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Intangible assets of multinational enterprises in Ireland and their impact on euro area activity[1]

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[1] This contribution was prepared for the conference. The views expressed are those of the authors and do not necessarily reflect the views of the European Central Bank, the Bank of Spain, the BIS, the IFC or the other central banks and institutions represented at the event.

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Abstract

The activities of multinational enterprises (MNEs) have become an increasingly important feature of the euro area economy, affecting output, trade and financial linkages. MNEs contribute to domestic output by maintaining large production facilities, offering high-paid jobs, bringing in new technologies and generating tax revenues. Following statistical changes implemented in 2015 to better capture the increasing importance of intangible investment, the economic impact of MNE activities has become much more evident in measures of intellectual property product (IPP) investment and external IPP trade flows. MNE activities, which often entail large and instantaneous transfers of IPP, are frequently highly volatile and can blur real-time assessment – and forecasting – of the business cycle, the current account and the capital stock in the euro area. Focusing on Ireland, given the strong prevalence of MNE activities in that economy and their importance for the euro area aggregate, this paper assesses the usefulness of the "modified" series for Irish non-construction investment and services imports. Using the modified series would provide a more accurate picture of the domestic dynamics of the Irish economy and enhance real-time assessment of the euro area business cycle, current account and capital stock. This paper brings insights into the unwinding of IPP shocks, which is a more straightforward exercise than seeking to anticipate the shocks themselves. The conclusions of this work underline the urgent need for more granular and internationally harmonised data on MNE activities to gain a clearer understanding of the dynamics of IPP operations and the implications for both short and long-term macroeconomic developments.

Keywords: Intangible capital, multinational firms, macroeconomic impact of globalisation
JEL classification: E22, F23, F62

Contents

Executive summary

Over the past few decades, a multitude of MNE activities have become increasingly important for economic activity in the euro area and across countries. MNEs[1] are companies producing goods or delivering services in more than one country, spanning all economic sectors and encompassing a wide range of operational patterns. Foreign-owned firms' share of total output in euro area countries increased from 12% in 2000 to 18% in 2019. Through their activities, MNEs contribute to domestic output, typically by maintaining large production facilities, offering high-paid jobs, bringing in new technologies and generating tax revenues. At the same time, some MNE activities are intrinsically volatile. As MNE activities have become more prevalent and increasingly involve intangible knowledge-based assets, national accounting standards have been adapted to better capture this phenomenon. The implementation of the European System of National and Regional Accounts 2010 (ESA 2010) in 2015 has meant that investment in, and imports of, intellectual property assets now directly affect measures of gross domestic product (GDP) and expenditure components. However, the resulting changes in the level, growth rate and volatility of measures of activity increasingly pose challenges to assessment, at both national and euro area level, of the business cycle, current account and capital stock, and complicate monitoring and forecasting at both levels. This is of great importance to national central banks and the European Central Bank (ECB) in conducting their economic assessments (see Section 2).

Ireland stands out as a country in which MNE activities both disproportionately affect measures of national output and result in visible and unpredictable impacts on euro area GDP and its components. These impacts stem from the volatility of IPP investment and import data, as well as from subsequent exports of goods and services, often themselves driven, in large part, by imported IPPs. In euro area countries other than Ireland, estimates point to IPP transfers having a relatively limited impact on overall country-level output for the present, and little effect on euro area GDP or its expenditure components. This is the case even for Cyprus, Luxembourg, the Netherlands, Malta and Slovakia, which have substantial MNE activities (see Section 3).

Transfers of intangible assets to and from Ireland have caused significant volatility in the expenditure components of euro area GDP. In most cases, the impact on real euro area GDP of such transfers broadly nets out in the quarter in which they take place, given that the investment concerned is fully offset by the associated imports. However, by boosting capital stock and exports, IPP inflows contribute positively to euro area GDP over time. These effects have propelled Ireland from a weight of approximately 1% of euro area GDP in 1999 to around 5% by 2023. The euro area current account and capital stock are also affected by MNE activities (see Section 4). . The same methodology may be used to derive a modified series for imports. Complementing the headline series with these smoother modified series facilitates economic assessment of the euro area (see Section 5).

[1] See the definition given in the glossary on the "Statistics explained" page of the Eurostat website.

Turning to macroeconomic projections, it is very difficult to anticipate intangible asset transfers by MNEs given that they are firm specific, often confidential and may result from corporate tax-efficiency considerations. Looking more specifically at the ex post patterns of Irish IPP transfers and the resulting shocks, large transfers typically take place within a single quarter and have increased in frequency and amplitude in recent times. Although surrounded by significant uncertainty, the historical pattern would suggest, as a rule of thumb, that IPP growth broadly reverts to its historical average in the quarter following the shock concerned. Out-of-sample simulations of the unwinding of the last seven Irish IPP shocks suggest that there would be some merit in applying a parametric modelling approach to assessing post-shock dynamics (see Section 6).

This paper summarises the findings of a Eurosystem expert group on MNEs.[2] The conclusions reached by the group were, first, that the modifications to the national accounts data compiled and published by the CSO in Ireland to address the specific features of the Irish economy contribute positively to economic assessment of the euro area. Second, while it is extremely difficult to foresee transfers of intangible assets ex ante, a rule of thumb approach based on historical regularities, and simulation exercises have proven to be of benefit in capturing more accurately the ex post patterns of large Irish IPP transfers. Third, there is a strong need for more granular and internationally harmonised data on MNE activity (see Section 7).

[2] The expert group is a subgroup of the Eurosystem Working Group on Forecasting.

1. Introduction

Multinational Enterprises (MNEs) have become an increasingly important feature of the euro area economy. In addition, the profits of some of the world's largest MNEs derive mainly from intangible assets (software, patents and other IPPs). This, coupled with increasingly complex cross-border corporate structures, means that some MNE activities may introduce significant volatility into measures of economic activity. While national accounting standards have made great strides in incorporating new metrics to account for these phenomena, the resulting changes to measures of activity, such as GDP, investment and imports, pose increasing challenges to the assessment of the business cycle, current account, and capital stock. This has been the focus of an expert group on multinational enterprises composed of staff from several national central banks and the ECB and reporting to the Eurosystem Working Group on Forecasting.

Ireland stands out as a country in which MNE activities both disproportionately affect national output measures and have visible impacts on euro area GDP and its components, owing to volatile IPP investment and imports and to subsequent exports of services and goods.

This paper points to the urgent need for more granular and internationally harmonised data on MNE activities to improve understanding of the dynamics of these operations and their implications for both short and long-term macroeconomic developments.

2. MNE activities and measurement issues

MNE activities represent an increasing share of economic activity globally and in the euro area. These activities take several forms, including production for domestic or export markets, cross-border production, supply chains and the provision of financial and consultancy services.[3] For example, the share of euro area gross output produced by firms not headquartered in the country in which their production takes place increased from 12% in 2000 to 18% in 2019, according to data produced by the Organisation for Economic Co-operation and Development (OECD). Most of this increase is driven by global corporations across a wide range of sectors with head offices that are established outside the euro area. The activities of these MNEs are particularly important in Ireland, Luxembourg, Slovakia, Malta and the Netherlands (Chart 1). For some countries, such as Slovakia, MNE activity is mostly driven by companies headquartered in other euro area countries, while Ireland stands out with the highest share of MNEs with headquarters outside the euro area. Within the euro area, foreign-controlled MNE activities are particularly prevalent in the pharmaceutical, refined petrol product, information and communications technology (ICT) and chemical sectors (Chart 2). The increasing importance of MNEs represents structural changes driven, for instance, by digitalisation, economic integration, financial liberalisation and increased competition.[4] This trend is likely to persist, despite moves in certain areas towards deglobalisation, as reflected in reshoring and the shortening of supply lines on the grounds of strategic autonomy.[5]

A particularly important MNE activity affecting national accounts is related to the creation and transfer of intangible assets, which have typically grown more strongly than tangible assets over the past two decades. This is especially the case in knowledge-intensive industries, such as ICT and pharmaceuticals, where a large proportion of the value of a product lies in its intellectual property. There is an increasing divergence between the market capitalisation of many large firms in certain sectors and their investment in tangible assets.[6] For many firms, know-how and intangible assets, such as digitised information and resources (software, databases) and innovative property (e.g. research and development (R&D) and artistic originals), are the primary drivers of their profits.

While intangible assets are an important factor in production in knowledge-intensive industries, they also play a pivotal role in the tax-optimisation activities of MNEs. By transferring such assets to countries with an attractive corporate tax system, MNEs can reduce the tax burden on income streams they derive from these assets. The decisions taken by MNE groups on their corporate structure may,

3 More broadly, such activities also entail transfers of IPPs, redomiciliation of headquarters, goods sent abroad for processing/contract manufacturing, merchanting, quasi-transit trade, transfer pricing and aircraft leasing. For more information, see Table A in the Annex.

4 With the increasing importance of intangible assets, firms are likely to operate in MNE structures with foreign affiliates under their control in order to retain IPPs within their structures (Rugman, 1981).

5 See Attinasi et al. (2023).

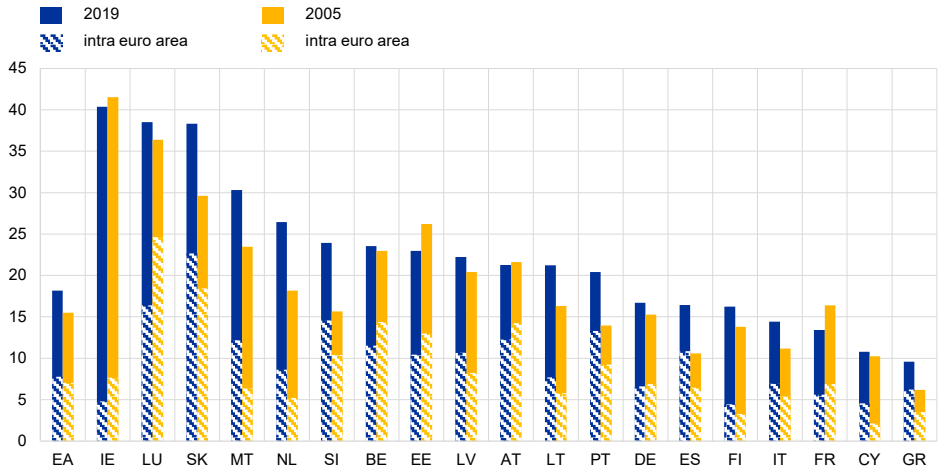
6 See Corrado et al. (2022).

in turn, trigger large shifts in aggregate investment and import expenditures, given that macroeconomic statistics are compiled on a residency basis.

Chart 1

Non-domestic MNE share of output across euro area countries

(percentages of gross national output)



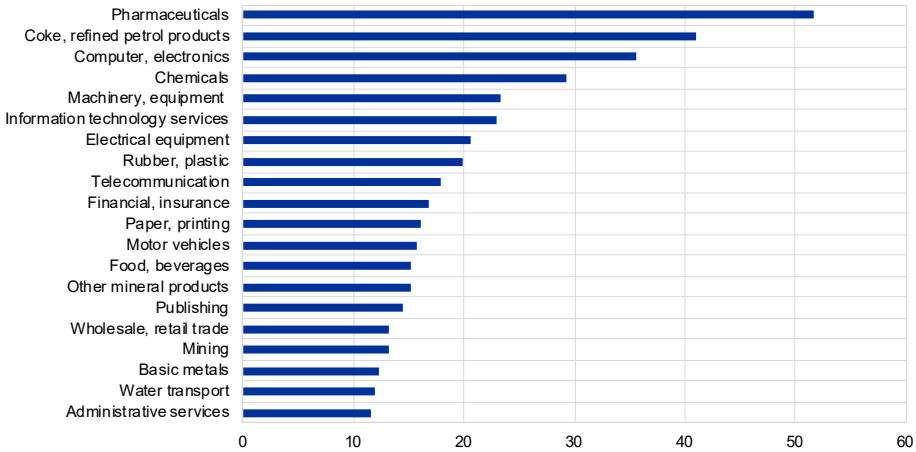
Sources: Organization for Economic Co-operation and Development – Activity of Multinational Enterprises (OECD AMNE) database and own calculations.

Notes: EA stands for euro area. The countries are in descending order based on the size of their MNE output in 2019. The share of total gross output produced by firms not headquartered in their respective home countries is calculated on the basis of the total output for the country concerned. Intra-euro area refers to production in the respective country by firms headquartered in another euro area country. Gross output refers to turnover before deduction of the value of intermediate goods used up in production by the 41 industries, including the financial and insurance sectors, covered by the OECD AMNE database.

Chart 2

Foreign MNE activities across sectors in the euro area

(percentages of euro area gross output in 2019)



Sources: Organization for Economic Co-operation and Development – Activity of Multinational Enterprises (OECD AMNE) database and own calculations.

The sharp increase in the importance of intangible assets and MNE activities has been partly addressed by more accurate measurement of these transactions

by statistical agencies.[7] These cross-border activities are, however, intrinsically complex and the operations of international networks are highly diverse, posing major challenges for national economic statistics. The European System of National and Regional Accounts (ESA 2010) introduced conceptual and practical changes to the ways in which economic activity and various facets of globalisation are measured. Chief among these, in terms of their effect on euro area measures of output, is the classification of R&D as capital formation of IPPs. As a result, the movement of intellectual property assets across borders between subsidiaries of MNEs has led to large spikes in gross fixed capital formation and related services imports in certain countries since 2015.[8]

Work in the statistical field is ongoing to ensure a more accurate picture of these MNE activities. For instance, Eurostat is working on: (1) an early warning system[9] to detect the restructuring of MNEs and ensure consistent reporting; and (2) a pilot scheme covering data on selected MNEs to enhance measurement of gross national income (GNI). It has also set up a task force on integrated global accounts and established a joint task force on IPPs in conjunction with the OECD.[10] At this stage, no major changes to the core national accounts are planned as part of the ongoing review of the system of national accounts (SNA), the European system of accounts (ESA) and the balance of payments manual (BPM).[11] Any changes contemplated in the next ESA review (ESA 2025) would be of a granular nature and relate to sectoral accounts, with a view to revised national accounts data being published in 2029.

With regard to special-purpose entities (SPEs), which are often sponsored by foreign-controlled MNEs in the euro area, an international definition was agreed in 2018 by the dedicated International Monetary Fund Committee on Balance of Payments Statistics (IMF BOPCOM) Task Force with the aim of collecting comparable cross-country data that separately identify SPEs in cross-border statistics. The ECB started publishing euro area and national balance of payments data on SPEs in April 2024.[12]

ECB statistical working groups are also developing data enhancements in both national accounts and balance of payments to capture the role of foreign-controlled non-financial corporations. In parallel, Ireland's CSO has developed a set of indicators that are designed to remove specific MNE-related data distortions from Irish national and international accounts (see Section 5.1).

7 See UNECE (2011).

8 See, for example, Connolly (2017).

9 See the article entitled "Globalisation of Businesses: Early Warning System", published on the Eurostat website.

10 See Eurostat-OECD (2020).

11 See IMF (2021) and IMF (2022).

12 See ECB (2024).

3. MNE activities across euro area countries with area-wide impacts

MNE activities may have a disproportionate impact on national output, especially for smaller countries. Three types of MNE activities are particularly important in this regard.

First, *intangible investment and imports of* R&D services, reflecting the growing importance of intangible assets and the relative ease with which these can be relocated across borders (see Section 2).

Second, *contract manufacturing* agreements, where a firm in the euro area contracts another firm abroad to produce a good that is then sold in a third country without ever crossing the border of that firm's home country. During the production process, ownership of the inputs remains with the firm and hence no trade flows are recorded in the balance of payments (b.o.p.) and national accounts, other than an import by the firm of manufacturing services from the foreign company that is producing the good concerned. The sale of the final good to the third country is, however, included in the b.o.p. and national accounts, which is consistent with the change in ownership principle.

Third, *merchanting,* which refers to a merchant company purchasing a good from an entity resident abroad and subsequently selling it to a buyer in a third country without the good itself crossing the border of the country in which the merchant is based.[13] Merchanting therefore also adds to exports even though the purchased good does not enter the merchant's economy.

The impacts are often more visible for small open economies than for larger countries. For instance, the share of IPPs to GDP is larger in Ireland and Malta, as well as in France[14] and Austria, than in the euro area as a whole (Chart 3). Merchanting as a share of GDP is also relatively high in Ireland, Luxembourg and Cyprus.[15] MNE activities in Ireland are reviewed in detail in the sub-section below. While Ireland is by no means unique in having sizeable MNE intangible investment activity, the level in other countries is typically lower and rarely affects measured euro area aggregates to the same degree.[16]

[13] The difference between revenues from the sale and purchase of the good (net of any expenses incurred to finance, insure, store and transport the good) is recorded as net exports of merchanting in the goods balance of the country in which the company resides.

[14] Some caution is warranted in interpreting literally the high share of intangible investment in France. This reflects different accounting practices by national statistics offices: software and databases are much more likely to be classified as capital in French data than in other euro area countries, see Guilou and Mini (2019).

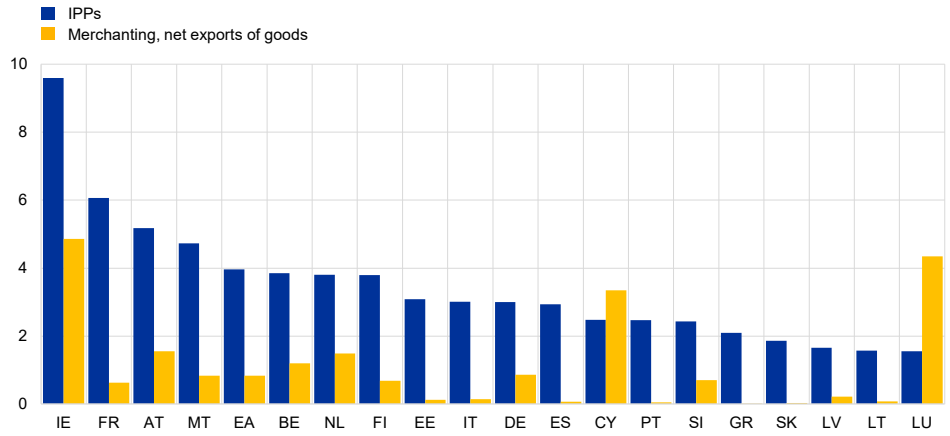
[15] In contrast to *merchanting,* data for the exact contribution of *contract manufacturing* to the b.o.p. goods trade is not available for most euro area countries.

[16] The occasional volatility in intangible investment in the Netherlands may be related to tax discounts (under the "Innovation Box" scheme) on IPP-related business (patents, copyrights, software, etc.) from 2010 onwards. In Cyprus, SPE activities relating to the provision of ship-

Chart 3

IPPs and merchanting

(percentages of gross national output in 2023)



Sources: Eurostat, ECB and own calculations.

Notes: Intellectual property products (IPPs) shows the share of intangible investment assets in nominal GDP based on national accounts data, the countries being shown in descending order. IPP values for Belgium relate to 2020. The values for merchanting are based on balance of payments data over four quarters up to the third quarter of 2023.

3.1 Impact on Ireland

Measures of economic activity in Ireland are particularly affected by the activities of MNEs, and the size and volatility of these transactions are sufficiently large to influence euro area aggregates visibly and regularly. Net primary income from abroad has represented a large and growing wedge between GDP and GNI for decades. In recent years, however, other factors - such as the size and structure of aircraft leasing firms, the very large profits of redomiciled[17] firms and the practice of moving intellectual property and other intangible assets to Irish subsidiaries - have all been playing an increasingly important role, thereby inflating Ireland's GDP.

Regarding the expenditure components of GDP, the statistical distortions are concentrated in investment, imports and exports. Most notably, lumpy investments in intangible assets by foreign-owned MNEs frequently lead to

owning services affect several national accounts sub-categories, including investment, and external statistics data. Luxembourg is generally considered highly globalised due to high levels of financial flows (e.g. related to the presence of investment funds) and foreign direct investment (FDI), while for other countries, such as Germany, Spain and Italy, the impact of MNE-related activities is reported to be increasing but still minor. France has a relatively high proportion of intangible investment related to the aerospace sector and has somewhat different accounting practices in this domain, see Guilou and Mini (2019).

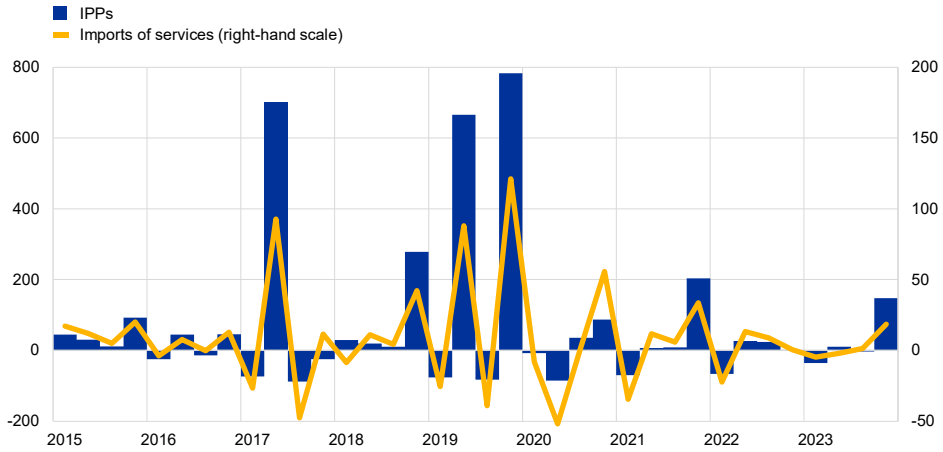
17 In Ireland, the CSO reports that "beginning in 2008 [...], a number of multinational corporations relocated their group headquarters to Ireland. As far as tax authorities were concerned, these firms were then domiciled in Ireland. These were mainly public limited companies whose shares trade on international stock exchanges. These are redomiciled Private Limited Companies in Ireland" – see the article entitled "Redomiciled PLCs", published on the CSO website in 2023. A redomiciled PLC is a company that owns large subsidiary companies which are still established overseas. The Irish headquarter holds shares or equity in these subsidiaries, and, as the owner, receives the profits of these branches abroad.

pronounced swings in Ireland's total investment and imports of services (Chart 4). Estimates of these transactions are also prone to large retroactive revisions from time to time. However, these transactions are usually GDP-neutral, given that IPP investments are generally imported and hence incorporated into IPP imports (typically resulting in broadly similar – but offsetting – percentage contributions to GDP within the same quarter). The issue is not unique to Ireland, given that it also affects the Netherlands, but Ireland has accounted for a disproportionate share of euro area IPP investment in recent years (Chart 5). Investment in and imports of aircraft for leasing purposes also usually result in offsetting contributions to GDP. By contrast, contract manufacturing (Box 1), and to a lesser extent merchanting, tends to boost both exports and GDP.

Chart 4

IPPs and import dynamics in Ireland

(quarter-on-quarter percentage changes)



Source: Eurostat.
Notes: IPP stands for intellectual property product. Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020.
Latest observation: Fourth quarter of 2023.

Over time, the onshoring of intangible assets has boosted Ireland's GDP by generating large exports highly concentrated with certain firms. Between 2014 and 2022, exports of goods and services increased by €470 billion. The most pronounced increase was in *computer* (ICT) services (Chart 6), a category covering services related to hardware, software and data-processing, as well as cloud services, sales of software transmitted electronically and software licence fees. Such services are often provided within individual MNE groups as part of a tax-optimisation strategy.[18] Other IPP-related income streams were classified as *royalties*, i.e. charges for the use of IPP, and *business services*. The latter category includes, for instance, advertising services (a key source of revenue for some ICT companies), together with legal, accounting, and other professional services, as well as operational leasing. IPP-based exports are highly concentrated with a few MNEs, to judge from the related data on corporate tax revenues.[19]

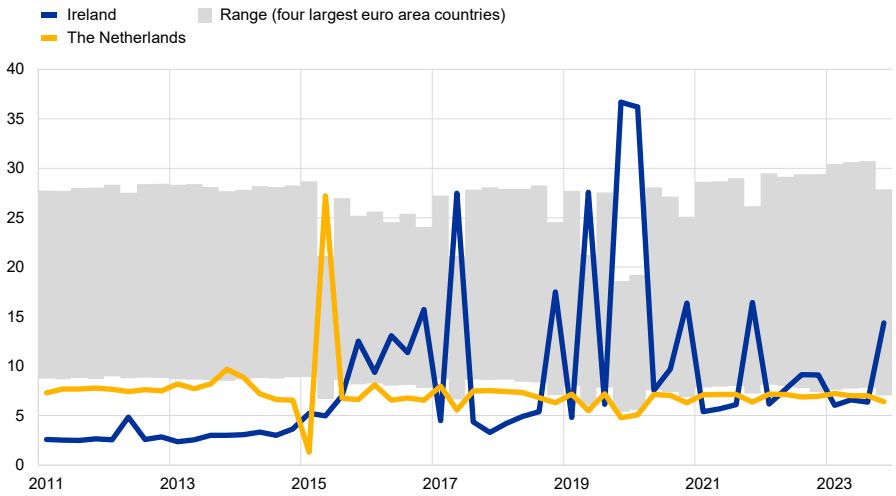
18 For a discussion of tax planning by MNEs in OECD countries, see Johansson et al (2017).

19 See Wier and Zucman (2022) and EU Tax Observatory (2024).

Chart 5

Contributions of Ireland and the Netherlands to euro area IPP investment

(percentages of euro area IPP investment)

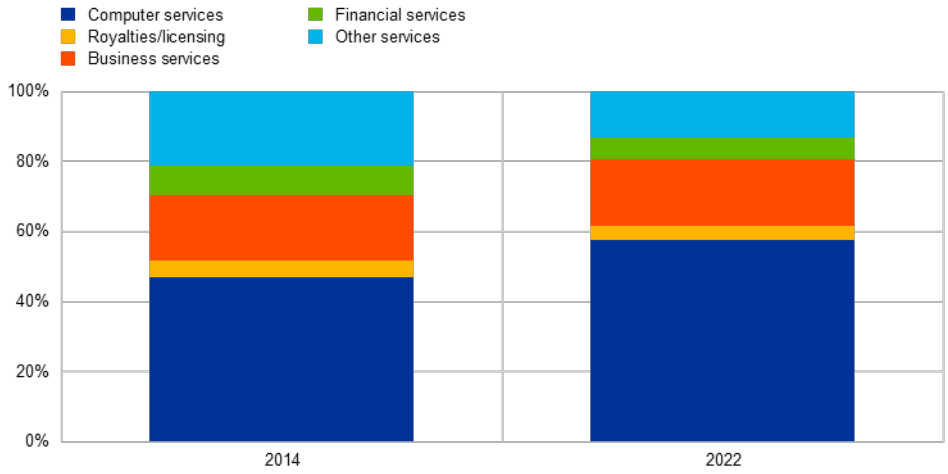


Sources: Eurostat and own calculations.
Notes: Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020. The grey range shows the minimum and maximum values for the four largest euro area countries, namely Germany, France, Italy and Spain.
Last observation: Fourth quarter of 2023.

Chart 6

Ireland's services exports

(percentages)



Source: Central Statistics Office, Ireland.

Box 1

Contract manufacturing, merchanting and Ireland's ICT value chain

Prepared by Nico Zorell

Contract manufacturing abroad has become an important source of IPP-based export income in Ireland. Foreign contract manufacturers produce IPP-intensive goods (such as smartphones or pharmaceuticals) abroad on behalf of Irish-resident MNEs without acquiring ownership of the products. Once the goods are sold to a third party, an export is recorded in Ireland's trade balance, although the goods never enter Irish territory. Contract manufacturing exports have increased almost five-fold since 2015 and now account for almost one-quarter of total exports. Notably, contract manufacturing is also included in Ireland's industrial production data despite actual production taking place elsewhere (e.g. China).

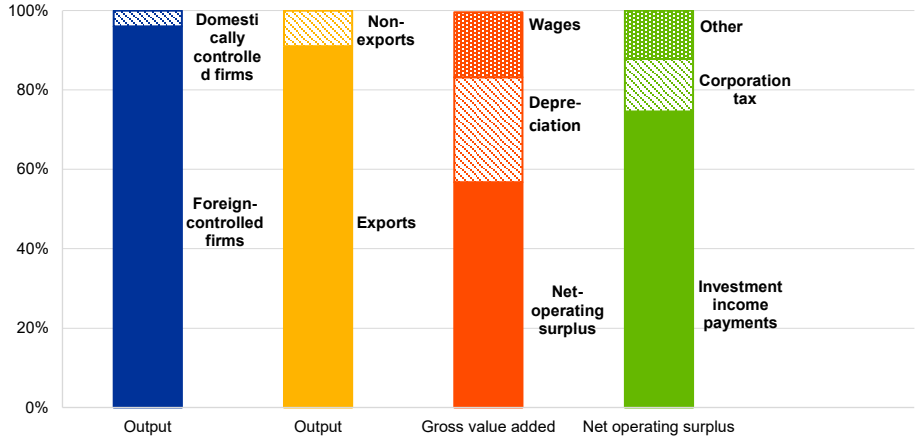
Besides contract manufacturing, Irish-resident MNEs are also involved in merchanting. This means that they acquire ownership of goods from manufacturers abroad for resale without these goods physically entering Ireland. However, the impact on GDP is more limited than for contract manufacturing given that the large quantities of goods sold under merchanting arrangements are broadly offset by goods acquired under merchanting arrangements.

Much of the IPP-related exports in Ireland require only minor domestic inputs and are thus only loosely connected with the domestic economy. Even so, they are included in Ireland's GDP, in line with international (residency-based) reporting standards.

Chart A

Ireland's ICT value chain

(percentages)



Source: Central Statistics Office, Ireland (2019).

Note: The data relate to 2019, the most recent year for which the requisite data are available.

For contract manufacturing, the loose link between exports and domestic activity is evident given that production is undertaken abroad. However, even IPP-based services exports can be scaled up and down without major effects on the domestic economy, as illustrated by a recent value chain analysis for Ireland's ICT sector[20]. In brief, the ICT sector transforms 'purchased' and 'rented' IPP capital from abroad into exported computer services while the income generated largely accrues to foreign residents. The domestic footprint, in the form of wages and taxes, is limited, although still significant for a small country like Ireland. More specifically, in 2019 (the latest available observation), foreign-controlled MNEs accounted for 96% of the output produced by the ICT sector (Chart A). Ninety-one percent of total output was exported. In terms of gross value added (GVA), 16% was paid to workers and 26% covered depreciation, while the remaining 57% was net operating surplus ('profit'). After deduction of corporation tax, this profit accrued almost entirely to foreign owners in the form of investment income.

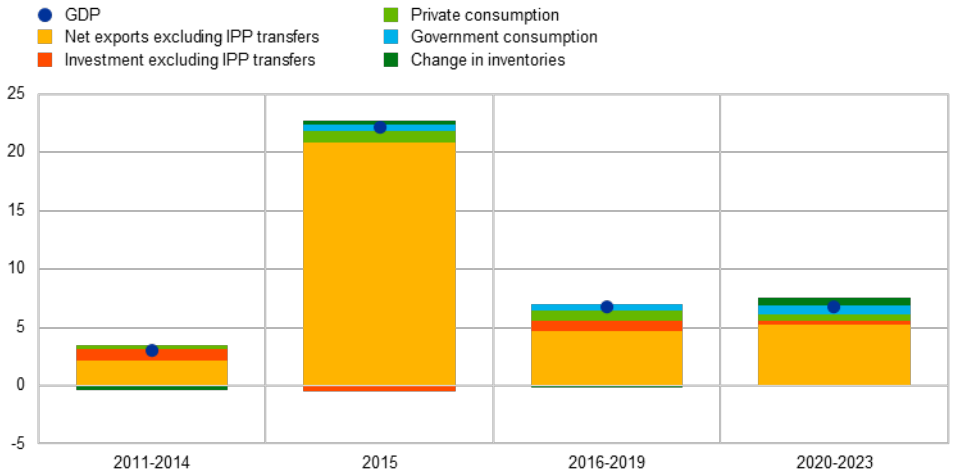
[20] See Central Statistics Office, Ireland (2019).

Propelled by IPP assets, net exports have become the main driver of Ireland's GDP. Since the statistical changes in 2015, net exports have accounted for most of the cumulated GDP growth (Chart 7). Given that they are also a particularly volatile GDP component, net exports have lifted the Irish economy on a steeper, but more volatile, growth path. They tend to grow particularly strongly in the quarters following a large IPP transfer.[21] This direct statistical relationship is fragile, however, in terms of its strength and timing, and is therefore difficult to exploit in forecasting.[22]

Chart 7

Average annual real GDP growth in Ireland

(percentage changes, percentage points)



Sources: Eurostat and own calculations.

Note: The data are based on annualised quarter-on-quarter growth rates. Intellectual property product (IPP) transfers have been netted out.

21 See FitzGerald (2018).

22 Specifically, this link is statistically insignificant in a trade model relating export growth to standard control variables and various lags of a variable capturing large IPP transfers.

4. Impact of MNE activities on the euro area

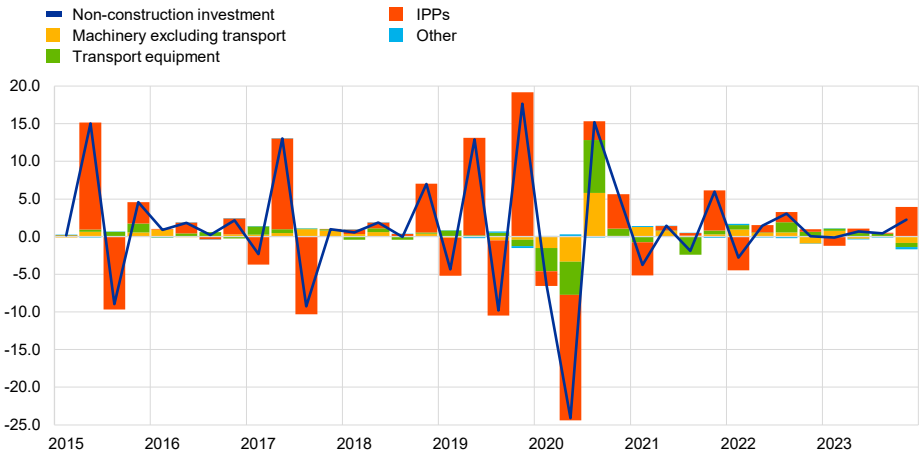
4.1 Impact on euro area GDP components

The impact of intangible investment in Ireland on euro area aggregates has been considerable in recent years in terms both of headline growth rates and of measures of levels for non-construction investment and imports. While trending upwards, reflecting the increasing importance of intangibles for the euro area, real non-construction investment growth rates have been particularly volatile since 2015, with Irish intangible investment contributing to the major part to this volatility (Chart 8 and Chart 9, panel a). In most other countries, the contribution of IPP investment to quarterly euro area non-construction growth is small. IPP-related transactions have also had a marked effect on euro area imports over the same period (Chart 9, panel b).

Chart 8

Euro area real non-construction investment across assets

(quarter-on-quarter percentage changes and percentage point contributions)



Sources: Eurostat and own calculations.

Notes: IPP stands for intellectual property product. Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020.

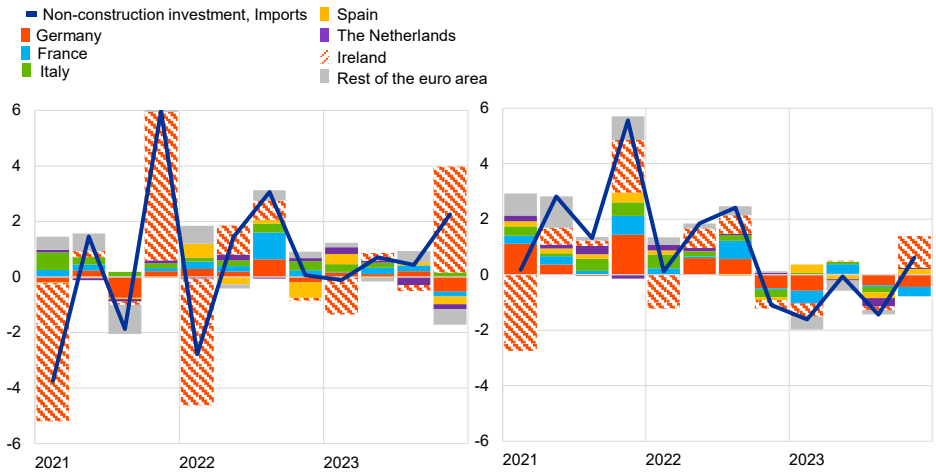
Latest observation: Fourth quarter of 2023.

Chart 9

Euro area real non-construction investment and imports by country contribution

(quarter-on-quarter percentage changes and percentage point contributions)

a) Non-construction investment b) Imports



Sources: Eurostat and own calculations.
Latest observation: Fourth quarter of 2023.

Turning to the level of investment, the fact that the pre-pandemic benchmark, i.e., the fourth quarter of 2019, was heavily affected by transfers of intellectual property resulted in a distorted assessment of the post-pandemic recovery in non-construction investment and, more especially, in intangible investments (Chart 10, panel a). By the fourth quarter of 2023, non-construction and intangible investments remained about 8% and 18% below their respective pre-pandemic levels in the euro area using the official euro area series. However, if Irish IPPs are excluded from the series, the pre-pandemic levels would appear to have been reached already by the end of 2020.[23] The volatility in the level of IPP investment is fully mirrored in the import series (Chart 10, panel b), as evidenced by the marked increase in euro area import volumes in the last quarter of 2023.[24]

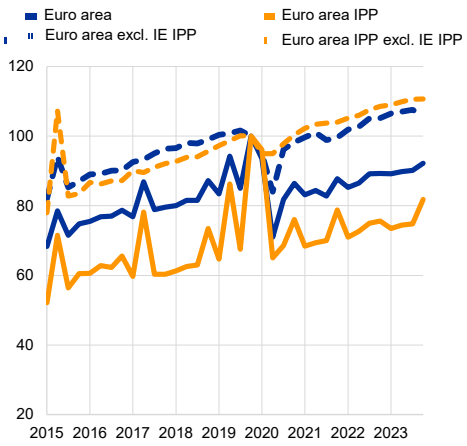
23 See also **Box 1** in Andersson et al (2023).

24 While full details for the last quarter of 2023 are not yet available, b.o.p. data reveal that the spike in euro area imports in the fourth quarter of 2021 was due to MNEs resident in Ireland importing IPPs in the form of R&D services from the United States amounting to 1.2% of euro area GDP. This resulted in a sizeably negative net trade contribution (-1.1 percentage points.) to euro area growth (-0.4 percentage points excluding Ireland).

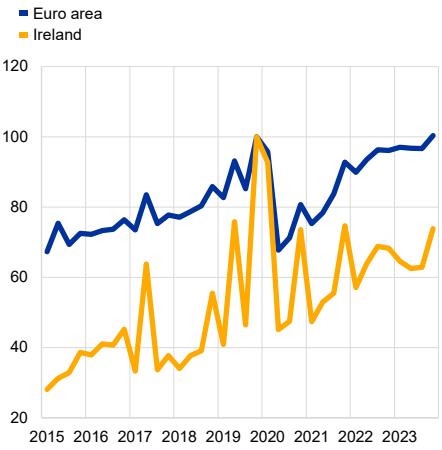
Chart 10

Real non-construction investment, IPPs and import dynamics
(Q4 2019 = 100)

a) Non-construction investment



b) Imports



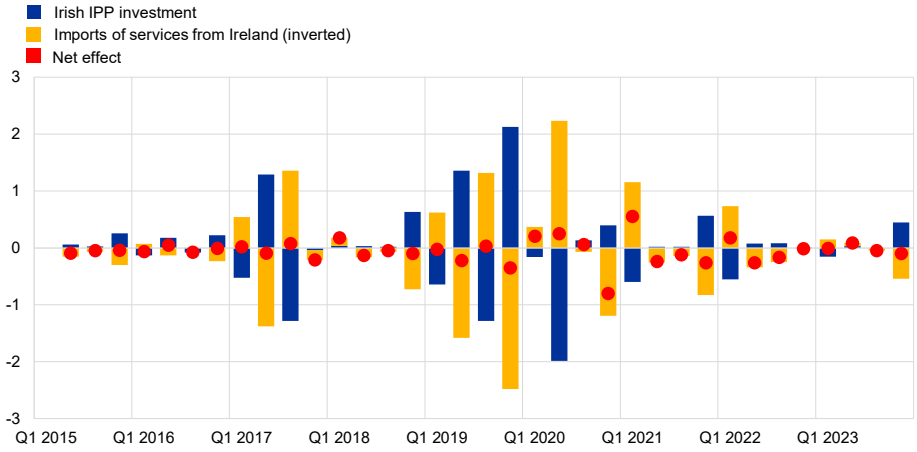
Sources: Eurostat and own calculations.
Notes: IPP stands for intellectual property product. Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020.
Latest observation: Fourth quarter of 2023.

4.2 Impact on euro area GDP

Taken together, the percentage contributions to euro area GDP growth from IPP investment and imports of services broadly nets out, e.g., when R&D investment is imported from outside the euro area in the form of IPPs (Chart 11).

Chart 11

Contribution to euro area GDP of Irish IPP and services imports, and the net effect
(percentage point contributions)



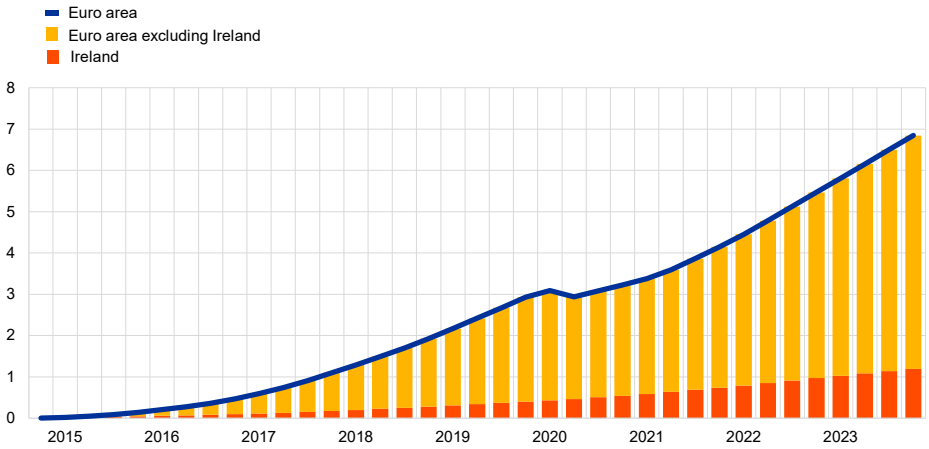
Sources: Eurostat and own calculations.
Note: IPP stands for intellectual property product. Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020.
Latest observation: Fourth quarter of 2023.

IPP inflows nevertheless contributed positively to euro area GDP growth in quarters subsequent to the IPP transfers. Ireland, which accounted for about 5 percent of euro area GDP in 2023, contributed disproportionately (around 18 percent) to the cumulative increase in euro area GDP between the fourth quarter of 2014 and the fourth quarter of 2023 (Chart 12). This largely reflects the long-term positive impact on euro area GDP growth of onshored IPPs, which (i) boost capital stock, increasing both productivity and depreciation (consumption of capital); and (ii) generate higher export streams (as well as net factor flows, given that the profits accrue to foreign direct investors).[25] Moreover, IPPs brought into Ireland have increasingly meant that certain royalty imports are no longer needed. As a result, imports of royalties no longer offset contract manufacturing exports to the same extent as in the past. As a result, they are adding to GDP, leading to very high growth rates.[26] The income generated by IPPs held in Ireland accrues mainly to foreign residents.

Chart 12

Contribution of Ireland to changes in euro area real GDP

(cumulated increases in euro area GDP from Q4 2014 to Q4 2023 in € trillions)



Sources: Eurostat and own calculations.
Latest observation: Fourth quarter of 2023.

4.3 Impact on the euro area current account

Cross-border production arrangements and merchanting activities related to MNEs affect the trade balance in the euro area current account (see Box 1). Such arrangements may involve foreign subsidiaries of MNEs through offshoring or the use of an unrelated foreign company (i.e. outsourcing). Like national accounts, b.o.p. statistics are based on the concept of changes in economic ownership. Consequently, trade in goods recorded in b.o.p. statistics includes contract manufacturing and merchanting, in contrast to international trade statistics that measure all goods crossing a country's border.[27]

25 See Andersson et al (2023).

26 See Connolly (2017).

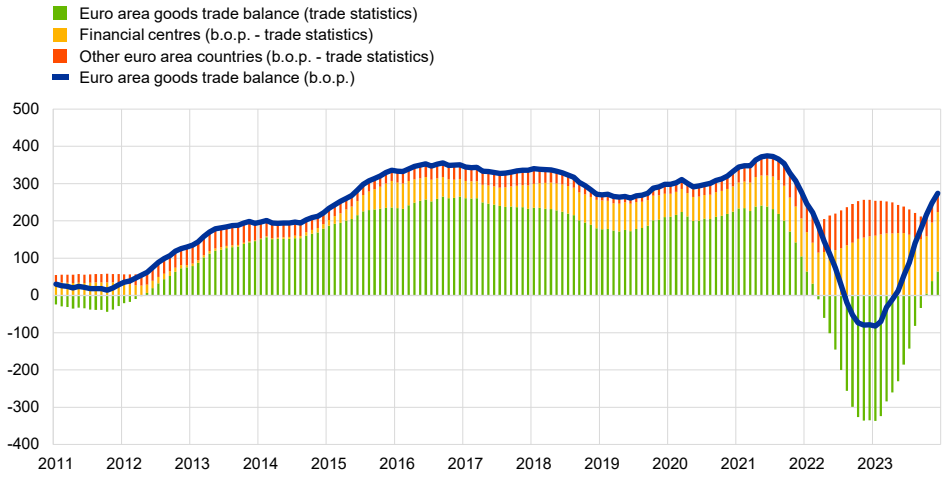
27 See Lane (2020) and Di Nino et al. (2020).

Contract manufacturing and merchanting conducted by entities resident in euro area financial centres – i.e. those economies with a high MNE and SPE presence – have contributed to a growing discrepancy between b.o.p. statistics and international trade statistics for the euro area goods trade balance. In the euro area, the gap between these two datasets has been growing over time, in particular since 2015 (Chart 13). This increase is explained, to a significant extent, by merchanting and the effect that IPP onshoring to Ireland has had on net exports under contract manufacturing arrangements from 2015 onwards. Merchanting – i.e. the process whereby a company purchases a good from abroad, and subsequently sells it to a buyer in a third country without the good crossing the border of the country where the merchant is based – is only recorded in the b.o.p., but not in trade statistics. Overall, net exports (including services trade) are typically less affected by contract manufacturing exports which are usually offset by the associated services imports, particularly royalty payments for the use of intellectual property. However, in the case of Ireland, the onshoring of certain IPPs means that fewer such payments are needed and hence services imports have ceased to increase in line with the exports produced by contract manufacturers (see also Box 1).

Chart 13

Euro area goods trade balance

(€ billion; 12-month moving total)



Sources: ECB, Eurostat and own calculations.

Notes: The green area is the net exports of the euro area as recorded in trade statistics. The yellow and red areas depict the difference between balance of payments (b.o.p.) and trade statistics in financial centres and other euro area economies respectively. The group of financial centres includes Ireland, Belgium, Luxembourg, the Netherlands, Malta and Cyprus. This chart is based on 12-month cumulative monthly data.

Latest observation: December 2023.

Another illustration of the impact of MNE activities is the large shift into deficit of the euro area goods balance in 2022, before rebounding in 2023. The broad-based fall in 2022 was due mainly to larger imports of energy products, driven by elevated energy prices.[28] The recorded deficit was, however, much larger in trade statistics than in the b.o.p. (Chart 13). This difference was attributable principally to the larger net exports of euro area financial centres recorded in the b.o.p.,

[28] See Emter et al. (2023).

which, in turn, primarily reflected MNE activities such as contract manufacturing and merchanting.[29]

MNE activities also increasingly affect the services trade balance of the euro area, particularly for items related to the transfer of IPPs. The euro area recorded an increasing surplus in services trade, which rose from 0.4 percent of GDP in 2008 to 0.9 percent of GDP in the third quarter of 2023. This increase was driven partially by the surplus in ICT services exports widening from 0.2 percent of GDP to 1.1 percent of GDP over the same period Chart 14, panel a). This, in turn, reflected, in part, the rapidly expanding surplus that Ireland recorded in ICT services, including services related to hardware, software and data-processing, as well as cloud services, sales of software transmitted electronically and software licence fees. As mentioned above, exports of such services from Ireland increased after the IPPs underlying those services were transferred to Irish resident subsidiaries of MNEs. As more IPPs accumulate in Ireland, the offsetting effect of the corresponding imports of IPPs - recorded as imports of R&D services under other business services - declines. At the same time, MNEs in Ireland are still paying royalties for the use of IPPs owned by other MNE subsidiaries (or other companies). Such payments increased, particularly to the United States, following the 2017 Tax Cuts and Jobs Act, which provided incentives for repatriating offshore profits (Chart 14, panel b).

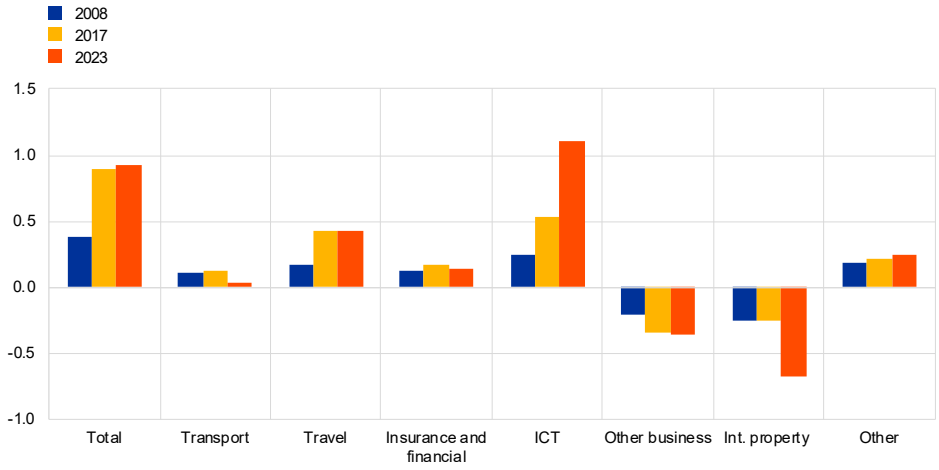
[29] Another factor driving the difference between trade statistics and the b.o.p. during this period , and in particular for "other euro area countries", was the increase in transportation prices which affected the Cost, Insurance and Freight (CIF)/Free On Board (FOB) adjustment. The CIF/FOB adjustment reduces the value of imports and consequently results in an increase in net goods exports in the b.o.p. figures.

Chart 14

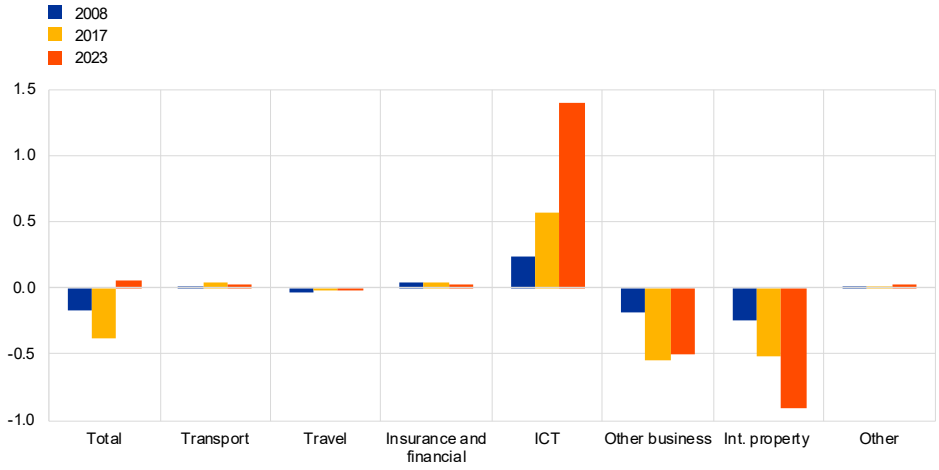
Services trade balance by component for the euro area and Ireland

(four quarter moving totals; percentages of euro area GDP)

a) Euro area



b) Ireland



Sources: ECB and own calculations.

Notes: ICT stands for information and communications technology. The values for intellectual property products (IPPs)relate to charges for the use of IPPs. Other business services includes research and development services. The transfer of IPP is recorded under other business services The values for 2023 relate to the data for the four quarters up to the third quarter of 2023.

The current account primary income balance, and in particular investment income, is also affected by MNE activities through FDI income and portfolio investment in equity.[30] Euro area financial centres usually have large trade surpluses that are partly counterbalanced by income deficits, reflecting the redistribution of profits to foreign shareholders.[31] Moreover, MNEs' pricing of intra-group transactions has a decisive impact on the amount and location of

[30] Investment income reflects the receipts and payments generated by an economy's external assets and liabilities (such as dividends and interest), and can be further broken down into functional categories of the b.o.p. (FDI, portfolio investment, other investment and reserve assets).

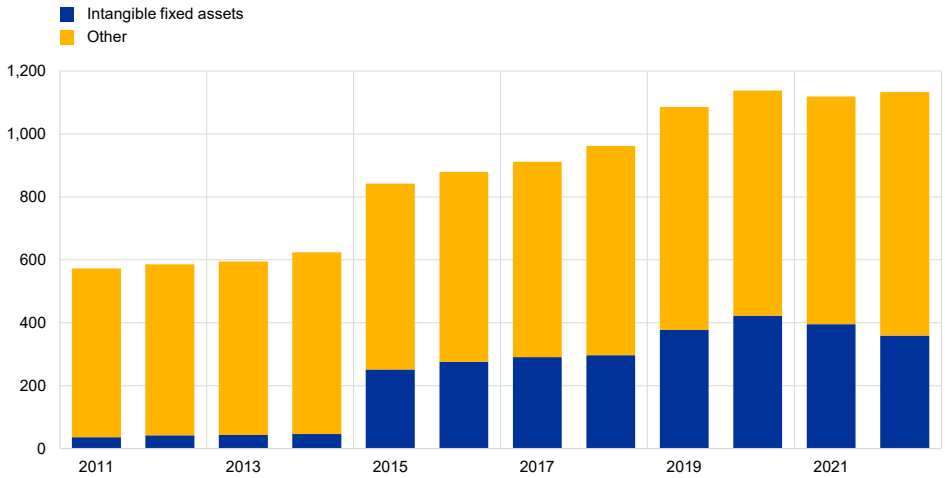
[31] For further details see Di Nino et al. (2020).

profits booked, which is in line with the well-established concept of transfer pricing.

4.4 Impact on euro area capital stock

Intangible asset transfers also affect euro area capital stock. IPP transfers have contributed decisively to the doubling of Ireland's net capital stock since the implementation of the ESA 2010 (Chart 15).[32] Unlike physical capital, intangibles may support large and variable quantities of production, both in Ireland and abroad, and drastically alter an economy's productive capacity within a short period of time. This reflects the fact that IPP capital can be transferred almost instantaneously, used repeatedly and separately from other factors of production.[33]

Chart 15
Net capital stock in Ireland
(€ billions; constant prices)



Source: Central Statistics Office, Ireland.
Latest observation: 2022.

Measurement of the euro area capital stock has shown a degree of volatility over the past few years, stemming mainly from the fluctuating growth of the capital contribution from IPPs (Chart 16).[34] The resulting volatility in capital per worker – or capital intensity - which is key to assessing labour productivity trends, blurs assessment of such trends.

32 With the introduction of the ESA 2010, R&D expenditure by firms on own account for own use is no longer regarded as intermediate consumption but is treated as investment in intellectual property products and allocated to capital stock.

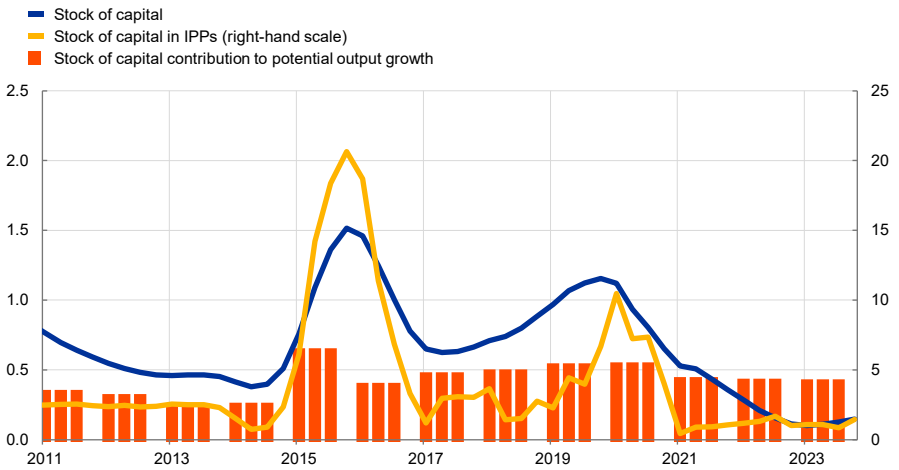
33 See Haskel and Westlake (2017) and Crouzet et al. (2022).

34 See Le Roux (2021).

Chart 16

Euro area stock of total and IPP capital

(year-on-year percentage changes and contributions in annual percentage points)



Source: ECB estimates.

Notes; IPPs stands for intellectual property products. ECB quarterly estimates of capital stock based on a constrained optimisation model using annual data from Eurostat (with a lag of two years) and temporal disaggregation techniques (see Hofmeister and van der Helm, 2017).

Latest observation: 2023 (contribution); Fourth quarter of 2023 (stock of total and IPP capital).

5. Dealing with the impact of MNE activities in real-time assessments

Assessment of the euro area economy should take into consideration the aggregate developments of all the participating economies. However, given the high volatility of MNE activity in Ireland and the lack of sufficiently detailed information on the driving factors, analysts have had to rely, on occasion (although sub-optimally), on euro area aggregates that exclude Ireland in order to be able to assess more accurately the underlying economic developments in the euro area in real time. This chapter therefore proposes that, for analytical purposes, the assessment of headline numbers be complemented by modified euro area series, using existing national metrics adjusted for the volatile items for Ireland.

5.1 Using alternative metrics excluding volatile items

The Irish CSO has developed a system of supplementary economic indicators that seek to address MNE-related data distortions. It is now a regular and well-established method applied in Ireland to report on series excluding particularly volatile items of investment, in addition to headline numbers. An important step in this direction was made in December 2016 when an expert team, chaired by Philip Lane in his capacity as Governor of the Central Bank of Ireland at that time, presented its recommendations on how to address the relevant data challenges.[35] Since then, the CSO has developed a set of coherent indicators designed to remove specific MNE-related data distortions from the national and international accounts. The indicators complement standard metrics and are tailored to Ireland. The CSO in Ireland has defined and is publishing modified domestic demand,[36] modified investment[37] and modified current account[38] measures to assess real domestic activity more accurately. Modified domestic demand is domestic demand adjusted for investments in aircraft purchased by leasing companies in Ireland[39] and intellectual property purchases.[40] This adjustment significantly reduces volatility at the euro area level (see Chart 17 and Chart 18). The ECB typically excludes Irish IPP data in reporting on euro area non-construction investment in many of its regular publications, such as the Economic Bulletin.

35 See Central Statistical Office in Ireland (2016) and the conceptual considerations in Lane (2017).

36 Modified domestic demand = consumption + modified Investment + government spending + inventories.

37 Modified investment (expenditure method used) = gross fixed capital formation - IPP investment - investment in planes related to aircraft leasing.

38 Modified current account = current account minus depreciation on R&D service imports and trade in IPPs + aircraft leasing depreciation + redomiciled incomes + R&D related IPP exports plus net aircraft related to leasing + R&D related IPP imports + R&D service imports.

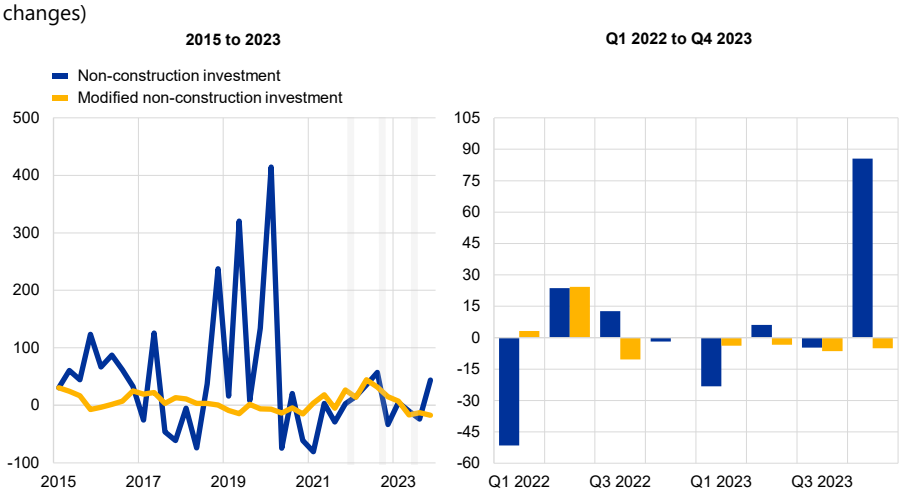
39 This relates to aeroplanes used for flights in other countries purchased by leasing companies that are resident in Ireland.

40 As regards seasonality, headline gross fixed capital formation in Ireland is seasonally adjusted in the standard way (X-13 Arima), with adjustments made to account for outlier transactions that do not have a seasonal pattern. The focus is, however, on annual growth rates rather than seasonally adjusted quarter-on-quarter series.

Chart 17

Irish non-construction investment

(left-hand panel: year-on-year percentage changes; right-hand panel: quarter-on-quarter percentage changes)

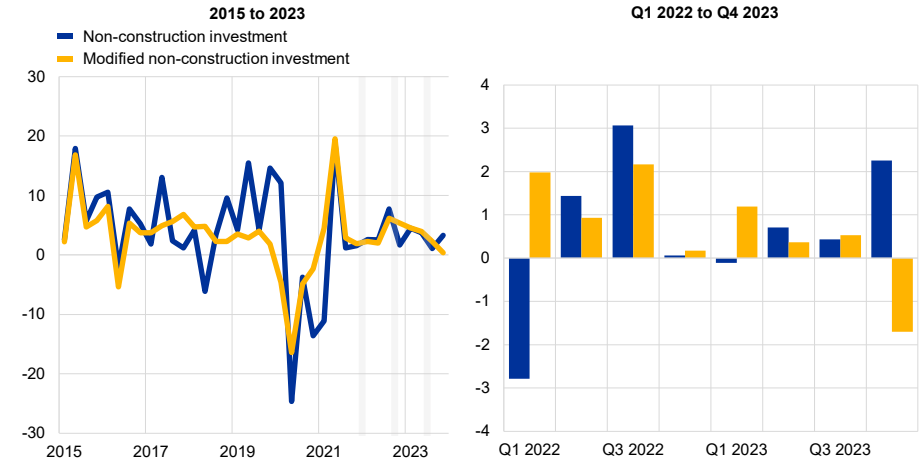


Sources: Eurostat and own calculations.
Notes: Modified investment excludes intellectual property product (IPP) investment and investment in planes related to aircraft leasing. Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020. The grey area corresponds to the time range of the right-hand panel.
Latest observations: Fourth quarter of 2023.

Chart 18

Euro area investment

(left-hand panel: year-on-year percentage changes; right-hand panel: quarter-on-quarter percentage changes)



Sources: Eurostat, Central Bank of Ireland and own calculations.
Notes: Modified imports excludes intellectual property product (IPP) transfers and imports of planes related to aircraft leasing. Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020. The grey area corresponds to the time range of the right-hand panel.
Latest observations: Fourth quarter of 2023.

Making statistical adjustments for MNE activities is a complex issue. Investments made by foreign-owned MNEs in Ireland may still be reflected in modified domestic demand. That investment may relate to specific areas - such as machinery used to produce semiconductors - and involve, for instance, machinery used in factories, data centre equipment, renewables or transport equipment other than leased aircraft. Where this is the case, modified domestic demand may still give imperfect signals about the state of the Irish and euro area economy.

However, as these investments are likely to be imported, they would typically be GDP-neutral for a given quarter.[41]

Modified gross national income (GNI*) is an indicator that adjusts Irish GNI for the depreciation of intellectual property and aircraft owned by leasing firms. It also subtracts the net factor income of redomiciled PLCs. GNI* is currently only around half the size of GDP. The first element of the indicator adjusts for the fact that the depreciation costs add to the gross operating surplus of MNEs and to GDP, although those costs are borne by foreign investors. The second element ensures that GNI* is not affected by whether redomiciled companies distribute or reinvest their profits.[42] GNI* is only available at an annual frequency and with a significant publication lag. In the period from 2015 to 2022, real GDP increased by 112%, GNI by 75% and GNI* by 35% (Chart 19). Hence, only one-third of income growth benefited domestic residents, which is much less than indicated by conventional GNI. The wedge is largely explained by the standard net factor income and the adjustment for depreciation on IPPs (Chart 20). However, even after these adjustments, Ireland recorded one of the fastest increases in income per capita across euro area countries in the period under consideration.

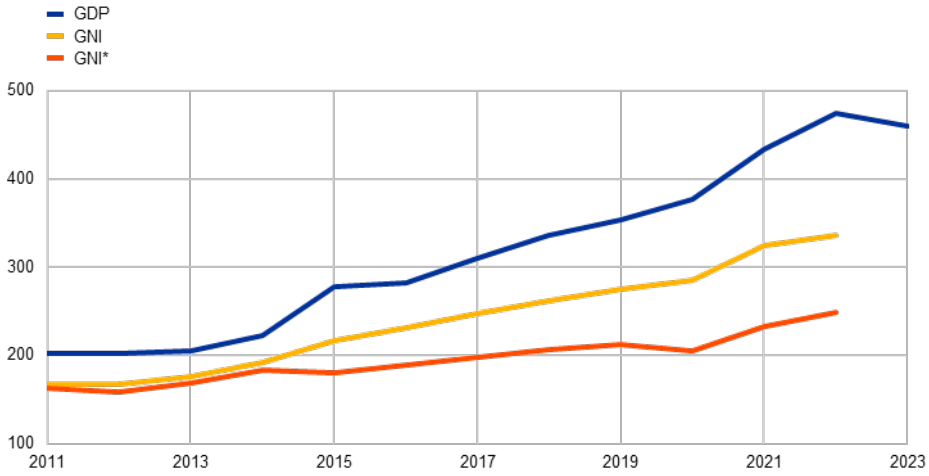
41 See Casey (2023).

42 **Several foreign-owned MNEs have moved their group headquarters to Ireland** in a process known as "corporate inversion". More specifically, Irish-resident subsidiaries of MNE groups have swapped roles with their original parent companies in other economies. As a result, MNEs have transferred large corporate balance sheets, including IPP assets, to Ireland. Through their ownership of foreign affiliates, the redomiciled companies also own around half of Ireland's stock of direct investment abroad. By current statistical conventions, their direct investment income is fully recorded in the b.o.p.. However, their investment income outflows on portfolio equity exclude undistributed profits. This asymmetry is relevant, given that the redomiciled companies have retained substantial profits over recent years and thus recorded net inflows of investment income.

Chart 19

Real GDP, GNI and GNI*

(EUR billions)



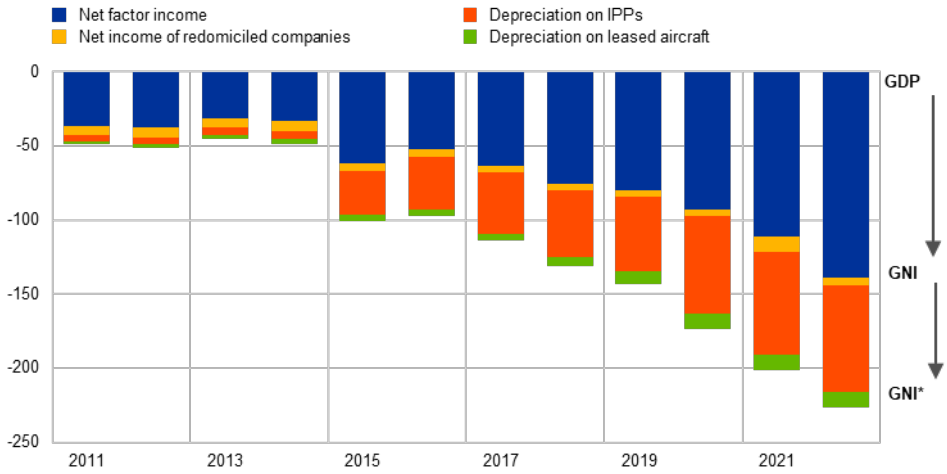
Source: Central Statistics Office, Ireland.

Notes: GNI* stands for modified gross national income. Latest observation: 2022 (GNI, GNI*) and 2023 (GDP).

Chart 20

Discrepancy between real GDP and GNI*

(EUR billions)



Source: Central Statistics Office, Ireland.

Note: GNI* stands for modified gross national income. GNI* adjustments are deflated with a common deflator.

Latest observations: 2022.

Since 2023, Eurostat has been including a public estimate of Irish GDP in the euro area preliminary flash national accounts release at t+30 days. Modified Irish domestic demand and investment series are available from the Irish CSO on a quarterly and seasonally adjusted basis on the same day as the release of the GDP breakdown in Ireland, at t+65 days. Modified Irish data can then be used to adjust the euro area expenditure breakdown.

Turning to euro area services imports, excluding distorted components of such imports using quarterly b.o.p. data would be possible theoretically but would entail practical challenges. In the b.o.p., these components would generally be imports of R&D services (which includes imports of IPPs) but would also include

other services imports (such as charges for the use of IPPs). However, there are two practical limitations to this approach. First, the b.o.p. data are released with a lag of one month compared to national account data. Monthly b.o.p. data for services imports do not provide full details of the services import categories and, in the case of Ireland, do not usually reflect large MNE transactions given that these are only included in quarterly releases. Second, detailed b.o.p. data are only available in nominal terms, complicating the matching with services import volumes in national account data. For Ireland, the CSO publishes a modified current account balance annually. This is calculated as follows.

$$\begin{aligned}&\text{Modified current account } (CA*)\\&= \text{Current account } (CA) - (\text{Depreciation on R\&D service imports and trade in IP}\\&+ \text{aircraft leasing depreciation} + \text{redomiciled incomes}\\&+ \text{R\&D related to IP exports}) + (\text{net aircraft related to leasing}\\&+ \text{R\&D related IP imports} + \text{R\&D service imports})\end{aligned}$$

This metric is the primary measure used by the Central Bank of Ireland in assessing the external position of the Irish economy, excluding the distortionary effects of some multinational activities unrelated to the Irish economy.

A modified concept of the Irish capital stock is not systematically and publicly available currently. However, when estimating potential output, the capital stock series could be replaced by a series adjusted for the impact of globalisation activities where the data are available. Alternatively, they could be derived using a permanent inventory approach[43] whereby gross fixed capital formation would be adjusted for Irish IPPs, in line with the suggestion as regards Irish non-construction investment.[44] Another option would be to revise the estimated total factor productivity (TFP) trend given that it is questionable whether a stock of capital that primarily reflects non-domestic factors should have a large effect on that trend. Finally, a more systematic use of the "capital services" concept[45] might lead to lower volatility of the capital stock contribution to potential output growth.

[43] See Kostarakos (2022). The authors control for distortions in the official investment data series while also incorporating intangible assets, which are not currently included in the national accounts.

[44] From about 2013 onwards, the official Irish capital stock and an estimated capital stock generated using the perpetual inventory method (with modified investment) would differ significantly since the modified data would exclude all IPP additions to the capital stock. The latter is used by the Central Bank of Ireland to compute a measure of domestically relevant potential output consistent with the factors of production available to firms contributing to the Irish economy.

[45] See OECD (2009) and Koszerek (2007).

6. Dealing with the impact of MNE activities in projections

MNE activities - particularly volatile flows of intangible assets - are a recurring challenge, especially as regards producing economic projections of affected series, and merit a deeper focus. This volatility raises issues related to both the size of the ex ante IPP shock and the ex post unwinding of that shock. The options for forecasting large transfers of IPPs and how they will unwind are considered below. The reasoning could also be applied, and further investigated, for services imports.

6.1 Forecasting large transfers

Transfers of intangible assets between countries are firm specific and, as such, very difficult to forecast. The Eurosystem is, however, required to make a credible forecast of gross fixed capital formation (GFCF), including IPPs, and imports. The approach adopted by the Central Bank of Ireland is, necessarily, multi-faceted but, in the main, includes models for the underlying (non-distorted) components.

$$\begin{aligned} &Modified\ investment \\ &= Construction \\ &+ Machinery\ and\ equipment\ (excluding\ aircraft\ related\ to\ leasing) \end{aligned}$$

Headline GFCF is then:

$$GFCF = Modified\ investment + Intangibles + Aircraft\ related\ to\ leasing$$

The forecasts for intangible assets and aircraft leasing are largely based on the best judgement of forecasters. This judgement is derived from statistical models, where the data generating process could best be described as a random walk with drift, and from market intelligence exercises, including monitoring the investor communications of the largest MNEs. The starting point is generally to assume that, beyond the short term, the level of IPPs does not affect the growth rate of total investment over the forecast horizon. The assumption is then that the baseline level will not include any sizeable IPP transfers in the years $t + 1$ and beyond.

Incoming cross-border transfers of intangible assets are, by definition, imports. As a result, the forecasts for total Irish imports also include an underlying component (related to modified final domestic demand), to which imports of intangible assets and other MNE-related imports are added using a methodology similar to that described above.

It is very difficult to forecast shocks to intangible investment, given that they are firm-specific and may have little to do with business cycle dynamics but instead reflect the tax-optimising behaviour of individual firms. The greater harmonisation of tax regimes, such as that envisaged under the joint OECD-G20 Base Erosion and

Profit Shifting Project (BEPS Project) to be launched in 2024, could help to reduce the incentives for sizeable profit sharing in the future.[46]

6.2 Forecasting the unwinding of large transfers

While ex ante forecasting of IPP transfers is very difficult, somewhat more can be said about their ex-post pattern. Below, we assess the usefulness of two methods to estimate the unwinding of shocks: (i) a simple rule of thumb approach based on historical precedents; and (ii) a parsimonious parametric approach. Nevertheless, conclusions based on very few events and considerable ex ante uncertainty in advance of IPP shocks, as well as the sometimes very high volatility in actual outcomes and recent sizeable revisions, warrant caution in interpreting the results.

Sizeable IPP transfers have tended to occur more frequently since the mid-2010s. Such shocks have typically been entirely unwound in the quarter immediately after the transfer. In a context of very strong volatility of the Irish IPP series, an Irish IPP "shock" is defined as any quarterly rise of more than three standard deviations above average growth rates, such increases in Ireland's IPP inflows having led to marked spikes in the quarterly growth of euro area investment.[47] The latest data point to eight such episodes since 2015, with the latest occurring in the fourth quarter of 2023 (though the unwinding of this episode was not clear at time of publication). This compares with just one spike in the first 14 years of Economic and Monetary Union (EMU). Chart 21 traces the path of each shock since 2015 in level terms from the quarter before impact until its unwinding. Except for the last quarter of 2019, when Brexit-related disturbances may also have played a role, pre-shock levels of Irish IPPs have, for the most part, been fully restored in the quarter immediately following the shock. Chart 22 shows the associated quarterly growth rates surrounding these episodes.

Given the regularity to date of the unwinding of the shocks seen, a simple rule of thumb approach - whereby shocks to real IPP levels in any given quarter are assumed to be entirely offset in the subsequent quarter - could provide a working estimate for forecasting Irish IPPs in the aftermath of a given shock. An alternative approach is to derive historical estimates from the available episodes and apply the parameters when forecasting the unwinding of an IPP shock. Box 2 presents such an exercise and compares it with the forecast performance of the rule of thumb approach.

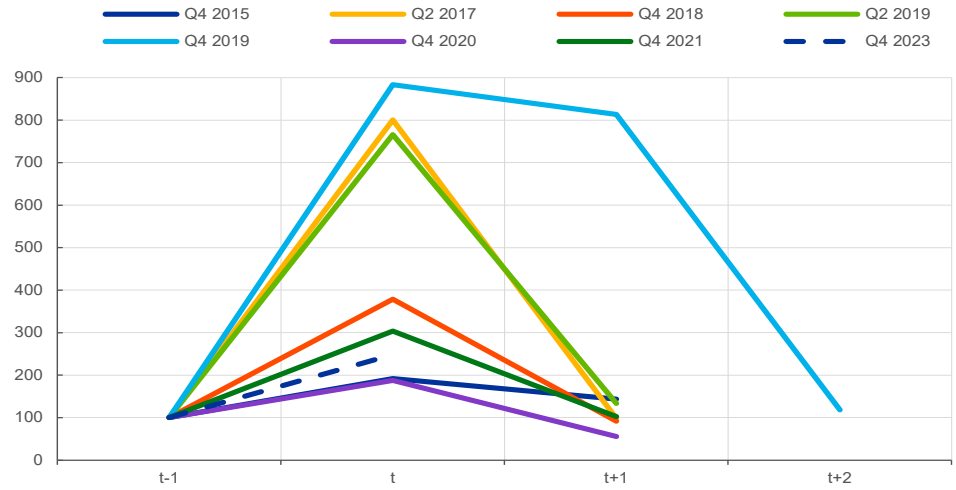
[46] The BEPS Project is a joint OECD-G20 initiative that establishes an international framework to combat tax avoidance by MNEs using base erosion and profit-shifting tools. One of the aims of this project is to ensure that company profits are more closely aligned with their economic substance (the function, assets and risks that generate those profits). For example, US MNEs that held IPP assets in offshore financial centres have had little economic substance in the US. For a detailed report on US MNEs, see Coffey (2021).

[47] The average quarter-on-quarter growth rate is 29% and the standard deviation is 131 over the period from 1999 to 2023. Without the spikes and accompanying unwinding, the average falls to 5.3%, with a standard deviation of 21. Three standard deviations represent the standard deviation of the lowest quarterly growth rate observed among the seven peak quarters identified.

Chart 21

Irish IPP investment levels around shock episodes

(t-1 = 100)

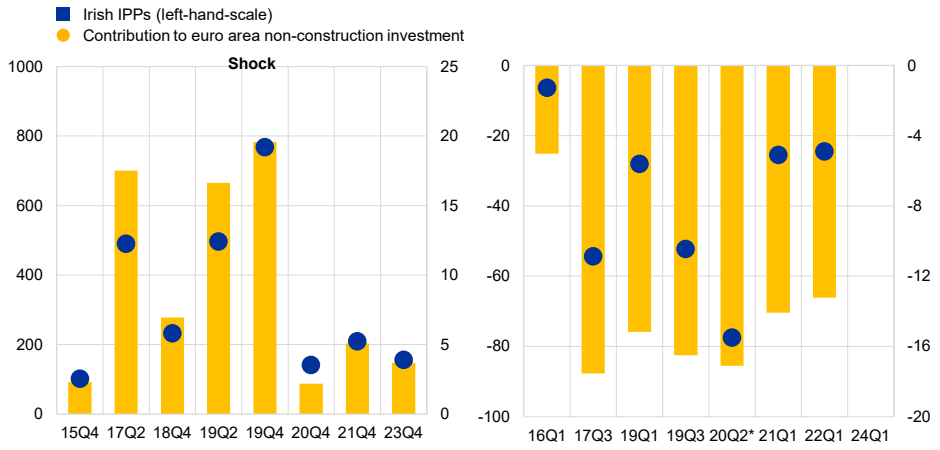


Source: Own calculations based on Eurostat data.
Note: Estimates were used for missing values for Irish intangibles in the official data for the first quarter of 2020.
Last observation: Q4 2023.

Chart 22

Irish IPP investment in shock and unwinding episodes

(quarter-on-quarter percentage changes; percentage point contributions)



Source: Own calculations based on Eurostat data.
Notes: IPPs stands for intellectual property products. The shock in the fourth quarter of 2019 took two quarters to unwind. Data were not yet available for the first quarter of 2024 at the time of writing.
Last observations: Q4 2023.

Box 2

A simple parametric approach to the unwinding of IPP shocks

Prepared by Jarvis Valerie

The rule of thumb provides a parsimonious approach to estimating the real-time unwinding of past shocks to Irish IPPs. However, an application of this approach missed the unusual unwinding in response to the large IPP inflow in the final quarter of 2019 and would have suggested a far stronger decline in euro area investment in the first quarter of 2020. A simple parametric approach could serve as a useful alternative for cross-checking, conditional on knowing the size of the shock that has occurred. To facilitate the use of the parametric approach for forecasting purposes, a viable model was drawn up that was expressed solely in terms of lagged values of the explanatory variables and dummies for IPP shocks. As a starting point, this model took the following form:

$$\mathbf{IPP_t} = f\,(\mathbf{IPP_{t-i}},\ \mathbf{SHOCK_t},\ \mathbf{SHOCK_t \cdot IPP_t},\ \mathbf{SHOCK_{t-1}},\ \mathbf{SHOCK_{t-1} \cdot IPP_{t-1}})$$

where the dependent variable – the quarterly growth rate of Irish IPPs in period t – was regressed on: lags of itself (where i = 1…4) and a dummy variable (SHOCK), set to 1 in each of the quarters in which the quarterly change in Irish IPPs exceeded 87% (over three standard deviations above average growth rates and reflecting the lowest quarterly growth rate observed among the seven peak quarters identified) and 0 for all other quarters. The estimation sample reported here covers a period from the first quarter of 1998 to the third quarter of 2023 (with a data cut-off date of 13 December 2023).

A variety of specifications and time spans were used to assess the robustness of the parameters, particularly on the unwinding variables (highlighted in blue in Table 1 below). Here, we highlight three simple variants: a "basic model" taking the form outlined above; an augmented "preferred" version that included a structural break in the IPP series from the fourth quarter of 2019 (as suggested by Augmented Dickey Fuller tests); and an "alternative" specification that incorporated an additional shock parameter designed to capture the impact of the exceptionally large (cited in the table as "MEGA") IPP inflows seen in the second quarters of 2017 and 2019 and in the fourth quarter of 2019[48].

The estimations generated highlighted the huge variation in the quarterly series, despite substantial variation in the dependent variable. Importantly, parameter estimates on the contemporaneous shock interaction terms, $SHOCK_t*IPP_t$, fully captured the extreme variation in the Irish data and were highly significant. The unwinding dummy, on $SHOCK_{t-1}$, was also correctly signed and statistically significant across the three models described above over various samples, with the parameters of interest broadly stable across specifications. Simulations of the unwinding of the seven shocks to Irish IPPs seen since 2015 suggest that there would be some merit in applying the parametric approach in assessing post-shock dynamics. In addition, the models have typically also replicated the data effectively during "normal" times, suggesting that these models may be useful as an additional satellite forecasting tool for this volatile variable.

A comparison between the rule of thumb approach and various forecasting models showed that the parametric approach outperformed the rule of thumb in five of the seven most recent episodes[49], while the "alternative" model lacks intuitive simplicity (Chart A). The parametric approach proved particularly efficient in capturing the

[48] The inclusion of the contemporaneous dummies when interacting with the dependent variable (in order to adequately capture all of the variations in the data generated by the shocks) was not problematic, given that these terms are set to 0 in any quarter where no shock occurs (i.e. they drop out of the equation). Given that the aim was not to predict shocks ex ante but merely to determine the magnitude of the unwinding of shocks that occurred in period t-1, new values of IPP(t) can take explicit account of both the occurrence of the earlier shock and its magnitude without compromising forecasting ability at these points in time.

[49] The episode following the large shock in the fourth quarter of 2023 cannot yet be tested and is therefore excluded.

unusually delayed unwinding following the shock in the fourth quarter of 2019 (due to its stronger reliance on lags of the dependent variable). The rule of thumb approach was more effective, however, for prediction than the parametric method in two of the seven cases (in 2017 and the unwinding of early 2022). Given the few observations and wide variability in the outcomes, no single approach appears to capture fully the dynamics of unwindings. From a comparison of the two approaches, where the estimations generated by the models and the rule-of-thumb approach converge, they clearly narrow the range of possible outcomes with a high degree of accuracy. For now, therefore, we conclude that there is merit in combining both approaches.

Table 1

Parameterisation of Irish IPP investment shock and unwinding episodes

(dependent variable: quarter-on-quarter percentage rates of IPPs; estimates for period from Q1 1999 to Q3 2023)

	Basic approach	Preferred approach	Alternative approach
C	5.54 **	6.18 ***	6.23 ***
IPP_{t-1}	-0.29 ***	-0.37 ***	-0.39 ***
IPP_{t-2}	-0.06 **	-0.11 ***	-0.11 ***
$SHOCK_t \cdot IPP_t$	0.99 ***	0.98 ***	1.02 ***
$SHOCK_{t-1}$	-35.98 ***	-35.45 ***	-22.14
$SHOCK_{t-1} \cdot IPP_{t-1}$	0.20 *	0.27 ***	0.18
$BREAK \cdot SHOCK_t \cdot IPP_t$		0.08 *	0.18
$BREAK \cdot SHOCK_{t-1}$		-47.13 **	-46.75 *
$BREAK \cdot SHOCK_{t-1} \cdot IPP_{t-1}$		0.18 ***	0.19 *
MEGA			415.73
$MEGA \cdot IPP_t$			-0.65
$MEGA_{t-1}$			72.06
$MEGA_{t-1} \cdot IPP_{t-1}$			-0.01
Adjusted R-squared	0.983	0.981	0.980
Akaike info criterion	8.756	8.771	8.823
Durbin-Watson statistic	1.966	1.796	1.771
RMSE	158.7	169.5	169.5

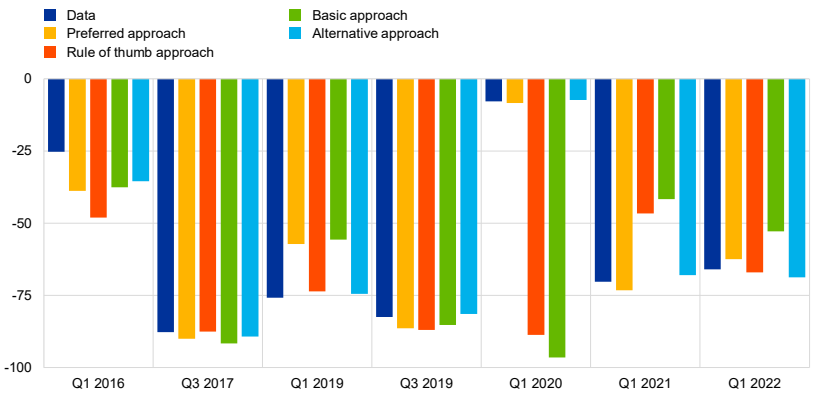
Sources: Eurostat and own calculations.

Notes: IPP stands for intellectual property product. MEGA refers to major IPP inflows (above 200% quarter on quarter). RMSE stands for root mean squared error. This is a simplified table showing only variables of economic relevance and/or statistical significance (while additional lagged dependent variables were included in some equations). *, **, *** refer to statistical significance at 10%, 5% and 1% levels, respectively. The basic model is estimated on data up to the fourth quarter of 2019 only.

Chart A

Estimated growth rates in the aftermath of large IPP shocks

(quarter-on-quarter percentage changes following a shock)



Sources: Eurostat and own calculations.

Note: The cut-off for data was 13 December 2023.

7. Conclusions

This paper summarises the findings of the Eurosystem expert group on MNEs under the umbrella of the Eurosystem Working Group on Forecasting. It sets out the important challenges associated with assessing and forecasting euro area economic developments owing to the increasing importance of MNE activities, primarily stemming from Ireland.

The first conclusion reached is that the modifications made by the CSO in Ireland to national accounts data to address the special features of the Irish economy improve the assessment of the euro area business cycle. Complementing the use of headline numbers, these modified series are now widely used in the regular reporting of statistical data in the publications issued by the ECB.

Second, it is very difficult to forecast ex ante transfers of intangible assets. However, this paper investigates the ex post patterns of large Irish IPP transfers and finds that there would be merit in using a rule of thumb approach based on historical precedents in combination with a parameterised approach in order to capture more effectively the unwinding of transfer shocks in the quarter following their occurrence.

To gain a better understanding of the dynamics and their implications for both short and long-term macroeconomic developments, more granular and internationally harmonised data on such activities, including across sectors, are urgently needed. Further collaboration between economists and statisticians is key in this field.

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Annex

Table A

Key globalisation activities with a bearing on national accounts

Activity	Characteristics and issues	National accounts items most affected
Intellectual Property Products (IPPs)	Own account reasearch and development (patents, trademarks and copyrights). Measuring the value of these assets and the associated services payments (in the form of fees or royalties payable for their use) is difficult. The challenges are even more formidable when the owner is an MNE and the benefits of holding and using the assets are spread throughout affiliates across the world. IPP may reflect profit shifting but there is uncertainty surrounding data and assumptions	GVA/GDP; capital formation; international trade in assets and related services
Redomiciliation	Large MNEs transferring domicile abroad (esp. NL)	GNI
Goods sent abroad for processing/contract manufacturing	Only a service fee for the processing work is to be recorded in the accounts, and not the import and export of goods on a gross basis (given that no transfer of economic ownership takes place). This complies with the principle of recording trade flows only where ownership of the goods changes, but will be at odds with the gross recording of goods shown in the International Merchandise Trade Statistics (IMTS) not included in national accounts/b.o.p. flows (creating a 4% gap in 2019-21). Considered as exports or imports of processing services and are recorded on a net basis; data available with some lags	GVA/GDP; international trade in goods and services
Merchanting	In accordance with the principle that a change of ownership should be recorded as a transaction, merchanting will be recorded in the country of residence of the merchant as a negative export of goods when it acquires them, and as a positive export when they are sold on. The treatment may be difficult to apply in practice, given that the goods concerned never cross the borders of the merchant's country of residence. Included in International Merchandise Trade Statistics and registered as net exports	International trade in goods (and possibly services)
Quasi-transit trade	Quasi-transit trade concerns goods imported into a country by an entity considered to be non-resident, and then exported to a third country within the same economic union or customs area. At the first point of entry in the economic union, the goods are cleared for free circulation within the union – it is at this point that any import duty is levied. There is often a significant difference in value between that declared at the point of entry to the economic union, and that observed on entry to a second country within the union	GVA/GDP; international trade in goods
Arrangements within MNEs, including transfer pricing	Transfer pricing may cause GDP to be misallocated between countries if the transfer prices are not true reflections of the market price	Allocation of GVA/GDP across countries; international trade in goods and services; investment income and financial flows
Special purpose entities (financial and non-financial SPEs)	SPEs are subsidiaries of parents in a different country, established to hold assets, incur liabilities, and receive and pay out income on behalf of the parent, often for tax reasons. SPEs are to be classified as resident in the country in which they are incorporated or registered even in the absence of a physical presence there. At the same time, SPEs have limited interaction with the economy they are established in and have limited employment	GDP in relation to GNI, international trade in goods and services; investment income and financial flows; international investment position
Transfer pricing	Transactions within a MNEs, the breakdown of value added is done on the basis of transfer pricing	GVA
Aircraft leasing	Depreciation is an issue	GDP

Source: Extended version of Table 1.1. in UNECE (2011).
Note: Globalisation activities related to the household sector, such as remittances, are not included.

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Impact of multinational enterprises activities on euro area macroeconomic aggregates and their forecasting

Conference: External statistics after the pandemic: addressing novel analytical challenges

Banco de España,
12 February 2024

Stephen Byrne, Central Bank of Ireland
Malin Andersson, Nina Blatnik, Lorenz Emter, Belén Gonzalez Pardo, Valerie Jarvis, Martin Schmitz, Nico Zorell and Christoph Zwick (all ECB) and EG on MNEs

Motivation and main messages

- **Activities of multinational enterprises (MNEs) in Ireland contribute increasingly to domestic output**, but sizeable and volatile transfers of intangible assets may also blur real-time signals about the euro area business cycle
- **Modified investment and import series** that exclude erratic transfers of intangibles in Ireland **better illustrate the underlying trends** in these expenditure components
- While the immediate within-quarter impact on euro area real GDP growth from intellectual property products (IPP) flows captured in investment and import volumes is broadly neutral, **onshoring of intangible assets boosts euro area GDP over time**


Opinion **Global Insight**

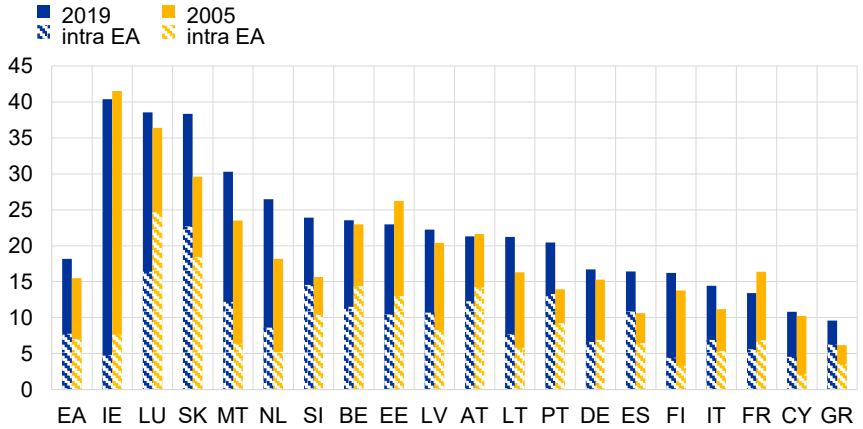
Ireland's wild data is leaving economists stumped

Eurozone statistics have been seriously distorted by US tech and pharma groups that found a home in Dublin

MNE activities make up an important share of euro area output

Non-domestic MNE share in output across euro area countries

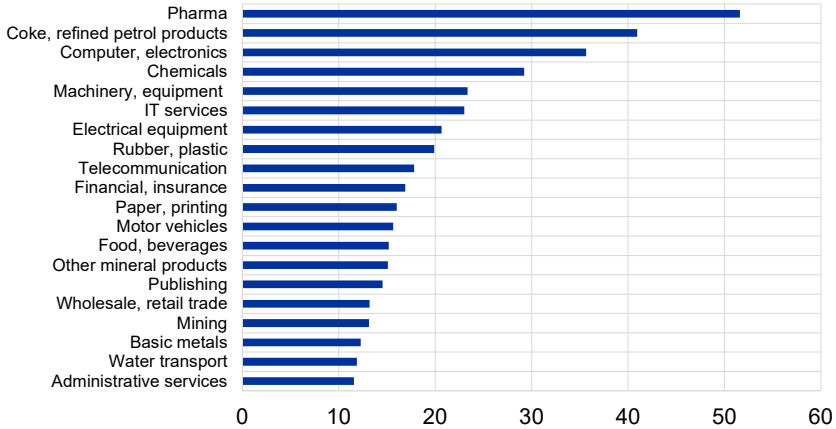
(% of country gross output)



Sources: OECD AMNE and authors' calculations.

Non-domestic MNE share in output across euro area sectors

(% of euro area gross output, in 2019)

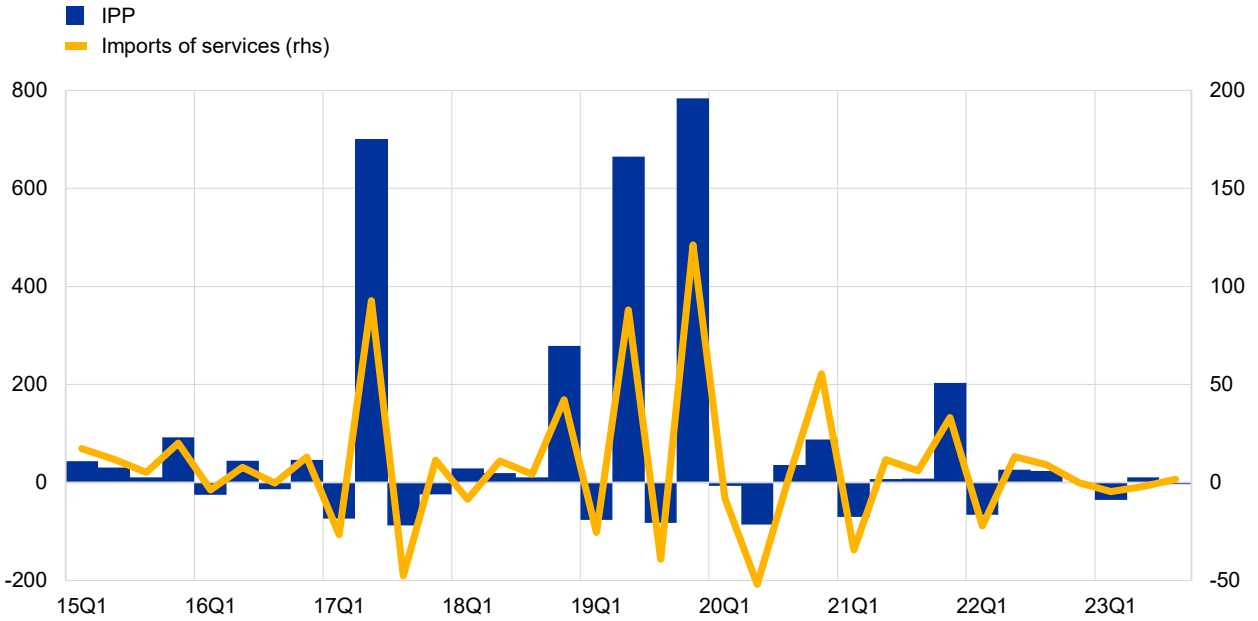


Sources: OECD AMNE and authors' calculations.

Growth in IPP and services imports in Ireland is intrinsically volatile

IPP and import dynamics in Ireland

(quarter-on-quarter percentage changes)

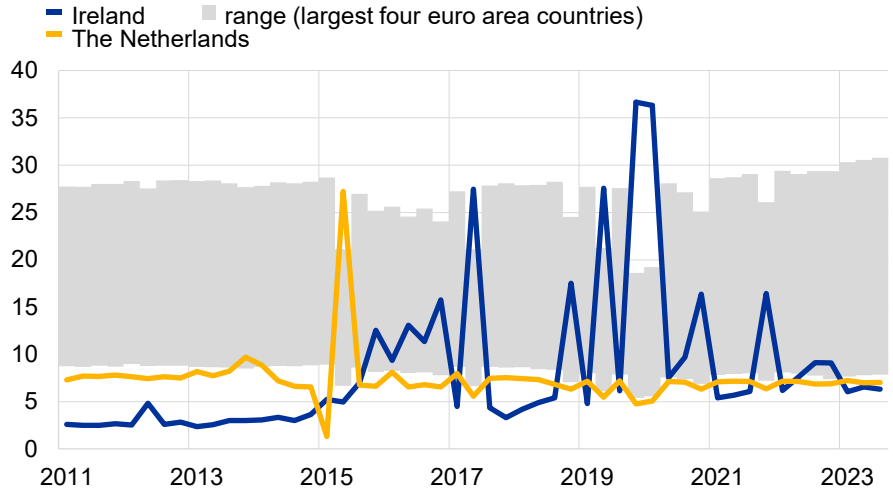


Sources: Eurostat and ECB staff calculations.
Notes: Last observation 2023 Q3.

IPP investment in Ireland is large, generating substantial exports

Share of Ireland and the Netherlands in euro area IPP investment

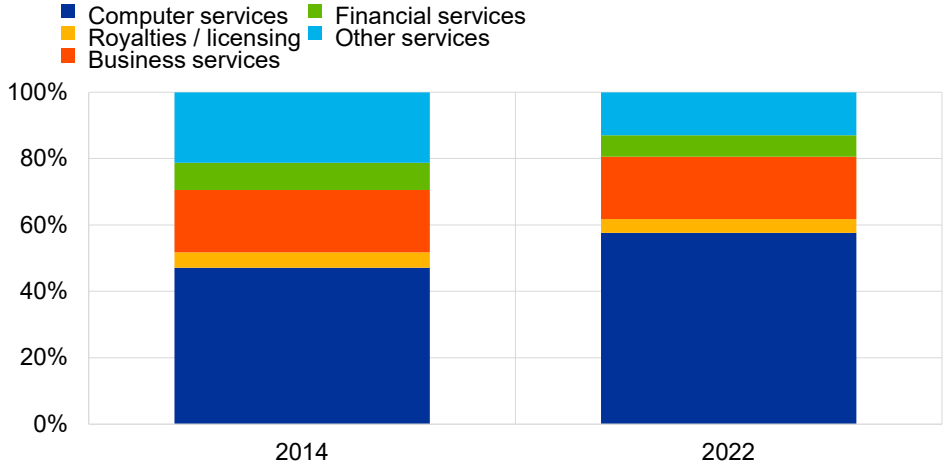
(% of euro area IPP investment)



Sources: Eurostat and ECB staff calculations.
Notes: Irish IPP dynamics are estimated for missing data. The grey range refers to the minimum and maximum of the largest four euro area countries, Germany, France, Italy and Spain.
Last observation: 2023 Q3 .

Breakdown of Ireland's services exports

(percent)

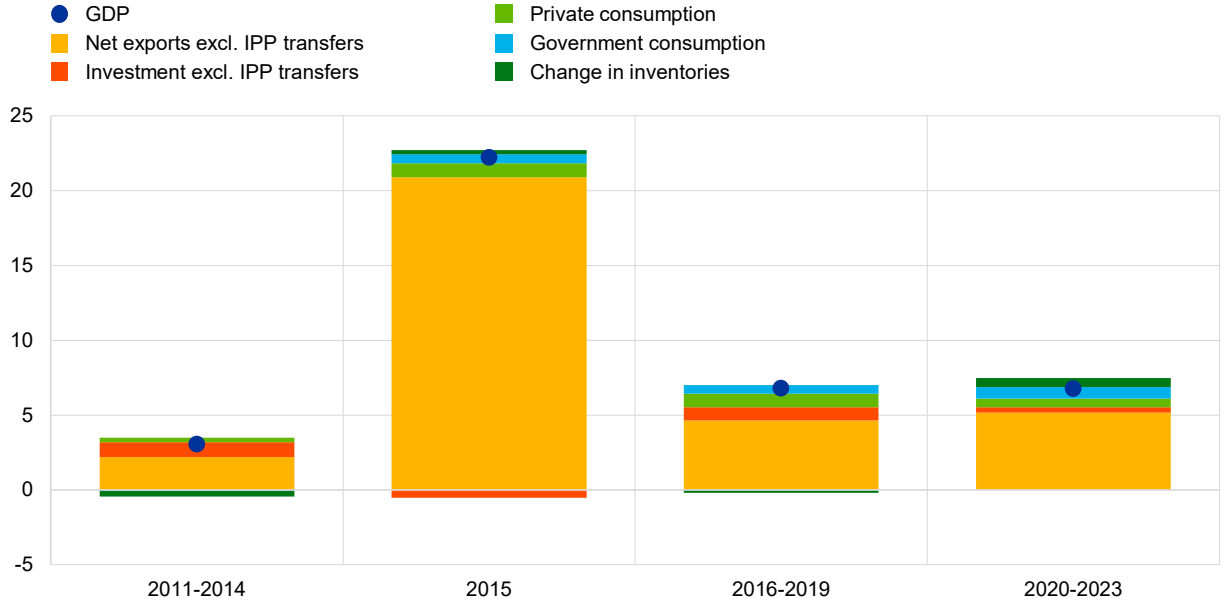


Source: Central Statistics Office Ireland.

Even excluding IPP transfers, net exports grow sizeably in Ireland

Breakdown of average real GDP growth in Ireland

(percentage changes, percentage points)

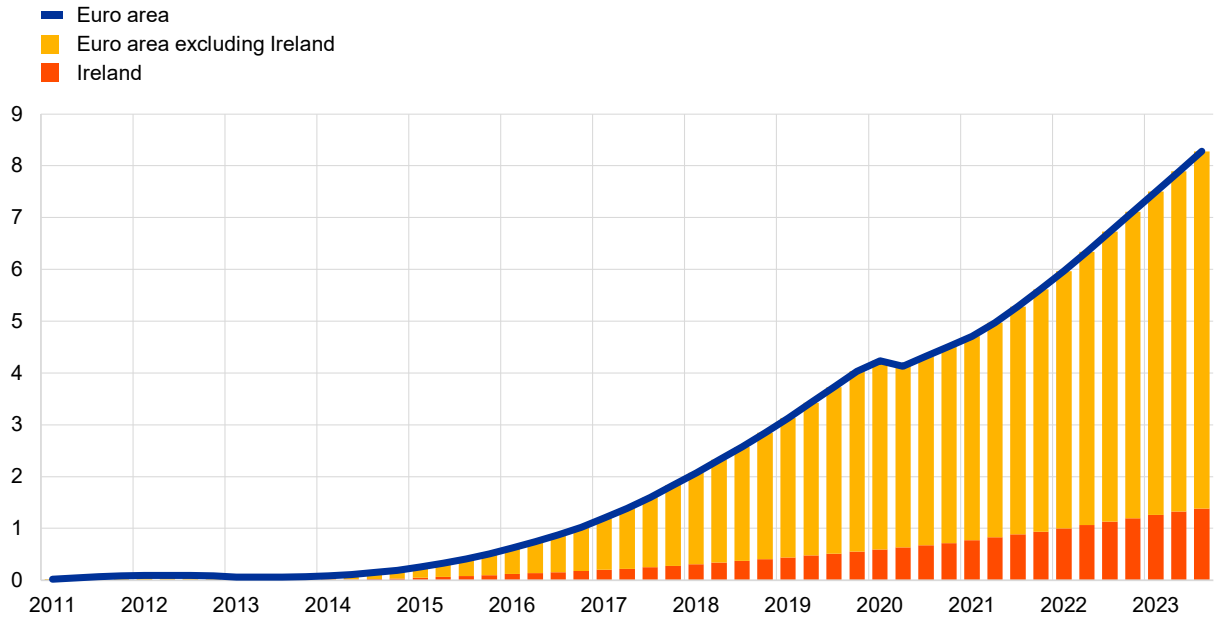


Source: Eurostat.
Note: Based on annualised quarter-on-quarter growth rates. IPP transfers have been netted out.

These dynamics have increased Ireland's share in euro area GDP

Euro area GDP and contributions from Ireland

(cumulated euro area GDP from 2011 to Q3 2023, EUR trillions; contributions from Ireland and the rest of the euro area)

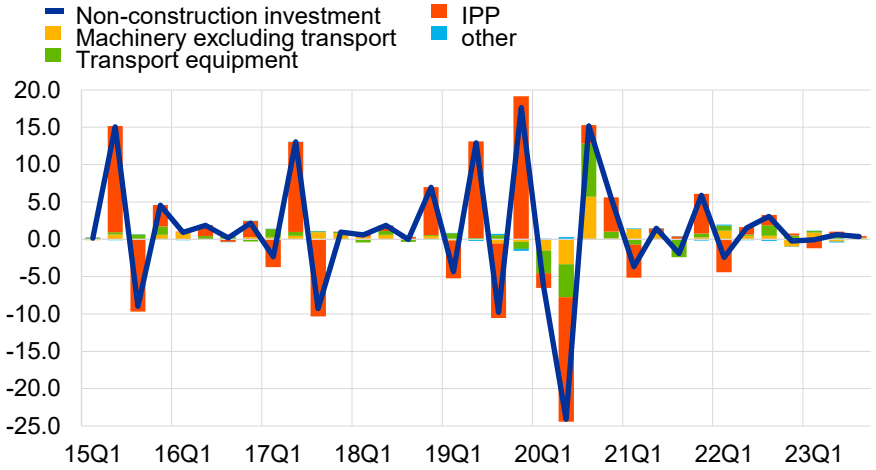


Sources: Eurostat and ECB staff calculations.
Last observation: 2023 Q3.

Transfers impact euro area expenditure components

Euro area real non-construction investment across assets

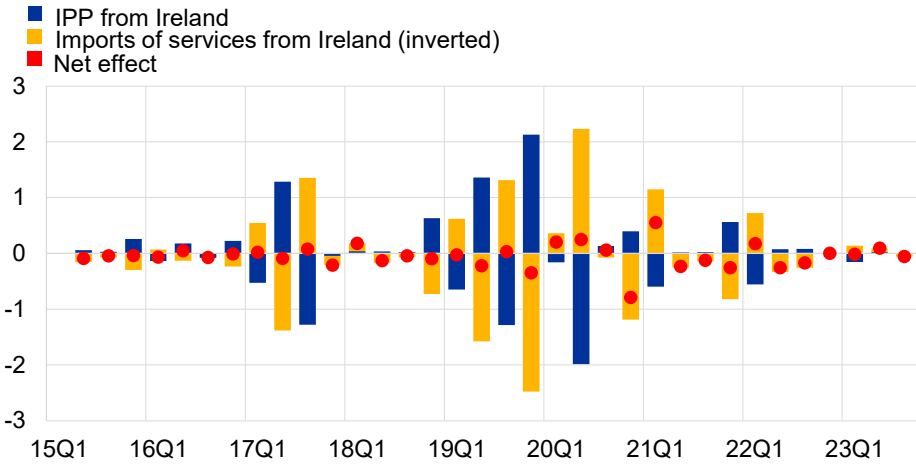
(q-o-q % changes and percentage point contributions)



Sources: Eurostat and ECB staff calculations.
Latest observation: 2023 Q3.

Contribution to euro area GDP from IE IPP, and services imports and net effect

(percentage point contributions)

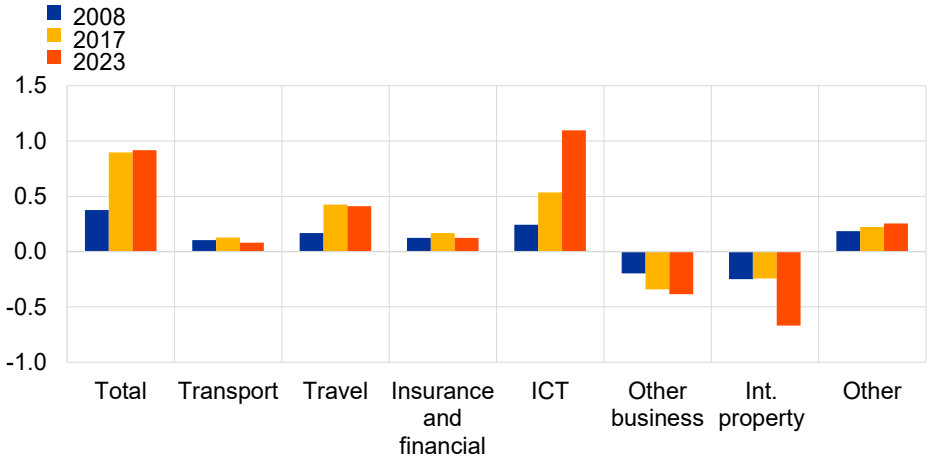


Sources: Eurostat and ECB staff calculations.
Latest observation: 2023 Q3.

Increase in services trade balance partly due to rise in ICT services in Ireland

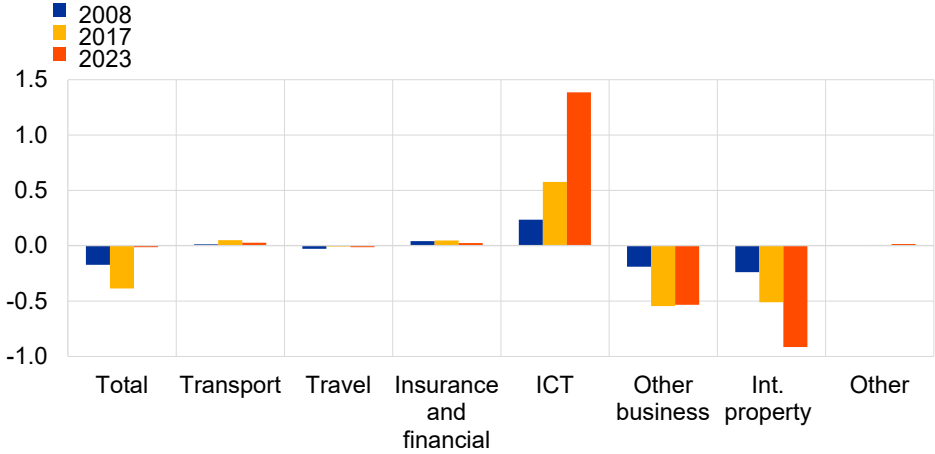
Euro area services trade balance by component

(four quarter moving sums, % of euro area GDP)



Ireland services trade balance by component

(four quarter moving sums, % of euro area GDP)

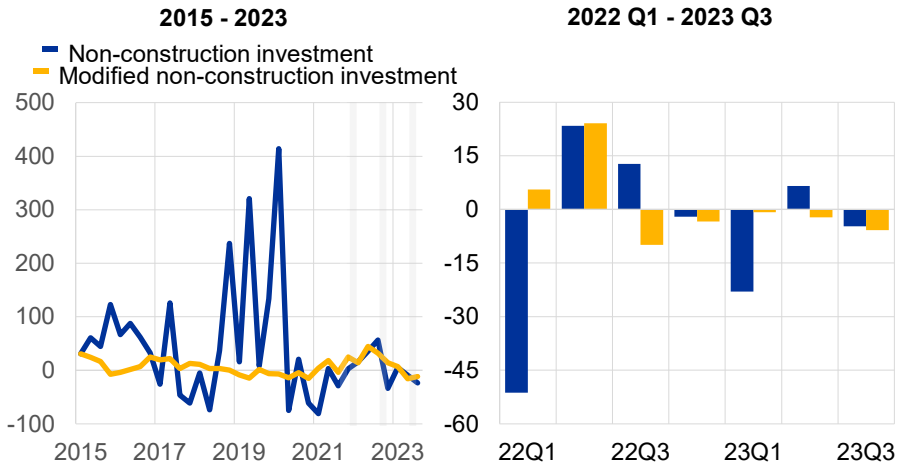


Sources: ECB and ECB staff calculations.
Notes: Int. property refers to charges for the use of intellectual property. Other business services include research and development services. Values for 2023 refer to four quarters up to 2023 Q2.

Modified series smooth the impact of MNE activities, helping the real-time assessment

(Modified) non-construction investment in Ireland

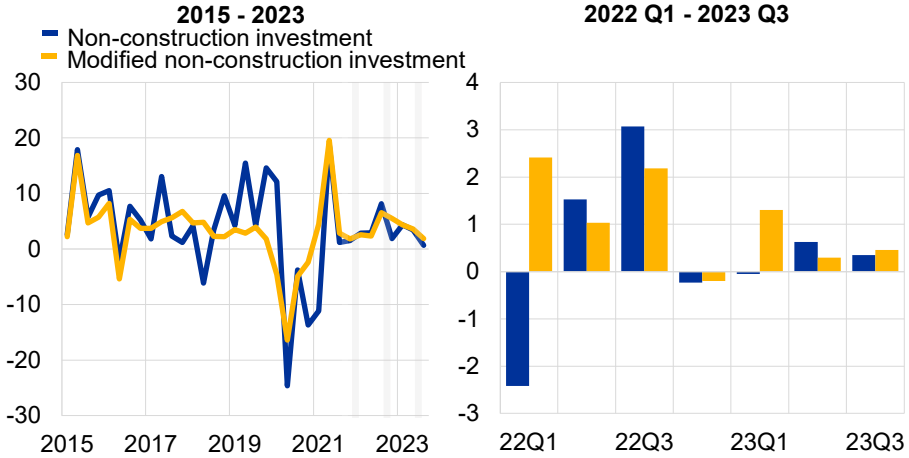
(lhs: y-o-y % changes; rhs: q-o-q % changes)



Sources: CSO Ireland, Eurostat, ECB staff.
Latest observation: 2022 Q3.

(Modified) non-construction investment in the euro area

(lhs: y-o-y % changes; rhs: q-o-q % changes)

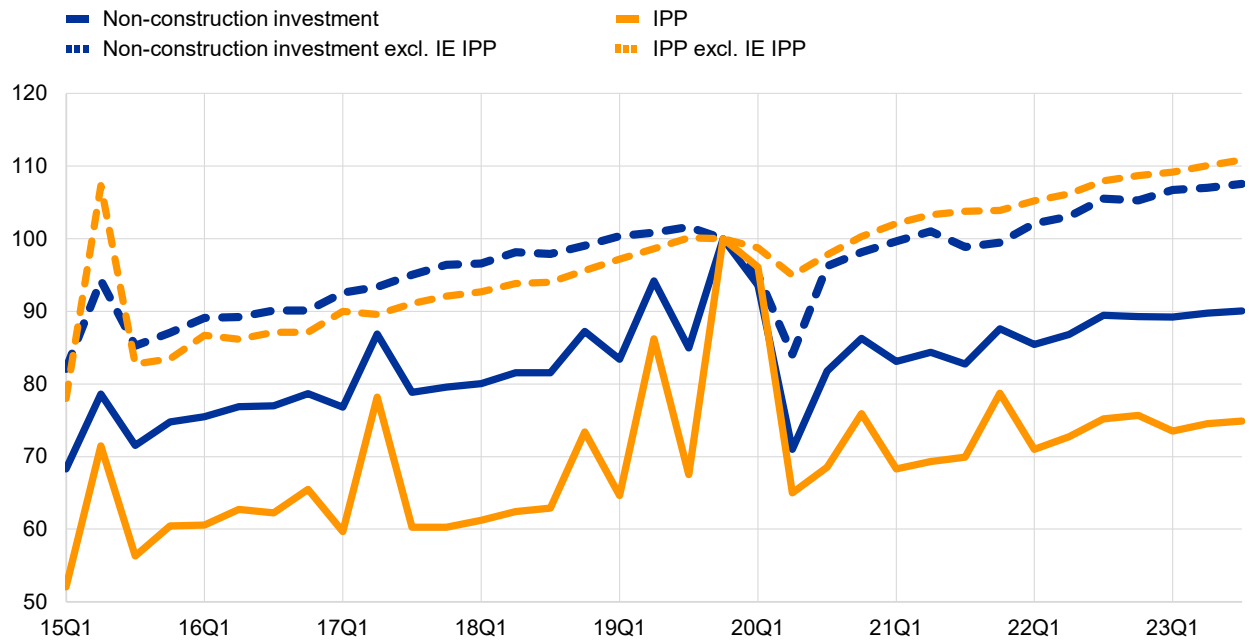


Sources: CSO Ireland, Eurostat, ECB staff
Latest observation: 2022 Q3.

Levels of IPP affect the interpretation of post pandemic recovery

Real non-construction investment and IPP dynamics

(2019Q4=100)



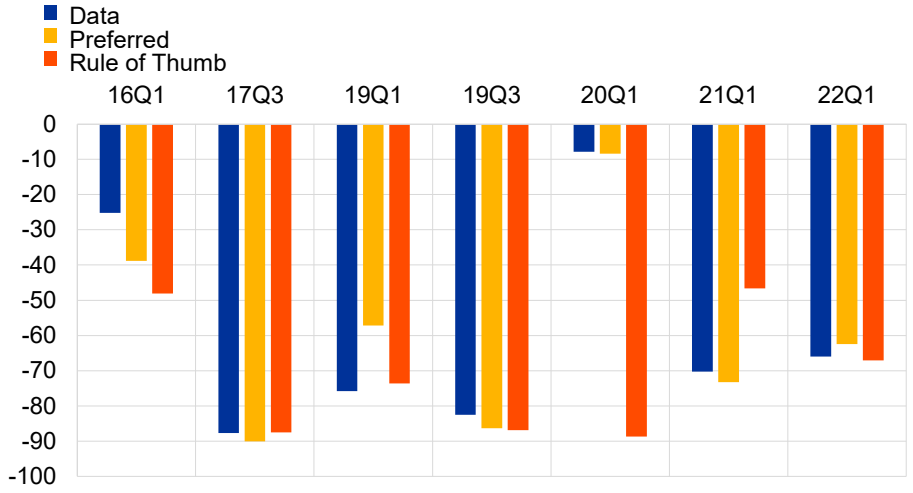
Sources: Eurostat and ECB staff calculations.
Note: Data for IPP in Ireland in 2020 Q2 are estimates.
Latest observation 2023 Q3.

Forecast: Estimations of IPP patterns

- **Rule of thumb**: IPP in Ireland broadly returns to pre-shock level after one quarter
- **Parametric Estimation** (99Q2 – 23Q3) often outperforms the rule of thumb:
- $IPP_t = f(IPP_{t-i,}\ SHOCK_t,\ SHOCK_t*IPP_t,\ SHOCK_{t-1},\ SHOCK_{t-1}*IPP_{t-1},)$

Estimated growth rates in aftermath of large IPP shocks

(q-o-q % change)



Sources: Eurostat and ECB staff calculations.

Conclusions

- Improved statistical measurement of **globalisation activities of MNEs imply large fluctuations** in Irish GDP, with knock-on implications for the euro area
- **Modifications of national accounts data** to address the specificities of the Irish economy, carried out and published by the CSO in Ireland, **help in assessing the euro area business cycle**
- While it is **difficult to foresee transfers of intangible assets ex ante**, we find merit in using a rule of thumb as well as a simulation approach to better capture the unwinding of such shocks

THANKS FOR YOUR ATTENTION!