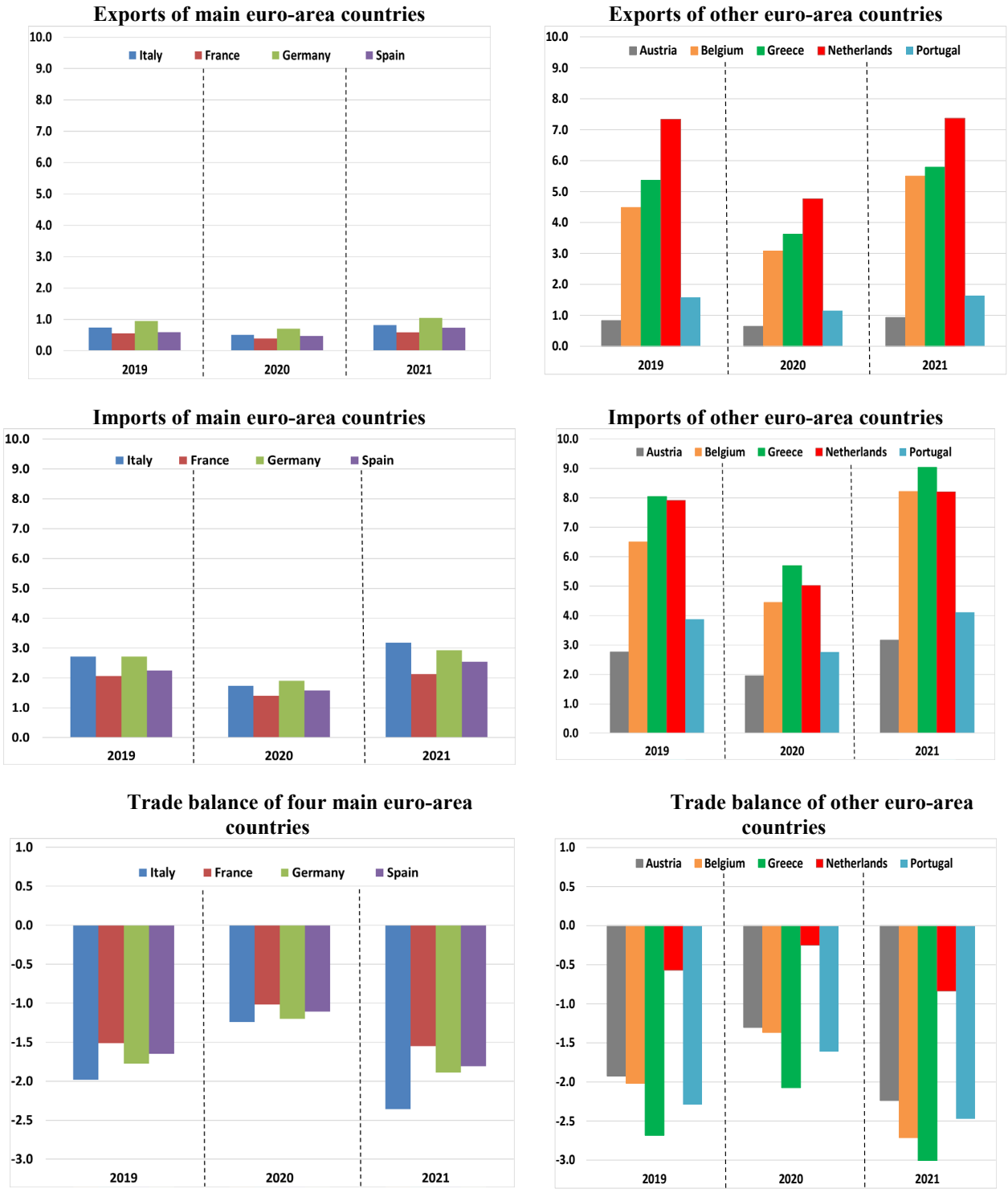
Figure A4 – The duration of gas import contracts in 2020



Source: ARERA, "Indagine annuale sui settori regolati".

Figure A5 – Energy goods trade flows within the euro area

(in percentage of GDP; current prices)



Source: Calculations on ECB balance of payments data, on Eurostat international merchandise trade statistics and on Eurostat national accounts.

Notes: Data for 2021 for Greece are partially estimated.

Annex B. Estimating the cyclically-adjusted current account balance

The cyclically-adjusted current account (CA) balance is obtained as the headline CA balance with a correction due to a cyclical component. In algebraic terms, the cyclically-adjusted CA balance as a percentage of GDP is defined as:

$$(B1)\ CACA_{it} = CA_{it} - \mu_{it} = (TB_{it} - \mu_{it}) + IB_{it}$$

where CA_{it} is the CA balance of a given country *i* in year *t* as a percentage of GDP and μ_{it} is the (estimated) cyclical adjustment as a ratio of GDP. In all existing methodologies to our knowledge, the effect of the business cycle on the CA is assumed to be reflected solely in the trade balance ($TB_{it} \equiv (X_{it} - M_{it})/Y_{it}$, where X_{it} and M_{it} are total goods and services exports and imports, respectively, and $Y_{it}$is nominal GDP), hence implying that the primary and secondary income balances (IB_{it}, as a percentage of GDP) are invariant to cyclical fluctuations.

Banca d'Italia (Fabiani, Federico and Felettigh, 2016) and the European Commission (EC; Coutinho et al., 2018) employ a similar methodology to estimate the cyclically-adjusted CA balance of a given country, by correcting for its position in the business cycle relative to that of its main trading partners. The broad idea is to measure the CA balance that would prevail if the output gaps of the country and of its trade partners were zero, i.e. if both domestic and foreign demand were at their potential, and exports and imports responded proportionately.[18]

This leads to measuring the cyclical adjustment term in the following manner:

$$(B2)\mu_{it} = \theta_{X,i} X_{it} \frac{(Y_{it}^F - Y_{it}^{*F})}{Y_{it}^{*F}} - \theta_{M,i} M_{it} \frac{(Y_{it} - Y_{it}^*)}{Y_{it}^*}$$

where $\theta_{M,i}$ ($\theta_{X,i}$) captures the long-run import (export) trade elasticity to GDP,[19] *F* stands for foreign trading partners, the asterisks denote nominal potential levels, $\frac{(Y_{it} - Y_{it}^*)}{Y_{it}^*}$ is the domestic output gap and $\frac{(Y_{it}^F - Y_{it}^{*F})}{Y_{it}^{*F}}$ is the foreign output gap. In this formulation it is assumed that the activation of imports (exports) associated with domestic (foreign) output is constant and independent of output movements; therefore, the amount of imports (exports) that stems from closing the current home (foreign) output gap is simply given by the product of the elasticity of imports (exports) to GDP, of current imports (exports) and of the current (foreign) output gap.[20]

The EC methodology, however, neglects composition effects in aggregate demand, i.e. the fact that the different components of aggregate demand activate imports with different intensities (e.g. Bussière et al., 2013). The Bank of Italy has overcome this issue by developing a model that posits that imports present a constant elasticity relative to a reduced-form import-intensity-adjusted demand (IAD) variable, in turn a convex combination of both exports and domestic demand. In formal terms, let ΔM_{it}^* (ΔX_{it}^*) be the difference between potential and current imports (exports). Since exports are assumed to present a constant elasticity relative to foreign demand as in the EC methodology, ΔX_{it}^* is identical to the second term inside the square brackets of equation 2. The key difference with respect to the EC methodology lies instead on the import side:

[18] In this methodology output gaps are considered as exogenously given, and non-linearities, the role of distributional issues, capacity and borrowing constraints, income and price effects are all disregarded.

[19] Long-run trade elasticities are employed to counteract the fact that all methodologies assume that it is sufficient to close the contemporaneous (domestic and foreign) output gaps, as opposed to setting to zero the entire time series (up to year t) of output gaps. Relaxing this assumption would be theoretically sounder, since trade flows tend to display persistence, but would be cumbersome to implement empirically. These persistent effects are anyhow partly captured by using long-run trade elasticities.

[20] The EC further assumes that both import and export elasticities to GDP are equal to 1.5 for all countries ($\theta_{M,i} = \theta_{Xi} = 1.5\ \forall i$) , although the empirical literature points to a relatively large dispersion in these elasticities across countries.

$$(B3)\Delta M_{it}^{*} = \theta_{M,i}^{IAD} M_{it} \omega_x \frac{M_{it}}{X_{it}} \Delta X_{it}^{*} + \theta_{M,i}^{IAD} (1 - \omega_{x)} \frac{M_{it}}{DD_{it}} \Delta DD_{it}^{*}$$

where $\theta_{M,i}^{IAD}$ is the country-specific long-run[21] elasticity of imports to IAD, in turn a geometric-weighted average of the two demand components, with weights reflecting their relative import contents; ω_x is the weight of exports in constructing the IAD variable and $(1 - \omega_{x)}$ is the weight of domestic demand DD_{it}; DD_{it} is the difference between potential and current domestic demand. The model can be solved by imposing the national-account identity for GDP (applied to the potential level of all variables):

$$(B4)\ Y_{it}^{*} = DD_{it}^{*} + X_{it}^{*} - M_{it}^{*}$$

and substituting out $M_{it}^{*} \equiv M_{it} + \Delta M_{it}^{*}$ using equation 3, then solving for Y_{it}^{*}, X_{it}^{*} and finally for DD_{it}^{*}. These operations provide an equation for ΔM_{it}^{*} expressed in terms solely of given parameters, which can thus be brought to the data. The cyclical adjustment term is then given by:

$$(B5)\ \mu_{it} = \Delta X_{it}^{*} - \Delta M_{it}^{*}$$

However measured (EC or Bank of Italy methods), it is important to recall that the cyclical adjustment term of the CA is highly sensitive to the set of output gap estimates employed in the computations. It is known that the latter figures vary significantly across international institutions, given the high uncertainty surrounding these measures, and the resulting cyclical adjustment terms of the CA can therefore turn out to be quite different.

[21] Based on the empirical findings in Bussière et al. (2013), Fabiani et al. (2016) assumes, for example, $\theta_{M,i}^{IAD}$=1.6 and $\theta_{X,i}$=1.9 for Italy.

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