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Shifting Paths?

The Evolution of Southern European Growth Trajectories Between the Global Financial Crisis and the Covid Pandemic

Appendix A: ISIC codes

Table 4 Industries and Industry Codes (ISIC 4)

D01T02	Agriculture, hunting, forestry
D03	Fishing and aquaculture
D05T06	Mining and quarrying, energy producing products
D07T08	Mining and quarrying, non-energy producing products
D09	Mining support service activities
D10T12	Food products, beverages and tobacco
D13T15	Textiles, textile products, leather and footwear
D16	Wood and products of wood and cork
D17T18	Paper products and printing
D19	Coke and refined petroleum products
D20	Chemical and chemical products
D21	Pharmaceuticals, medicinal chemical and botanical products
D22	Rubber and plastics products
D23	Other non-metallic mineral products
D24	Basic metals
D25	Fabricated metal products
D26	Computer, electronic and optical equipment
D27	Electrical equipment
D28	Machinery and equipment, n.e.c.
D29	Motor vehicles, trailers and semi-trailers
D30	Other transport equipment
D31T33	Manufacturing n.e.c.; repair and installation of machinery and equipment
D35	Electricity, gas, steam and air conditioning supply
D36T39	Water supply; sewerage, waste management and remediation activities
D41T43	Construction
D45T47	Wholesale and retail trade; repair of motor vehicles
D49	Land transport and transport via pipelines
D50	Water transport
D51	Air transport
D52	Warehousing and support activities for transportation
D53	Postal and courier activities
D55T56	Accommodation and food service activities
D58T60	Publishing, audiovisual and broadcasting activities

D61	Telecommunications
D62T63	IT and other information services
D64T66	Financial and insurance activities
D68	Real estate activities
D69T75	Professional, scientific and technical activities
D77T82	Administrative and support services
D84	Public administration and defence; compulsory social security
D85	Education
D86T88	Human health and social work activities
D90T93	Arts, entertainment and recreation
D94T96	Other service activities
D97T98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

Source: OECD (2023e, 45).

Table 5 Industry Aggregates I and Codes (ISIC 4)

D01T03	Agriculture, hunting, forestry and fishing
D05T09	Mining and quarrying
D10T33	Total Manufacturing
D16T18	Wood and paper products and printing
D19T23	Chemicals and non-metallic mineral products
D20T21	Chemicals and pharmaceutical products
D24T25	Basic metals and fabricated metal products
D26T27	Computer, electronic and electrical
equipment D29T30	Transport equipment
D35T39	Electricity, gas, water supply, sewerage, waste and remediation activities
D45T82	Total Business Sector Services
D45T56	Distributive trade, transport, accommodation and food services
D49T53	Transportation and storage
D58T63	Information and communication
D69T82	Other business sector services
D84T98	Public administration, education, health and other personal services
D84T88	Public administration, defence; education and health
D90T98	Other social and personal services
D90T96	Other community, social and personal services
D05T39	Industry (mining, manufactures and utilities)

D45T98	Total Services (excl. construction)
D58T82	Information, finance, real estate and other business services
D41T98	Total Services (incl. construction)
DINFO	Information industries
DTOTAL	TOTAL

Source: OECD (2023e, 46).

Table 6 Industry Aggregates II and Codes (ISIC 4)

Commodities and energy	D01T03, D05T09, D35T39
Construction and real estate activities	D41T43, D68
Knowledge-intensive private services	D50, D51, D58T60, D61, D62T63, D64T66, D69T75, D90T93
Less knowledge-intensive private services	D45T47, D49, D52, D53, D55T56, D77T82, D94T96, D97T98
Manufacturing – high and medium-high technology	D20, D21, D26, D27, D28, D29, D30
Manufacturing – low and medium-low technology	D10T12, D13T15, D16, D17T18, D19, D22, D23, D24, D25, D31T33
Public administration, defence; education and health	D84T88

Note: "Knowledge-intensive private services," "less knowledge-intensive private services," "manufacturing – high and medium-high technology," "manufacturing – low and medium-low technology" are essentially grouped according to aggregations suggested by Eurostat (2016, Eurostat indicators on high-tech industry and knowledge-intensive services. Annex 3 – High-tech aggregation by NACE Rev. 2. Available online at https://ec.europa.eu/eurostat/cache/metadata/en/htec_esms.htm, accessed October 31, 2023). Eurostat refers to NACE Rev. 2 sectors, but on the 2-digit level they are identical to ISIC 4 industries (cf. https://unstats.un.org/unsd/classifications/Econ# Correspondences). A remaining problem is the placement of "administrative and support services" (D77T82) because D78 ("employment activities") and D80 ("security and investigation activities") are classified as "knowledge-intensive services." We decided to group the aggregate sector according to the majority of subsectors. Moreover, we grouped "real estate activities" (D68) with construction instead of "less knowledge-intensive private services," because we believe this makes for a better proxy of the construction-housing nexus. We also separated "Public administration, defence; education and health" (D84T88) from the other knowledge-intensive private services. We suggest that they can be considered a proxy for the public sector, even though not all of the included services are necessarily public in all countries. Finally, we classified the non-service, non-manufacturing services as "commodities and energy."

Appendix B: Growth contribution of import-adjusted GDP components

The common approach to showing the relevance of different components of final demand for GDP growth has been to use decompositions based on national accounts data. However, this approach is problematic because it assumes that all imports flow directly into exports, whereas consumption and investment only consume domestic production. The expenditure approach used in national accounts decomposes GDP into private consumption (C), government consumption (G), investment (I), and net exports (X–M). While the growth contribution of net exports is interesting information in itself, it does not reflect the growth contribution of exports. In fact, the traditional approach systematically underestimates the growth contribution of exports and overestimates the contribution of the other components of final demand. In practice, all components of demand represent a mix of foreign and domestic production. Households, for example, directly import goods and services and indirectly consume the intermediate imports needed for the domestic production of the goods and services they consume. If these imports increase (ceteris paribus), this should not be seen as a growth contribution to GDP, since there is no change in domestic production. However, the traditional approach would show that the growth contribution of consumption increases while the growth contribution of net exports decreases.

A more accurate approach is to allocate imports to their respective demand categories and to consider GDP as the sum of the import-adjusted elements of final demand:

Y = (C – CM) + (G – GM) + (I – IM) + (X – XM)

CM, GM, IM, and **XM** denote the import content of private consumption, government consumption, investment, and exports.

This makes the calculation somewhat more difficult, as the necessary data cannot be easily obtained from national accounts. However, it can be estimated on the basis of input-output tables (IOT). Using OECD data, it is possible to derive coherent estimates for a large number of countries for the period 1995–2020.

For a more detailed yet accessible explanation of IOT, the logic of import adjustment, and the required matrix calculation procedures, see Baccaro and Hadziabdic (2024). The procedure described below is very similar to theirs, but we make a couple of different choices and use a more recent version of the OECD IOT. As a result, our results differ somewhat from theirs.

Import adjustment procedure

The OECD provides ready-made input-output tables of domestic output and imports, as well as the domestic Leontief inverse matrix. This is all that is needed to calculate the import-adjusted components of final expenditure.

Based on the OECD's definition of the import content of exports (stats.oecd.org), the import content for each category of final expenditure can be defined as follows:

Import content of exports = u Am $(I - Ad)^{-1}$ EX

Import content of private consumption = u Am $(I - Ad)^{-1}$ PCd + Σ PCm

Import content of government consumption = u Am $(I - Ad)^{-1}$ GCd + Σ GCm

Import content of investments = u Am $(I - Ad)^{-1}$ GFCFd + Σ GFCFm

Import content of inventory changes = Am $(I - Ad)^{-1}$ INVNTd + Σ INVNTm

Am is the input-output coefficient matrix for imported transactions.

u is a 1 x n vector, each of whose components is 1 for corresponding import types.

u Am is thus a 1 x n vector where $(\mathbf{u\ AM})_{1,n}$ is equal to total imports of sector n divided by total output of sector n.

Ad is the input-output coefficient matrix for domestic transactions.

I is the identity matrix.

$\mathbf{(I - Ad)^{-1}}$ is the domestic Leontief inverse.

EX is the export vector. Exports are the sum of direct exports and consumption by non-residents.

PCd, GCd, GFCFd, and **INVNTd** are the domestic vectors of private consumption, government consumption, investments, and inventory changes. Private Consumption is the sum of final consumption expenditure of households and final consumption expenditure of non-profit institutions serving households.

Σ PCm, Σ GCm, Σ GFCFm, and **Σ INVNTm** are total direct imports (column sums) in the respective category of final expenditure. Private Consumption is the sum of final consumption expenditure of households, final consumption expenditure of non-profit institutions serving households, and direct purchases abroad by residents.

Import-adjusted values can be computed by simply subtracting the import content from the total value of each component of final expenditure.

It is important to note that the import contents calculated above should be used in combination with OECD IOT or the OECD Trade in Value Added (TiVA) database. *They cannot be used to adjust values from national accounts!* The main reason is that export and import data in OECD IOT and TiVA tables are adjusted for direct re-exports. Moreover, the IOT data differ from national account data because they are recorded in basic prices.

Price adjustments and deflation

Since we want to look at trends over time, the data must be adjusted for inflation. Unfortunately, the OECD IOT are in current US dollar prices.

As a first step, we therefore use the period-averaged exchange rates provided in the OECD's national accounts to convert the data into national currencies. The next step is more problematic.

To compare values across years and compute real growth rates, one would ideally use either accurate deflators for each cell in the IOT or IOT that are fully expressed in the previous year's prices (chain-linking). Neither option is currently available. As far as we can tell, this leaves two options.

First, one could use the overall GDP deflator (provided in the OECD national accounts) to deflate all final import-adjusted values of GDP components. This assumes that all prices in all parts of the economy have moved in the same direction. A second solution adds more nuance. The OECD also provides deflators for different expenditure components (i.e., different deflators for imports, exports, etc.), although they are not made for import-adjusted components. However, one could deflate the non-import, adjusted expenditure components with their respective deflators before subtracting the estimated component-specific imports deflated by the import deflator.

For the figures presented in this paper, we put a premium on transparency and show results based on the former method, i.e., a common deflator for all components. In any case, we hope that better options will be available in the near future, as neither alternative is particularly satisfactory.

Finally, there is one last issue related to prices. Unlike other values in the IOT, expenditures are given in purchase prices instead of basic prices. This is not a problem in itself. One could simply display results based on purchasers' prices. However, these results might look a bit strange to anyone familiar with the standard results on GDP growth. For this reason, we make a final adjustment by multiplying the results by a factor equal to output-based GDP (basic prices) divided by expenditure-based GDP (purchasers' prices). This keeps the shares of the different components the same, but the absolute values add up to the kind of GDP totals that most readers will be familiar with from national accounts data. This is admittedly a rather brutal approach, but we think it helps to relate the results to conventional perspectives on growth.

Growth decomposition

Based on the values generated through the steps described above, growth contributions for 1996 to 2020 can be easily computed using the familiar decomposition approach usually applied to conventional national account data:

$$\textbf{Growth contribution of component B in period t} = ((B_t - B_{t-1}) / |B_{t-1}|) * |(B_{t-1} / GDP_{t-1})|$$

That is, the growth rate of component B between the previous period and this period is multiplied by the GDP share of B in the previous period.

Appendix C: Indicator of sectoral domestic value added in total exported domestic value added

To really get a sense of which sectors are important for producing exports, we need to consider both the value added that is exported directly by a sector and the value added that contributes to the exports of another sector. Consider a service sector that provides a lot of inputs to a manufacturing sector that mainly exports its product. If only direct sectoral exports were considered, the service sector would not be classified as relevant to exports. TiVA makes it possible to generate an indicator that estimates the value of sectoral exports, regardless of whether they are exported directly or whether they contribute to the exports of other sectors.

This indicator can be derived from the OECD TiVA dataset using the indicator "EXGR_BSCI," which provides estimates of the origin of value added in gross exports. We keep only those observations for which the country of origin of the value added is equal to the exporting country and for which the exporting sector is equal to "DTOTAL." This gives us the amount of sectoral domestic value added that goes into exports, regardless of the exporting sector. These values can be divided by the economy-wide exported value added to estimate the relative sectoral importance with respect to national exports.

To clarify, this indicator differs from the widely used traditional indicators that consider only directly exported sectoral value added by combining all of a sector's contributions to economy-wide exported value added, rather than referring only to a sector's contributions to its own exports. As a result, this indicator is sensitive to "indirect" export dependence. In our view, it is a more accurate indicator of how important a sector is to total exports.

Appendix D: Estimates of export-related employment and hours worked

The TiVA-based sectoral export indicator can be used to estimate sectoral indicators of export-related employment and hours worked. To do this, we merge TiVA data with data from OECD STAN and from the ILO which provide information on sectoral employment and hours worked. The estimation of export-related employment is straightforward. We multiply the labor variables

by the share of sectoral value added going to economy-wide exports (for the latter, see Appendix C). This is a rather simple estimation. It essentially assumes that if x percent of a sector's value added goes to exports, then x percent of the hours worked in that sector is export-related. As far as we know, this is more or less common when approximating trade-related employment figures.

Results differ depending on the sectoral breakdown. At a given level of sectoral aggregation, the approach assumes that each unit of value added is produced by the same number of hours. For example, when we take the economy-wide share of exported value added in total value added and multiply it by the total number of hours worked in the economy, we do not take into account whether exported value added is produced in sectors of high or low labor intensity. But the data allow us to make such distinctions. It makes a difference whether the export-dependent shares of hours, persons, and income are calculated on a more detailed sectoral basis: The sum of the sectoral results is not equal to the result at the aggregate level. This means that the best approach is to calculate the variables at the smallest sectoral level available. More aggregated sectors, such as total manufacturing, are calculated as the sum of subsectors.

The procedure thus accounts for the differences in labor intensity between the available sectors. However, it is of no help when export-related and domestic-oriented activities within a sector differ significantly in labor intensity.

Unfortunately, STAN data on hours worked (HRSN) and ILO data on hours worked were not available for all desirable country-year-sector combinations matching TiVA-based indicators. We followed two simple procedures to fill some remaining gaps:

> (1) When HRSN was available on a broader sector aggregation (e.g., D19T23) and some of the subsectors (e.g., 19, 20, 21), we used these values to calculate HRSN for the remaining subsectors (e.g., D22T23). The same procedure was used to fill gaps in the ILO database.
>
> (2) When HRSN was available on a broader sector aggregation (e.g., D49T53) but total employment (EMPN) was available for more detailed sectors (e.g., D49), we estimated sectoral HRSN by distributing the aggregated HRSN value according to the sectoral share in aggregated EMPN.

Moreover, it is important to note that due to the estimation process, "growth" in export-dependent employment/hours can mean two things. Changes in the number of hours related to foreign demand could occur either because a sector added total hours or because existing hours were reclassified as export-related due to increased export intensity. Positive growth thus does not automatically indicate a positive development of total sectoral employment/hours. At one extreme, growth could simply be the result of a shift in sectoral export intensity, while total sectoral jobs/hours remain stable or even decline.

Appendix E: Additional figures

Figure 7 Decomposition of annual GDP growth into final demand components, 1996–2019

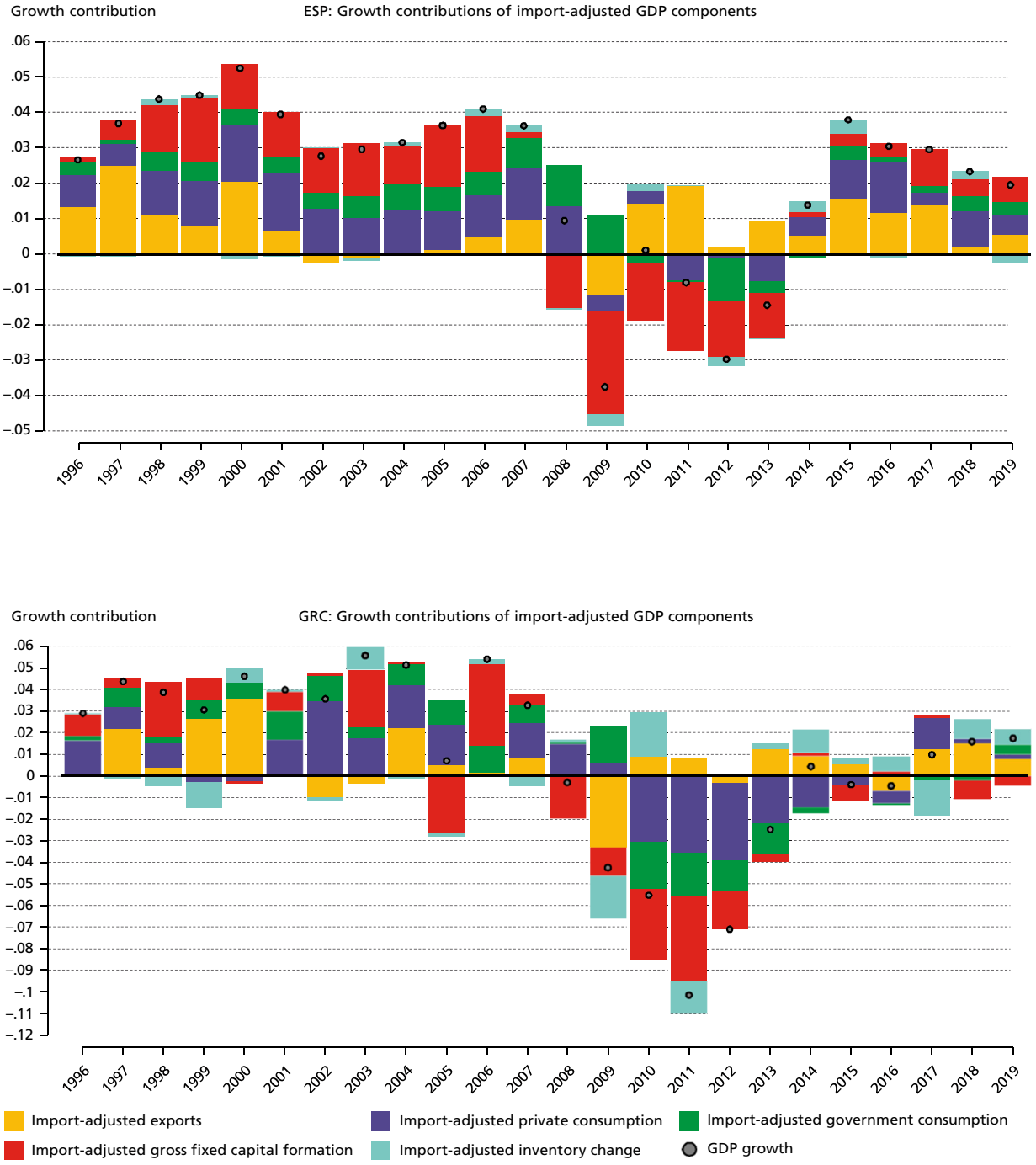
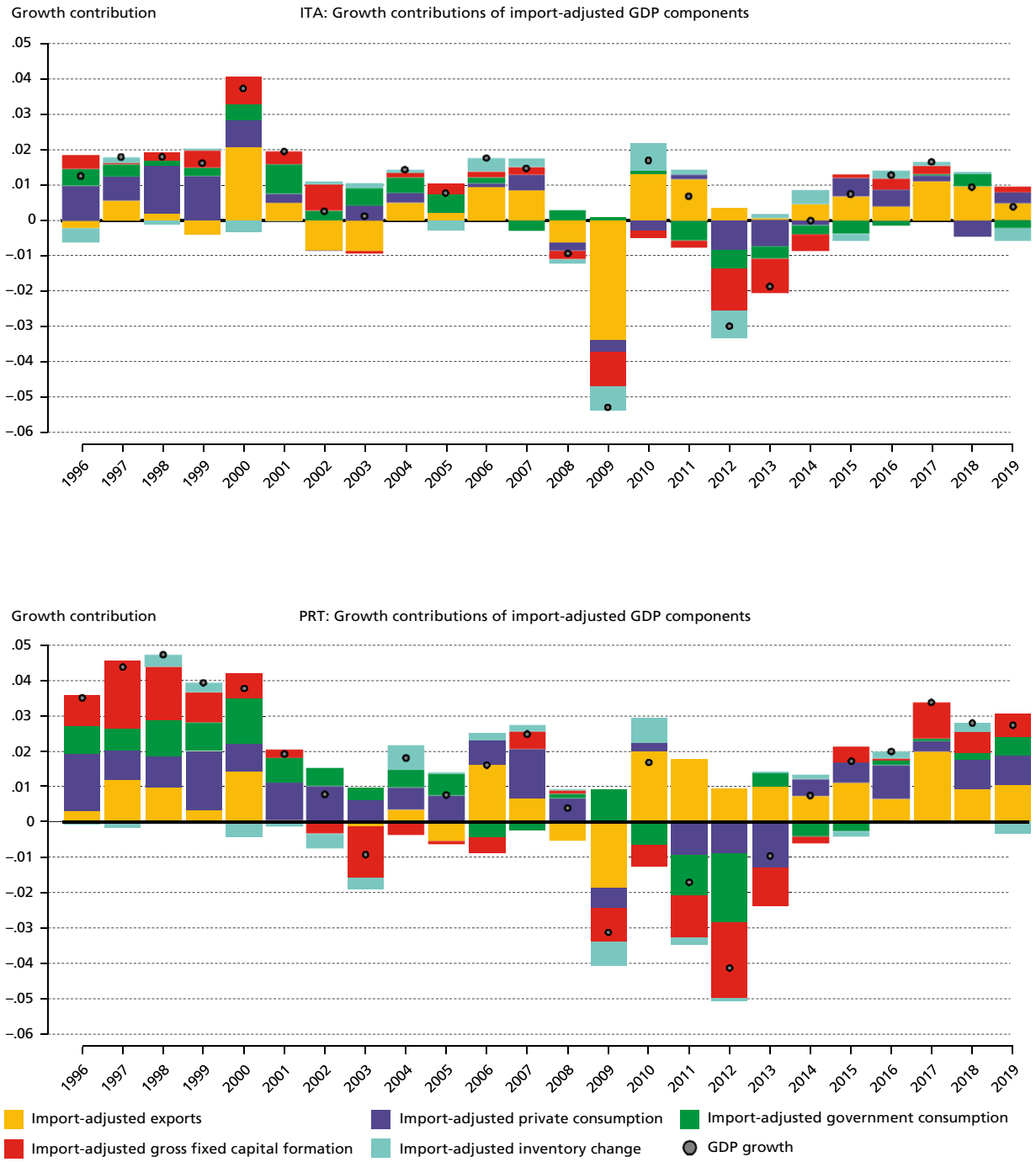
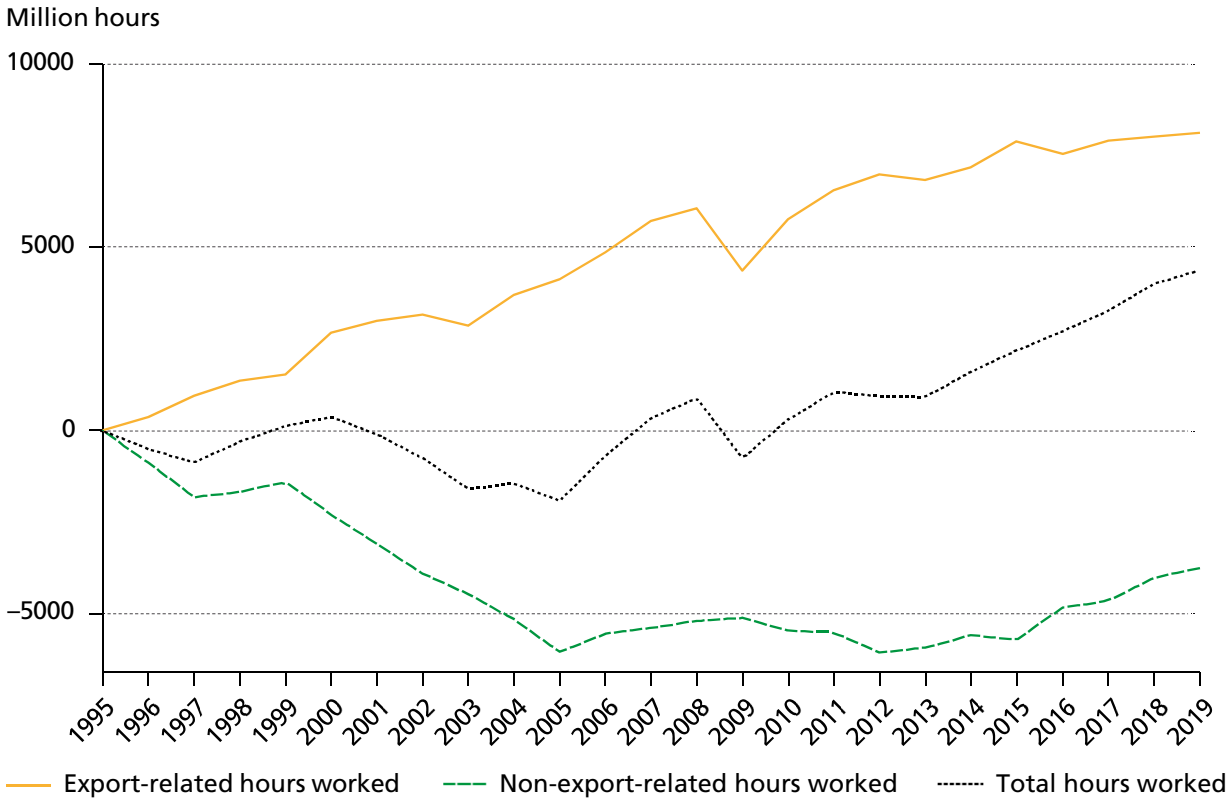


Figure 7, continued



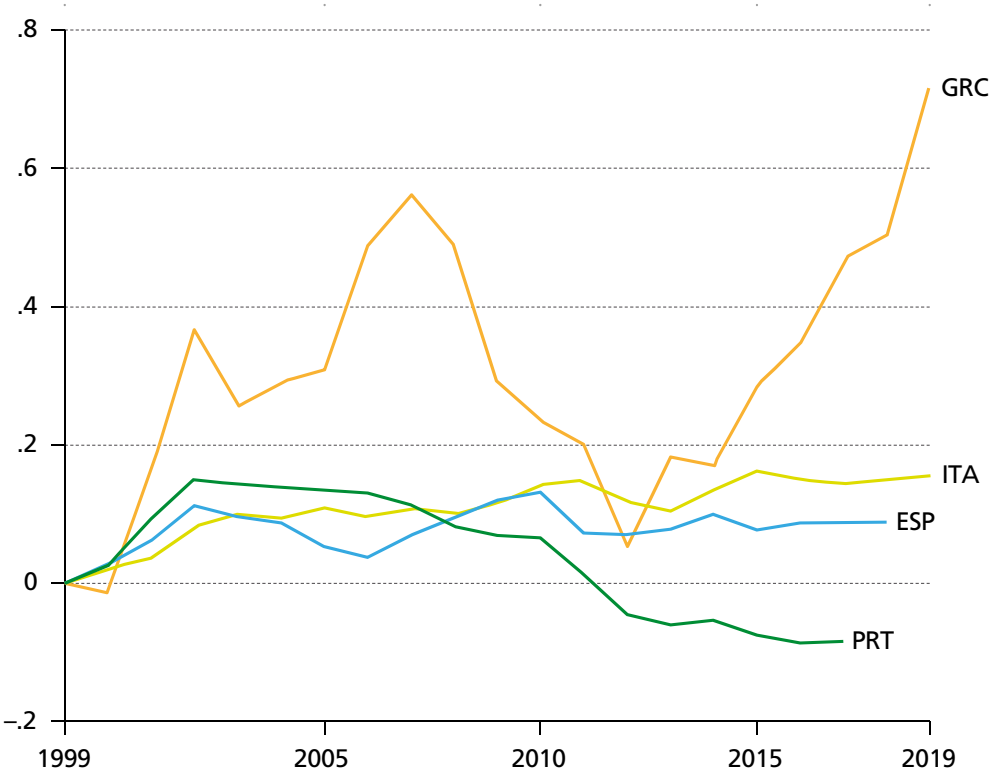
Source: Own calculations based on OECD (2023b; 2023c).

Figure 8 DEU: Absolute growth of export-related and non-export-related hours worked since 1995



Source: Own calculations based on OECD (2023d; 2023e) and ILO (2023).

Figure 9 Growth in average hourly labor compensation in "IT and other information services" (62-63)



CPI-deflated.
Source: Own calculations based on OECD (2023a; 2023d).