



**Irish Fiscal
Advisory Council**

Ireland's modified domestic demand: what it tells us and where we should be cautious

Analytical Note No. 19

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May 2023



Abstract

Modified domestic demand has become a key indicator of focus for understanding what is happening to Ireland's domestic economy. This is good in the sense that it strips out some of the major distortions arising from foreign-owned multinational enterprises, including aircraft leasing and contract manufacturing. However, users should remain cautious in interpreting the measure. The outsized role of multinational enterprises in very specific areas can still distort modified domestic demand through their effect on modified investment. And by ignoring the trade side entirely, these investments are not offset by imports in the modified domestic demand measure. We show how imports of machinery and equipment to develop semiconductors may have distorted modified domestic demand growth in 2022. We explore Ireland's modified investment closely and propose some avenues to better understand it, including through a focus on selected areas of domestic machinery and equipment investment.

Suggested reference:

Casey, E., (2023). "Ireland's modified domestic demand: why we should be cautious interpreting it". Irish Fiscal Advisory Council Analytical Note Series No. 19. Dublin. Available at: www.FiscalCouncil.ie

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Background

Since at least 2015, economists studying the Irish economy closely have put an increased emphasis on specially tailored measures of domestic demand. This has been largely a response to the increasing distortions associated with standard measures such as GDP and GNP along with measures of investment published in the national accounts.

The distortions to standard measures for Ireland are relatively well understood. Foreign-owned multinational enterprises in the pharmaceutical sector and tech sector have generated enormous exports out of Ireland that are not necessarily linked to domestic activity and demand. Ireland's exports have also been boosted by "contract manufacturing": the production of goods overseas that are then exported but booked as Irish exports.

In many cases, these activities are offset by corresponding imports, be it imports of royalties for the use of intellectual property, imports of business services, or imports of the machinery and equipment involved. Historically, their impact on the Irish economy has been offset by net factor income outflows (FitzGerald, 2016). However, in some cases, these activities are not offset in full or simply do not show up because of where we are focusing our interest. For instance, Connolly (2017) shows how intellectual property being brought into Ireland has increasingly meant that some royalty imports are no longer needed. As a result, imports of royalties are no longer offsetting contract manufacturing exports to the same extent as in the past. As such, they are adding to GDP and leading to extraordinarily high growth rates.

These distortions argue for a more timely, quarterly estimate of modified Gross National Income as discussed in Timoney (2023).

In the absence of more timely measures of the wider economy, modified domestic demand has become an increasing focus of domestic analysis. It is meant to be one of the cleaner measures of Ireland's domestic economic activity. Users often turn to it to get away from the distortions related to multinationals on the trade side, with both exports and imports absent from the measure. The modifications to standard domestic demand also see it exclude leased aircraft and some intangible investments, such as traded intellectual property. These adjustments help rid the series of potential further distortions from multinationals.

However, massive investments made by foreign-owned multinational enterprises in Ireland can still show up in modified domestic demand. As we show, these can sometimes be in very specific areas. By omitting the imports that would offset this, it means the modified domestic demand measure can still present a misleading picture of the domestic economy.

1. What is modified domestic demand?

Modified domestic demand is basically a measure that captures three things:

- 1) spending by Irish consumers,
- 2) government spending on goods and services, and
- 3) modified investment.

How does it differ from overall domestic demand?

The only difference with the standard domestic demand measure widely used internationally is on the investment side (Table 1).

Table 1: The differences between domestic demand and modified domestic demand

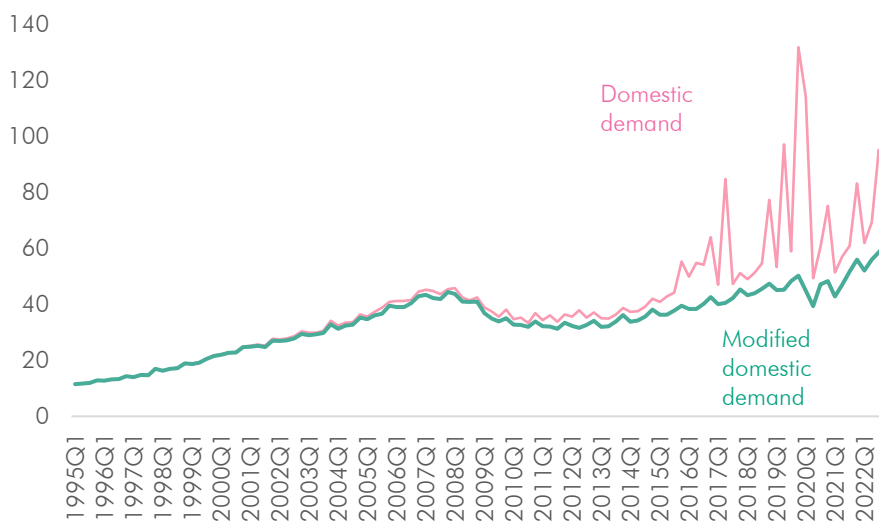
Consumer spending	Both include same measure
Government spending on goods and services	Both include same measure
Investment	Modified domestic demand removes imported Research and Development, traded intellectual property, and leased aircraft
Changes in Inventories	Both include same measure
Exports	Both exclude
Imports	Both exclude

In both cases, we can see that the domestic demand and modified domestic demand measures exclude the traded sector. While changes in inventories (or stocks) can be included in both, these are typically excluded in the most widely reported version of each measure (that is, modified final domestic demand rather than modified total domestic demand where inventory changes are included).

We can see that, compared to the standard measure of domestic demand, the modified domestic demand measure has tended to be less volatile (Figure 1).

Figure 1: Modified domestic demand less volatile than standard measure

€ billions, value



Source: CSO, and Fiscal Council workings.

The reason modified domestic demand has tended to be less volatile than the standard measure of domestic demand is mainly due to the outsized role of investments in intangible items. That is investments showing up in the Irish economy that relate to certain intangible items. These include purchases of intellectual property and the import of research and development services (Figure 2).

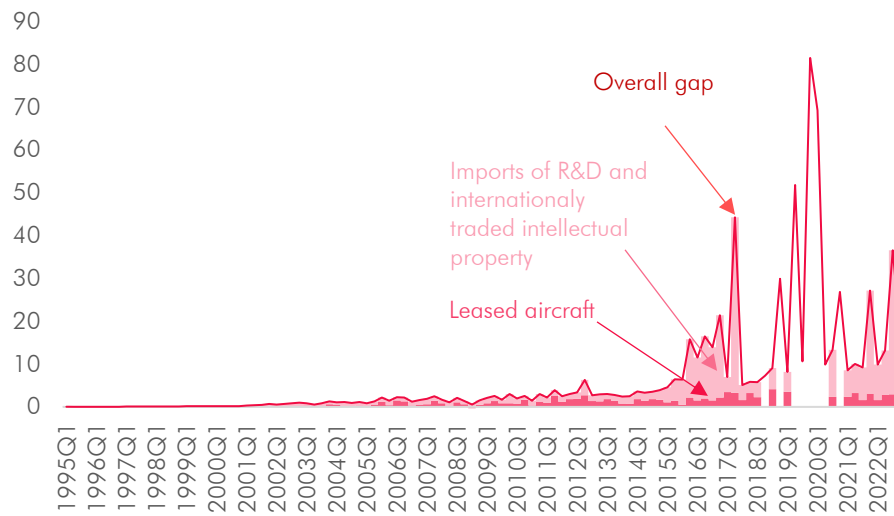
Indeed, there are just two adjustments to domestic demand that lead us to modified domestic demand:

- **Adjustment 1:** the exclusion of imported Research and Development services and trade in intellectual property
- **Adjustment 2:** the exclusion of investment in leased aircraft. This relates to aeroplanes purchased by leasing companies that are resident in Ireland but then used for flights in other countries.

In both cases, these investments often involve sizeable transactions that tend to relate to large, foreign-owned multinationals. The investments are predominantly imported. As well as that, these investments generate profits that, in the main, will ultimately flow out of the Irish economy. As a result, there is often little impact on the real economy beyond some impact on employment and tax receipts.

Figure 2: Gap between modified investment and total investment

€ billions, value



Source: CSO, and Fiscal Council workings.

These adjustments are a sensible approach to tackling some of the key features of the Irish economy in recent years that has plagued economists and policymakers understanding of its underlying performance.

However, while the adjustments go some way to removing distortionary effects caused by large, foreign-owned multinationals, some impacts can still show up in modified domestic demand as we will show.

2. What is modified investment?

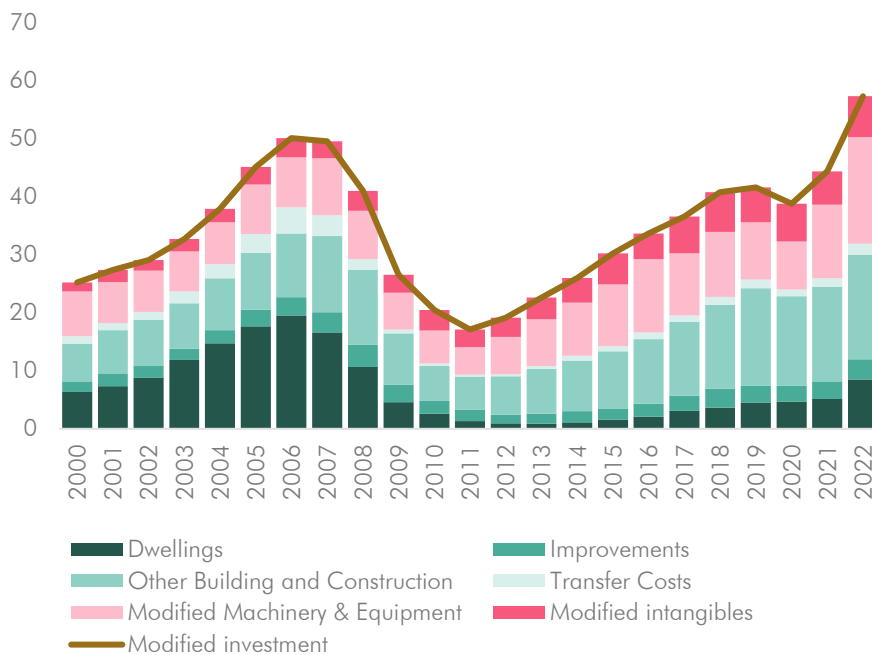
The standard measure of investment within domestic demand is essentially made up of spending on building and construction, spending on machinery and equipment, and spending on intangible investments: things such as art, research, software development and intellectual property.

To recap, the CSO gets to its “modified” measure of investment with just two adjustments. It excludes leased aircraft from machinery and equipment, and it excludes imports of research and development and intellectual property from intangibles.

That leaves us with the following components within modified investment (Figure 3).

Figure 3: Modified investment

€ billions, value



Source: CSO, and Fiscal Council workings.

Construction activity: about a half to two-thirds of modified investment is made up of construction areas. These are shown in green in Figure 3. Investment in new dwellings includes the development of new houses and apartments.¹ Improvements to existing dwellings includes renovations and or home extensions. Transfer costs captures expenditure on different

¹ This category also includes houseboats, barges, mobile homes, and caravans used by households as principal residences.

transaction costs involved in property assets: real estate services, stamp duties, and solicitors' fees.

"Other building and construction" is the largest sub-category of construction. It is rather nebulous. It includes roads, bridges, hospitals, offices, warehouses, data centres, factories, etc. These can be both public and private investments.

Given how wide-ranging the activities are in the "other" category of construction and its size — typically two-thirds of construction areas — it would be helpful if the CSO could separate this category out more. This would help to provide users with a better understanding of underlying developments in the domestic economy.

A key principle of construction investment worth knowing is that the investment is recorded on a National Accounts basis when the ownership is transferred to the entity that will use the asset in production.²

Furthermore, the improvements that are included under construction refer to improvements to existing assets that are beyond ordinary maintenance and repairs.

Modified machinery and equipment: The next largest category of modified investment outside of construction-related areas is investment in machinery and equipment.

This includes investment in trains, buses, trucks, tractors, computers, plant machinery. It mainly covers investments made by businesses and governments rather than by households.³

The modified version strips out aircraft related to leasing. This helps to remove some distortions related to multinational activities. However, it does not remove all potential distortions.

There is still the possibility that sizeable investments by individual multinationals could result in outsized impacts from time to time. This could include, for example, machinery related to factories, data centres, renewables, or transport equipment other than leased aircraft. While these may reflect investments that are physically present in Ireland, their impact on output is likely to be limited by other outflows, such as of profits or payments for imported royalties or business services. In addition, the

² See 3.134 of the European System of Accounts (2010). There are two exceptions. For entities that invest on their own account, as in for their own use, the investment is recorded when it is produced. For financial leasing, a change of ownership from lessor to lessee is imputed.

³ It excludes investment in machinery and equipment by households for final consumption. Household purchases of machinery and equipment such as for vehicles, furniture, kitchen equipment, computers, communications equipment, and so on, instead, show up under consumer durables. Also excluded from machinery and equipment investment are tools that are relatively inexpensive and purchased at a fairly steady rate, such as hand tools. As well as that, machinery and equipment that is essential to the ongoing operation of buildings shows up in dwellings and non-residential construction.

impact on employment may, depending on the nature of the investment, be small and with negligible tax implications.

Modified intangibles: The last category of modified investment is modified intangibles. This covers investment in items such as computer software and databases, original literary works, artworks, or other entertainment works, and oil and gas exploration. While the modification means it excludes traded intellectual property and imported research and development services, it still includes research that is invested in domestically and hence not imported.

3. How can we better understand modified machinery and equipment?

Since the only adjustment for the *modified* machinery and equipment investment measure is to remove leased aircraft, there is still a large possibility of distortions arising from multinationals.

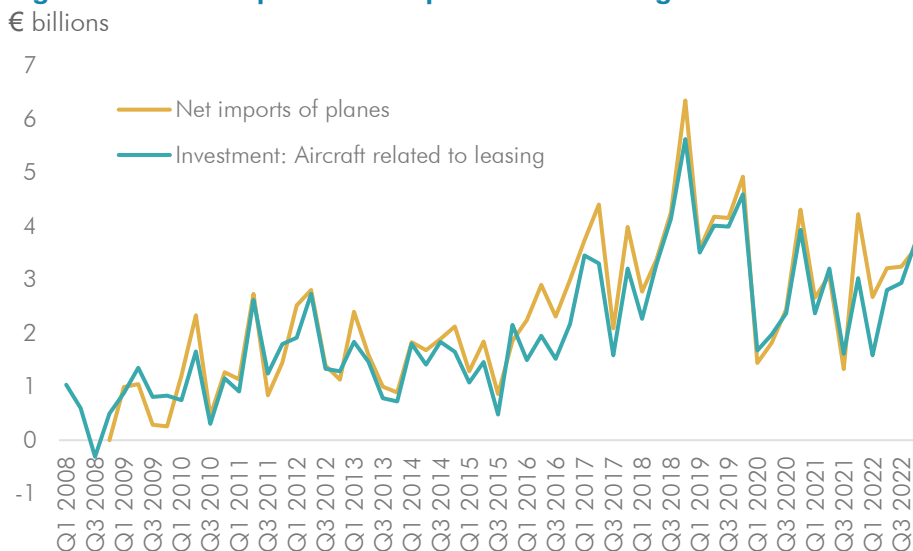
One way we can better identify what is in modified machinery and equipment spending is to assess Ireland’s trade data.

Eurostat provides detailed information on Ireland’s goods trade. Within this, there is extremely detailed information on individual items within the broad category of machinery and equipment.

The detail on net imports should be a reasonable guide as to what ends up in Ireland’s national accounts measure of investment in machinery and equipment.

Of course, not all machinery and equipment investment will be imported from overseas, but it is likely that a large share of it will be, given its nature and the size and structure of the Irish economy. For instance, Ireland has no substantial manufacturing base for vehicles, computers, and other major machinery.

Figure 4: An example of net imports as a useful guide to investment



Sources: Eurostat EU trade data by SITC.

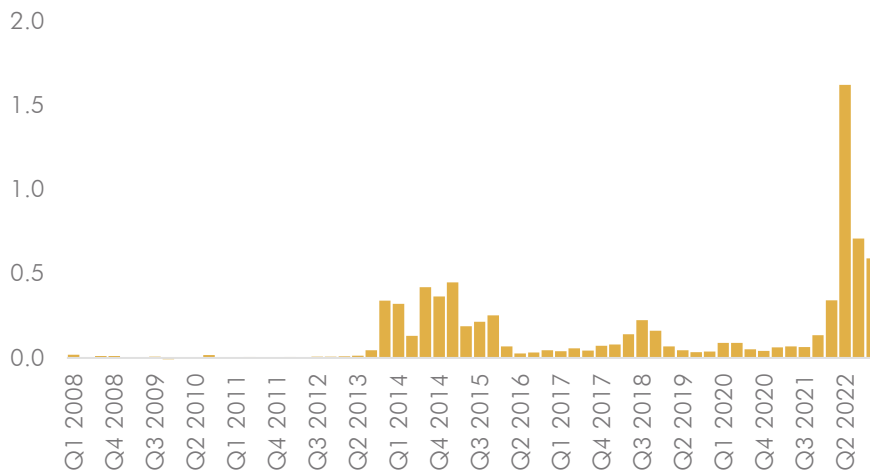
Notes: The series shown is defined as Ireland’s net imports of SITC category 7924 (Aeroplanes & other aircraft, mechanically-propelled (other than helicopters), of an unladen weight exceeding 15,000 kg).

A clear example of how useful this can be is if we take the net import value of planes and compare this with the measure of aircraft related to leasing that is stripped out of machinery and equipment to arrive at the modified measure. Figure 4 show the two series in quarterly levels. Generally, these track each other very closely.

We can extend this approach to examine other parts of machinery and equipment imports that can tend to be very volatile. One such category is machinery used to develop semiconductors (Figure 5).

Figure 5: Machinery to develop semiconductors

€ billions, net imports, value



Sources: Eurostat EU trade data by SITC.

Notes: The series shown is defined as Ireland’s net imports of SITC categories 72821 (Machines & apparatus for the manufacture of boules & wafers, semiconductor devices/of electronic integrated circuits & flat panel displays), 72822 (Machines & apparatus solely/principally of a kind used for the manufacture/repair of masks & reticles, assembling semiconductor devices/electronic integrated circuits & lifting, handling, loading & unloading of boules, wafers, semiconductor), and 72829 (Parts & accessories of heading 728.2).

This series has grown drastically, increasing from about €70 million a quarter before late-2021 to as high as €1.6 billion in Q2 2022. The monthly imports data show that most of this occurred in April 2022. In the same month, there were reports that Intel, with significant operations in Co. Kildare, imported “one of the most complex machines ever built”.⁴ The device is reported to be used to print billions of transistors onto silicon wafers that are then transformed into computer chips.

In March 2022, Intel signalled its intentions to invest in an expansion of its Irish facilities in Kildare that entailed “spending an additional 12 billion euros and doubling the manufacturing space”.⁵ The exact timing of how the Intel investment might impact investment in Ireland’s national accounts is unclear but statements from Intel suggested that it would take place

⁴ See the article “One of the most complex machines ever built has arrived in Ireland” in <https://www.irishexaminer.com/business/technology/arid-40846262.html>.

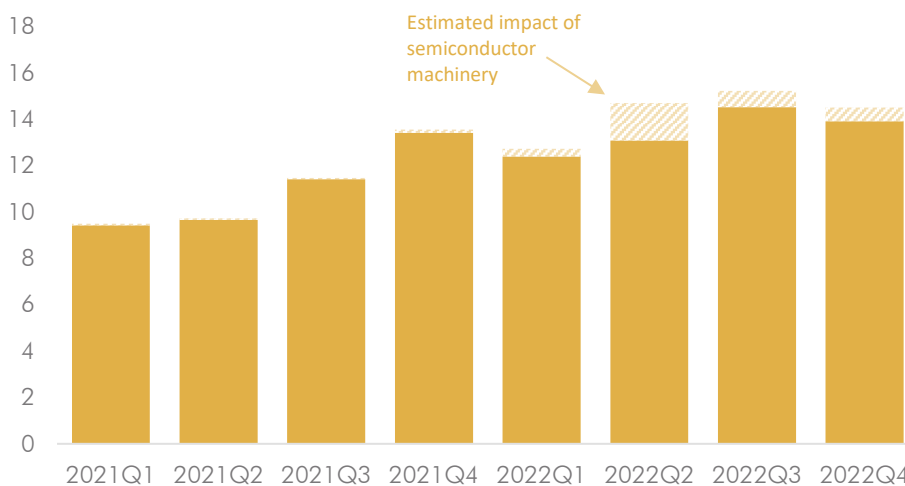
⁵ See press release: <https://www.intel.com/content/www/us/en/newsroom/news/eu-news-2022-release.html#gs.u1bi9q>

over between March 2022 and the end of 2023.⁶ For context, the total level of machinery and equipment investment in Ireland was less than €11 billion on average between 2016 and 2021. Intel also noted that, in terms of employment, the new facility would add 1,600 new positions to the existing 4,900.

The net imports of semiconductor machinery series is certainly big enough to make a substantial difference to estimates of modified investment. Figure 6 shows what Ireland’s modified investment levels in value would look like if the nominal amounts of these imported machinery were removed. This shows that it would be sufficient to reduce Q2 2022 levels markedly — shaving off about 11% of the headline level. The profile that would result would suggest that the value of modified investment remained higher in Q3 and Q4 than in the first two quarters of 2022. By contrast, official estimates show it weaker in Q4 than in Q2. In terms of understanding trends in business investment and what is happening to Ireland’s domestic demand, this is potentially quite important.

Figure 6: An illustrative adjustment to modified investment to remove investments in semiconductor machinery and equipment

€ billions, nominal, unadjusted



Sources: CSO; Eurostat EU trade data by SITC; and own workings.

Notes: This exercise removes the net imports of machinery used to develop semiconductors.

Specifically, it removes Ireland’s net imports of SITC categories 72821 (Machines & apparatus for the manufacture of boules & wafers, semiconductor devices/of electronic integrated circuits & flat panel displays), 72822 (Machines & apparatus solely/principally of a kind used for the manufacture/repair of masks & reticles, assembling semiconductor devices/electronic integrated circuits & lifting, handling, loading & unloading of boules, wafers, semiconductor), and 72829 (Parts & accessories of heading 728.2).

The impact on modified domestic demand could also be significant. It is unclear how the CSO would deflate a semiconductor machinery series. However, if we assume for simplicity that it attracts the same deflator as the rest of the modified machinery and equipment series, and we assume no seasonal element, then we can examine what it would look like when

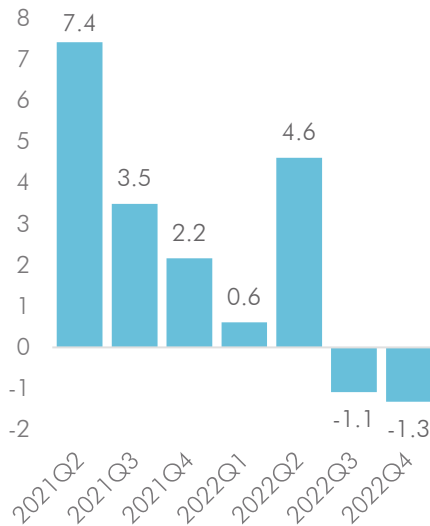
⁶ See press release: <https://www.intel.ie/content/www/ie/en/newsroom/opinion/intel-path-for-increased-manufacturing-in-eu.html#gs.u1c5hk>

removed from modified domestic demand. This analysis is purely an illustrative exercise.

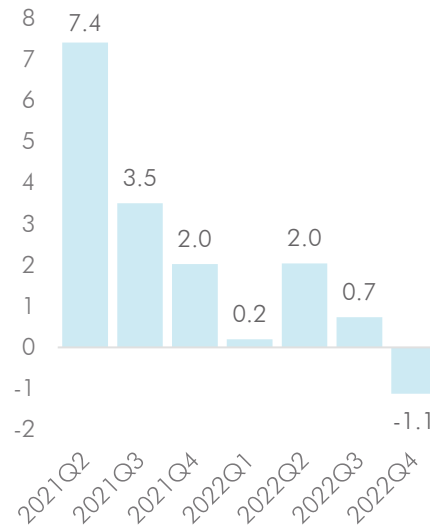
Figure 7: Modified domestic demand may not have contracted for two consecutive quarters

% change quarter-on-quarter, seasonally adjusted

A. Modified domestic demand



B. Excluding semiconductor machinery imports



Sources: CSO; Eurostat EU trade data by SITC; and own workings.

Removing the estimated impact of imported semiconductor machinery could show a notably different picture of performance of modified domestic demand in 2022. Figure 7A shows the growth rates in seasonally adjusted modified domestic demand as indicated by the official CSO estimates. Figure 7B shows the same but adjusted for the estimated impact of imported semiconductor machinery. The results suggest a very different picture for growth in 2022. Rather than having grown sharply in Q2 2022 and then contracting for two consecutive quarters, the series would instead have shown a more moderate Q2 growth rate, before slowing in Q3 and contracting in Q4.

There is an issue here. Clearly, we can see how a very specialised area can play havoc with our interpretation of how the domestic economy is performing. This speaks to the risks involved in over-relying on any single measure such as modified domestic demand when trying to understand activity in the Irish economy. It also emphasises the need for caution when developments are being driven by modified machinery and equipment investment, given that this particular area can be prone to highly idiosyncratic factors related to multinational activities.

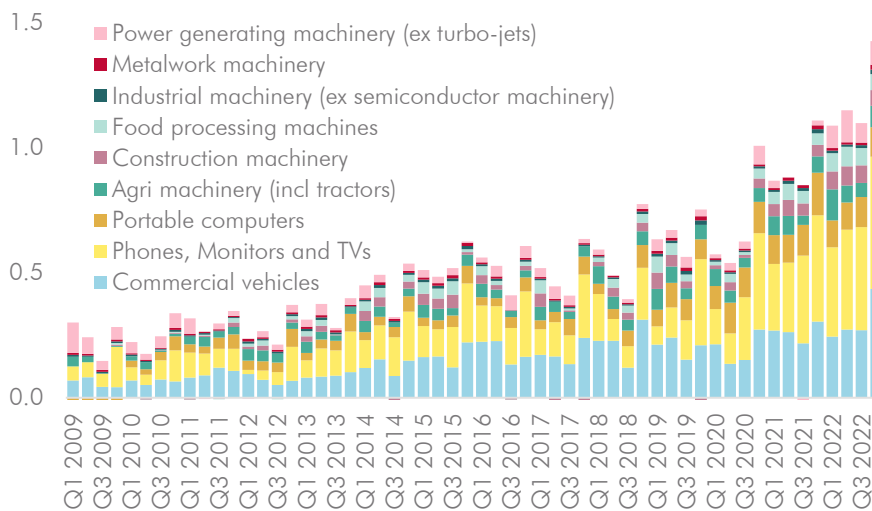
A related question is how domestic business investment might be performing outside of areas that could be influenced by a small number of large foreign-owned multinational enterprises. This is difficult to answer with the existing national accounts information we are provided with by the CSO.

One way to get at domestic business investment might be to focus on areas of net imports of machinery and equipment that are likely to be used more generally by domestic businesses. As in, we might be better able to determine a signal of how the Irish economy is performing on an underlying basis — abstracting from idiosyncratic developments related to multinationals — if we focus on investments that are less likely to be related to a small number of outsized players.

We focus on six selected areas of net imports that might be more representative of domestic machinery and equipment investment. Figure 8 shows these in values. The largest three categories are 1) commercial vehicles, 2) phones, monitors and TVs, and 3) portable computers. As we can see, net imports of these two categories increased drastically in 2021 and 2022. For phones, monitors & TVs and computers, this is likely to be a result of the pandemic, with many offices increasing their outlays on 1) home office equipment and then 2) office equipment as workers returned to offices. However, we can also see a slight rise in the value of net imports of commercial vehicles, most notably in Q4 2022.

Figure 8: Selected net imports relevant to domestic machinery and equipment investment

€ billions



Sources: CSO; Eurostat EU trade data by SITC; and own workings.

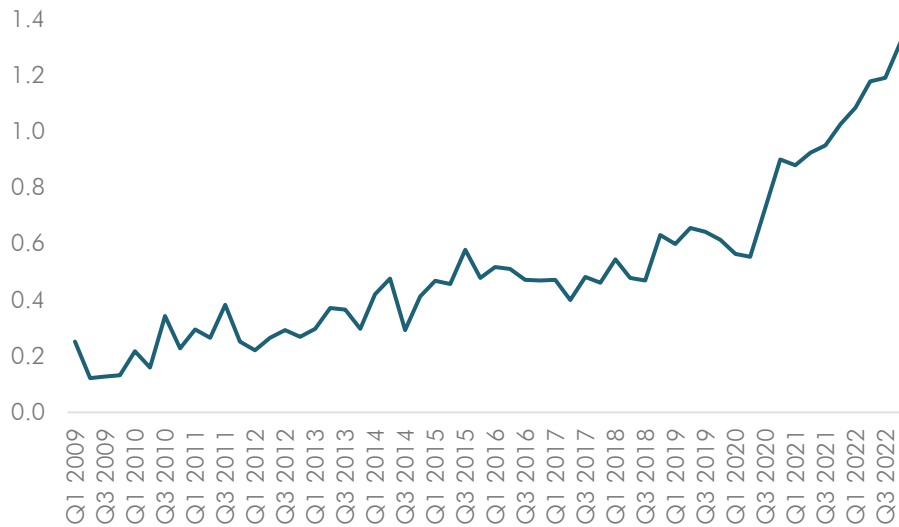
Notes: The “Commercial vehicles” series is defined as Ireland’s net imports of SITC categories 782 (Motor vehicles for the transport of goods and special-purpose motor vehicles), 783 (Road motor vehicles, n.e.s.), 791 (Railway vehicles), and 793 (Ships, Boats, and floating structures). “Phones, Monitors and TVs” are defined as 76 (Telecommunications and sound-recording and reproducing apparatus and equipment). Portable computers are defined as “Portable automatic data processing machines, weighing not > 10 kg, consisting of a least a central processing unit, a keyboard & a display”. Agri machinery (incl tractors) consists of 721 (Agricultural machinery (excluding tractors) and parts thereof) and 722 (Tractors (other than those of headings 744.14 and 744.15)). “Food processing machines” consists of 727 (Food-processing machines (excluding domestic); parts thereof). “Metalwork machinery” consists of 73 (Metalworking machinery). “Power-generating machinery (ex turbo-jets) consists of 71 (Power-generating machinery and equipment) but excludes 71441 (Turbojets) and 7149 (Parts of the engines and motors of heading 714.41 and subgroup 714.8).

Combine the six selected categories above, we can see that the growth in these areas of machinery and equipment spending is likely to have remained reasonably strong through 2022. Figure 9 shows the aggregate

values seasonally adjusted and estimated in constant prices.⁷ On average, the quarter-on-quarter growth rates were 6.5% in 2022, with the final quarter having the strongest growth rate at 10.6%. In terms of the year as a whole, the real growth in 2022 is estimated to have been 26% as compared to 2021.

Figure 9: Selected domestic net imports of machinery and equipment

€ billions, seasonally adjusted, constant prices



Sources: Eurostat EU trade data by SITC; and own workings.

Notes: The series combines the selected areas of net imports identified as relevant to domestic machinery and equipment investment. This is seasonally adjusted and set in constant price terms.

This gives a starkly different picture of what is potentially happening in the Irish economy in terms of machinery and equipment investment. It is possible that — if we were to focus on measures arguably more representative of the domestic economy — that machinery and equipment investment grew continuously through the year rather than contracting in both the third and fourth quarter of 2022.

There are a number of caveats to this analysis. First, the selected areas of net imports are quite small relative to overall machinery and equipment investment (between one-quarter and one-third of typical values). Second, the areas selected may overlap with consumer spending, such as for personal laptops and TVs.⁸ Third, there may be areas of investment that are not imported, but instead purchased domestically. Fourth, the approach crudely estimates a deflator based on overall machinery and equipment investment in the national accounts.

⁷ Here we use the overall machinery and equipment deflator as before to deflate the values series. We use the TRAMO-SEATS program to implement an ARIMA model-based seasonal adjustment method (Gomez and Maravall, 1996).

⁸ There is a risk that by examining imports of these items here, we will incorporate household purchases for personal use. This should show up in personal consumption expenditure rather than in machinery and equipment investment. Unfortunately, even with the detailed data available, it is not possible to separately identify which areas these items might be used for. By contrast, the CSO uses its business surveys as its source of information, thus ensuring that it is only getting business-related investment in relation to such equipment.

4. Discussion and conclusions

Business investment can be a key leading indicator of what is happening in an economy.

Investment in machinery and equipment by businesses today can reflect some degree of optimism and confidence in future growth. In a similar way, contractions in investment can mirror a worsening outlook for the economy. Indeed, the 2001 US recession was preceded by a pronounced decline in business investment, particularly in information technology. As Stock and Watson (2003) show, this affected manufacturing and production before diffusing slowly through to employment, wages and consumer spending.

There are also important long-run implications related to investment. Through their impact on the economy's overall capital stock, investment can lead to lasting output effects. This assumes of course that the productive benefits of accumulated investments do not flow elsewhere.

Users of macroeconomic data for Ireland have shifted to an increasing reliance on bespoke measures of economic activity. This includes modified gross national income, modified domestic demand, and modified investment. These measures are incredibly useful.

However, there is a risk that users misinterpret these measures and think that they exclude distortions caused by large, foreign-owned multinationals in full. This is not necessarily the case. As we show, idiosyncratic investments by foreign-owned multinationals can still show up within the modified investment measure produced by the CSO for Ireland. This includes the recent case of highly specialised machinery and equipment used to develop semiconductors, which increased dramatically in 2022. This investment is unlikely to be representative of business investment decisions more generally and will cloud the picture of what is happening elsewhere, given the scale of investment involved. Furthermore, it is likely to be mostly imported, and associated profits in future are likely to flow overseas.

With distortions owing to a small number of multinational enterprises still potentially clouding our understanding of modified domestic demand, users should be cautious.

Ultimately, a quarterly estimate of modified Gross National Income, or GNI*, would be the best measure of whether Ireland is in a technical recession. As discussed in Timoney (2023), the CSO should further develop its work towards producing this statistic on a timely, quarterly basis. Otherwise, we will be left with the inherent limitations that come

with focusing on modified domestic demand: most notably the absence of the traded sector, including the offsetting role of imports.

This note makes two key contributions. First, we show how modified domestic demand is likely to look very different when adjusting for the estimated impact of machinery and equipment to develop semiconductors in 2022. Second, we explore selected measures of net imports of machinery and equipment that might prove more representative of the performance of the domestic economy. Both contributions suggest that domestic demand would have performed slightly better in 2022 were a more representative measure of business investment available compared to the modified measures.

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