ECONOMIC BULLETIN

OCT. 2022

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1 Introduction

According to the projections in this issue of the *Economic Bulletin*, the Portuguese economy is expected to grow by 6.7% in 2022, continuing to benefit from the recovery in tourism and private consumption (Table I.1.1). In 2022 the economy is marked by an early rebound to pre-pandemic levels in the first quarter and a subsequent slowdown, translating into a relative stabilisation of GDP (Chart I.1.1 – Panel A). The external and financial environment has deteriorated due to higher inflation and interest rates, with adverse effects on real disposable income. These effects have been mitigated in 2022 by the strong performance of the labour market — reflected in buoyant employment and nominal wages — as well as an increase in the participation rate to historically high levels. The resilience of private consumption also stems from households channelling part of the savings accumulated during the pandemic crisis into expenditure and from the support measures. In contrast, investment is expected to grow only slightly, against a background of heightened uncertainty, supply constraints and higher financing costs. Exports, led by the services component, continue to recover significantly, albeit decelerating in quarter-on-quarter terms. The economic growth profile in 2022 implies a carry-over effect of only 0.5 p.p. in 2023, in clear contrast to this effect in 2022, which reached 3.9 p.p.[1]

Inflation is expected to rise to 7.8% in 2022, reflecting increasing external price pressures. Strong demand for goods and services — whose consumption was constrained in the first phase of the pandemic — has also contributed to the upward path throughout 2022, with an inflection point expected towards the end of the year (Chart I.1.1 – Panel B).

Table I.1.1 • Projections of Banco de Portugal for 2022 | Year-on-year percentage change, unless otherwise stated

	Weights 2021	EB October 2022			EB June 2022		
		2020	2021	2022(p)	2020	2021	2022(p)
Gross domestic product (GDP)	100.0	-8.3	5.5	6.7	-8.4	4.9	6.3
Private consumption	63.5	-7.0	4.7	5.5	-7.1	4.5	5.2
Public consumption	18.8	0.3	4.6	2.0	0.4	4.1	2.2
Gross fixed capital formation	20.3	-2.2	8.7	0.8	-2.7	6.4	5.0
Domestic demand	103.0	-5.4	5.6	4.0	-5.6	5.0	4.8
Exports	41.6	-18.6	13.5	17.9	-18.6	13.1	13.4
Imports	44.6	-11.8	13.3	10.8	-12.1	12.9	9.5
Employment (number of persons)		-1.8	1.9	2.3	-1.9	2.1	1.7
Employment (hours worked)		-8.6	3.1	5.1	-9.3	4.5	5.8
Unemployment rate		7.0	6.6	5.8	7.0	6.6	5.6
Current plus capital account (% of GDP)		-0.1	0.6	0.6	0.0	0.7	0.4
Trade balance (% of GDP)		-1.9	-2.7	-1.9	-1.9	-2.6	-3.5
Harmonised index of consumer prices		-0.1	0.9	7.8	-0.1	0.9	5.9
Energy goods		-5.2	7.5	24.5	-5.2	7.5	18.8
Excluding energy goods		0.3	0.4	6.4	0.3	0.4	4.8

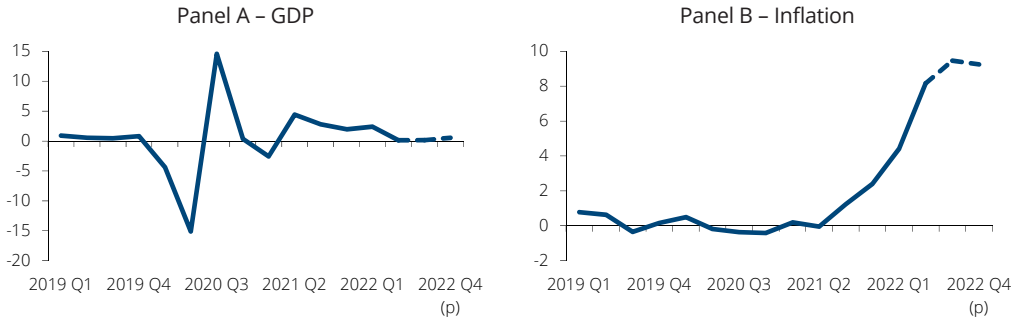
Sources: Banco de Portugal and Statistics Portugal. | Notes: (p) – projected, pp – percentage points. Cut-off date for macroeconomic projections: 23 September. For each aggregate, this table shows the projection corresponding to the most likely value, conditional on the set of assumptions. (a) According to the national accounts concept. (b) In percentage of the labour force.

The deterioration of the international environment is a result of successive shocks associated with the invasion of Ukraine, with an impact on inflation, energy supplies and confidence among economic agents. Higher import prices for energy commodities and food result in a

1. The carry-over effect in a given year corresponds to the annual GDP growth that would be observed if all quarter-on-quarter rates of change over the year were nil.

terms-of-trade loss leading to a transfer of real income from importing economies to exporting countries. Russia cutting off gas supplies to Europe in early September — for an indefinite time horizon — has a negative impact on euro area activity and external demand for Portuguese goods and services. In turn, the pronounced, broad-based and persistent increase in headline inflation has led to a reversal of the monetary policy stance in several countries, resulting in more unfavourable financing conditions.

Chart I.1.1 • Quarterly projections for GDP and inflation | GDP quarter-on-quarter percentage change and HICP year-on-year percentage change



Sources: Banco de Portugal and Statistics Portugal. | Note: (p) – projected.

GDP and inflation projections have been revised upwards compared with the June issue of the *Economic Bulletin*. The stronger recovery in activity in 2021 and the first half of 2022 — revealed by the latest national accounts — outpaces the downward revision in the second half of 2022. Exports and private consumption explain the upward revision in the first half of the year, with the latter showing greater resilience to adverse shocks throughout the year. GFCF justifies most of the downward revision in the second half of the year, showing lower growth than in previous years. These developments are noteworthy, as the economic cycle needs to be relaunched through investment and owing to the importance of the Recovery and Resilience Plan (RRP), the implementation of which has been revised downwards. Over the last seven years, cumulative investment growth has exceeded 40%, compared with 20% for exports and only 10% for private consumption. The revision of inflation compared to the June exercise (+1.9 p.p.) reflects the incorporation of the latest data, the update of the external assumptions, and a reassessment of the speed of pass-through of the increases in production costs to prices and of the impact of the reopening of the economy in the second half of the year. The surprise in price developments has occurred across all the main items of the Harmonised Index of Consumer Prices.

The uncertainty surrounding these projections is high. The possibility of more adverse economic impacts associated with the invasion of Ukraine is the main source of uncertainty. In particular, higher energy rationing needs and production cuts than entailed in the baseline scenario, notably due to a harsher than usual winter in Europe, increase the likelihood of weaker developments in activity in Portugal towards the end of the year.

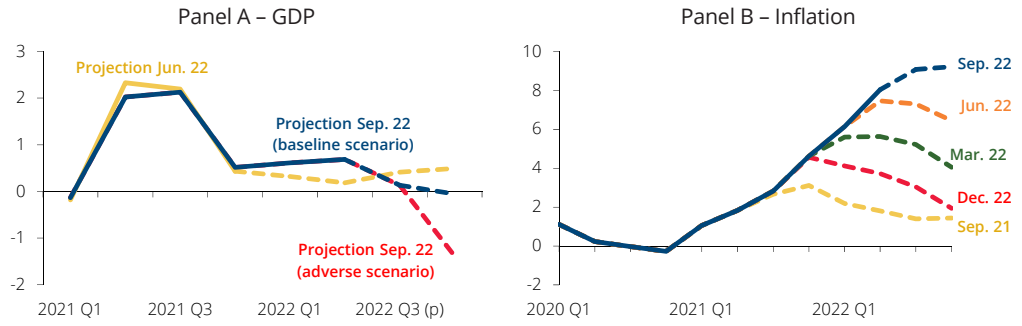
2 External environment, financing conditions and policies

After the strong rebound in activity in 2021, the global economy is expected to decelerate in 2022, influenced by negative spillovers from high inflation. World GDP slowed in the first half of

the year as a result of the contraction observed in the United States and China, in the former mainly influenced by the impact of the reduction of fiscal stimulus measures and, in the latter, by the restrictions imposed in the face of a resurgence in COVID-19 case numbers. Conversely, activity in the euro area has benefited from a solid recovery in services, particularly in contact-intensive services such as tourism. The worsening economic fallout from the invasion of Ukraine, the impact of high inflation on household purchasing power and tighter monetary and financial conditions have led to a deterioration in the outlook for euro area activity in the second half of the year. The baseline scenario of the ECB's September 2022 projections incorporates a stagnation of euro area GDP in this period (3.1% annual growth in 2022) (Chart I.2.1 – Panel A). However, a deterioration in activity has become more plausible due to the halt of Russian gas supplies to Europe (after the cut-off date for the ECB's projections). The assumptions considered for the external demand for Portuguese goods and services point to a slowdown in 2022, albeit less marked than anticipated in the June issue of the *Economic Bulletin*, as a result of better developments in the first half of the year.

The increase in inflation has been higher and more persistent than expected. Inflation has continued to rise on a global scale, reaching values unobserved in most advanced economies since the 1980s. These inflation developments led most central banks to change their monetary policy stance (Box 1). In the euro area, the rise in inflation has mostly reflected an increase in energy and food prices, initially as a result of the recovery in global demand in the post-pandemic period and, more recently, exacerbated by the invasion of Ukraine. Price pressures have extended to other goods and services, reflecting a faster and stronger pass-through of production cost pressures and, in the case of services, the effects of the reopening of the economy. The ECB's September projections point to euro area inflation standing above 9% until the end of the year, implying an upward revision of 1.3 p.p. compared to the June projections and reaching 8.1% in annual terms in 2022 (8.4% in the ECB's adverse scenario) (Chart I.2.1 – Panel B).

Chart I.2.1 • ECB projections for the euro area | GDP quarter-on-quarter percentage change and HICP year-on-year percentage change



Sources: ECB and Eurosystem (Banco de Portugal calculations). | Notes: (p) – projected. Dashed lines – projection in the respective date. The adverse scenario assumes an escalation and higher persistence of geopolitical tensions related with the invasion of Ukraine, including a total cut of the Russian supply of gas to Europe for an indefinite period, with a low margin of substitution, in a context of a more rigorous winter. Additionally, this scenario incorporates higher uncertainty with a negative impact on financial conditions and a stronger increase of energy and food prices.

The projection assumptions consider sustained high prices for energy commodities until the end of the year and a rise in short-term interest rates (Table I.2.1 and Chart I.2.2). Gas prices are expected to rise again in the second half of 2022, reaching historically high levels (€204 per MWh). Oil prices are expected to reverse the upward trend, falling in the last two quarters of 2022, but to continue

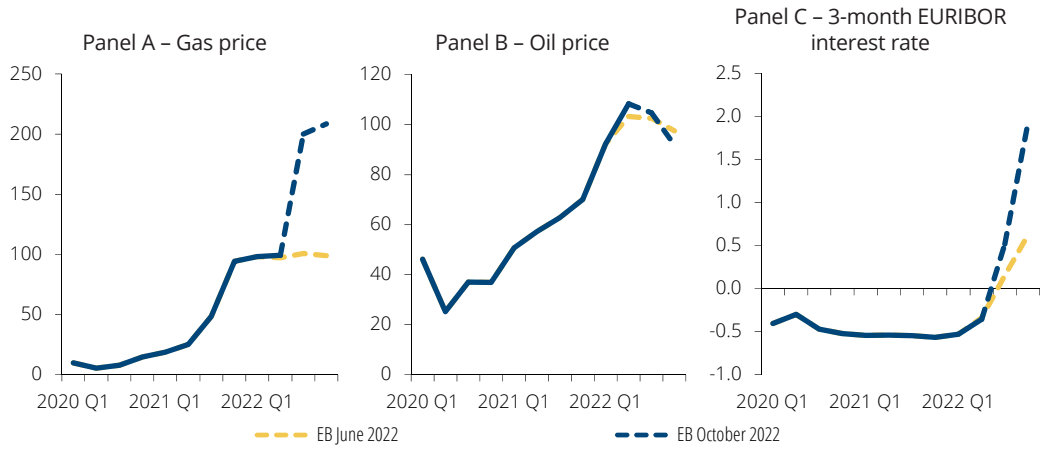
to exceed average prices in 2021. Compared with the June *Economic Bulletin*, energy commodity prices were revised upwards in 2022. The assumptions for the three-month EURIBOR incorporate increases in the second half of the year. In 2022 this rate is expected to increase by 0.9 p.p. compared with the previous year, resulting in an upward revision vis-à-vis the June exercise. The nominal effective exchange rate is projected to depreciate in 2022, more than assumed in the previous Bulletin.

Table I.2.1 • Technical assumptions of the projection exercise

		EB October 2022			EB June 2022		
		2020	2021	2022	2020	2021	2022
International prices							
Oil prices	aav	36.4	60.1	99.4	36.4	60.1	98.9
Gas prices (MWh)	aav	9.4	46.6	151.5	9.4	46.6	98.8
Non-oil commodity prices	yoy	1.3	37.4	20.5	1.3	37.4	26.3
Competitors' import prices	yoy	-2.2	7.8	15.7	-2.2	7.7	12.4
Monetary and financial conditions							
Short-term interest rate (3-month EURIBOR)	%	-0.4	-0.5	0.4	-0.4	-0.5	0.0
Implicit interest rate in public debt	%	2.2	1.9	1.9	2.2	1.9	2.0
Effective exchange rate index	yoy	3.3	1.2	-3.9	3.3	1.2	-3.4
Euro-dollar exchange rate	aav	1.14	1.18	1.05	1.14	1.18	1.07

Sources: Banco de Portugal and Eurosystem (Banco de Portugal computations). | Notes: yoy – year-on-year rate of change, % – in percentage, aav – annual average value, Mwh – megawatt-hour. Technical assumptions include information up to 21 September. The international prices are measured in euros. The technical assumption for the price of oil, gas and non-energy commodities is based on futures markets. The import price of competitors corresponds to a weighted average of the export deflators of the countries from which Portugal imports, weighted by their weight on total Portuguese imports (for more information, see "Trade consistency in the context of the Eurosystem projection exercises: an overview", *ECB Occasional Paper* 108, March 2010). The evolution of the 3-month EURIBOR is based on expectations implied by futures contracts. The implicit interest rate on public debt is computed as the ratio of interest expenditure for the year to the simple average of the stock of debt at the end of the same year and at the end of the preceding year. An increase in the exchange rate corresponds to an appreciation. The effective exchange rate of the euro is computed against 42 trading partner countries. The technical assumption for bilateral exchange rates assumes that the average levels observed in the two weeks prior to the cut-off date will remain stable over the projection horizon.

Chart I.2.2 • Technical assumptions of the projection exercise for the gas price, the oil price and the short-term interest rate | In euros and in percentage



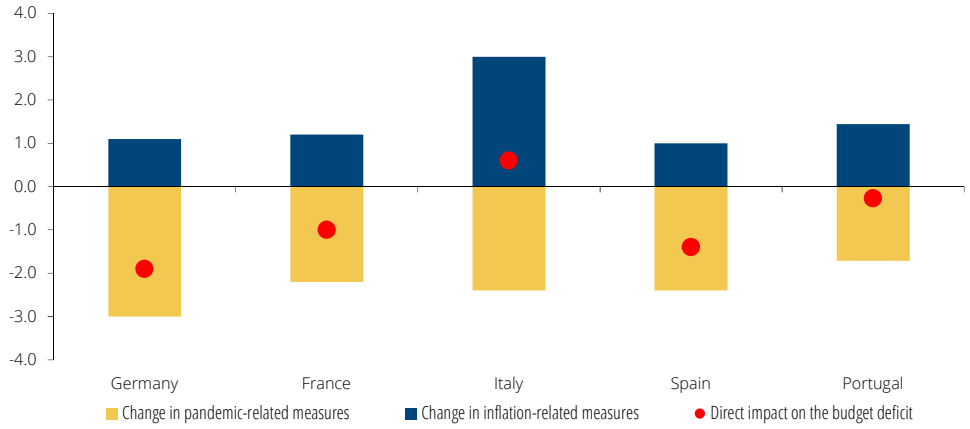
Sources: Banco de Portugal and Eurosystem (Banco de Portugal computations).

The reversal of the ECB's accommodative monetary policy has translated into worsening monetary and financial conditions for the Portuguese economy. The rise in the key ECB interest rates has passed through to interest rates on new and existing loans linked to a benchmark rate.

In the case of interest rates on new loans, there was a 1.4 p.p. increase in housing loans and 0.8 p.p. in corporate loans since the beginning of the year, reaching 3.7% and 2.7%, respectively, in August 2022. The expected path of rising interest rates of loans to non-financial corporations and households next year — in line with market-based expectations — will have a non-negligible impact on household disposable income and the financial situation of firms (Box 2). However, the ratio of interest expenditure to household income or corporate earnings is not expected to approach past peaks. The decline in indebtedness and the (nominal) economic growth that has taken place since then, with an impact on household income and corporate earnings, mitigate the effect of the interest rate.

The stimulus from fiscal policies is expected to decline in 2022. Like most European countries, the Portuguese government has recently announced a further package of measures to mitigate the impact of the energy crisis and inflation on households and firms. Together with the measures previously taken, this package is estimated to amount to 1.5% of GDP — similar in size to those of other euro area economies (Chart I.2.3). In the Portuguese case, the measures already announced have offset almost all of the impact of the reduction of support associated with the pandemic shock, which is not the case in other economies.

Chart I.2.3 • Impact of measures on the 2022 budget deficit | In percentage of GDP

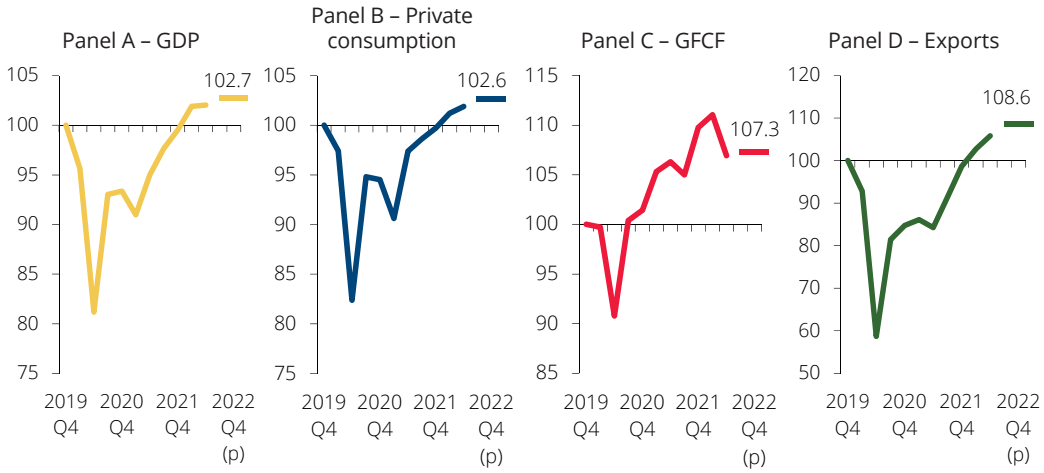


Sources: National Central Banks, Bruegel and European Commission (Banco de Portugal calculations). | Notes: The change in the impact of pandemic-related measures is based on the European Commission estimates underlying Country-Specific Recommendations. The impacts of inflation compensation measures correspond to measures announced until the end of September and are based on preliminary estimates by National Central Banks and Bruegel, with calculations by Banco de Portugal.

3 Activity and external accounts

GDP is projected to accelerate in 2022 (6.7%, after 5.5% in 2021), supported by the behaviour of tourism exports and, to a lesser extent, private consumption. This growth is associated with the recovery from the pandemic crisis and partly reflects a positive effect stemming from developments already observed in 2021 (the carry-over effect implies a contribution of 3.9 p.p. to GDP growth in 2022). The composition of growth in 2022 contrasts with that of the years prior to the pandemic crisis, with a more significant contribution from exports and private consumption, and a weak role of investment. At the end of the year, GDP is projected to stand 2.7% above its pre-pandemic level (Chart I.3.1).

Chart I.3.1 • GDP and main expenditure components | Index 2019 Q4 = 100



Sources: Banco de Portugal and Statistics Portugal. | Notes: (p) – projected. The dashes in the fourth quarter correspond to projections.

Private consumption is expected to grow by 5.5% in 2022 (4.7% in the previous year), benefiting from the lifting of pandemic-related restrictions and the release of pent-up demand. The recovery path that started in the second quarter of 2021 is projected to continue until the end of 2022, albeit at a slower pace (Chart I.3.2 – Panel A). This slowdown takes place against a background of increased uncertainty and declining confidence and reflects the growing negative impact of higher inflation and interest rates on household income. Still, consumption is projected to grow slightly in the second half of the year, sustained by the support measures announced by the government in September — which underpin current expenditure — and fading constraints in the car sector, with a positive impact on the consumption of durable goods. The effect of the support measures is projected to be significant, as the group of beneficiaries has a higher propensity to consume. Nevertheless, the projection incorporates a strong rebound in the saving rate in the fourth quarter, related to household income support measures. This smoothing behaviour of private consumption is crucial in the current environment of uncertainty, high inflation and a less favourable economic outlook.

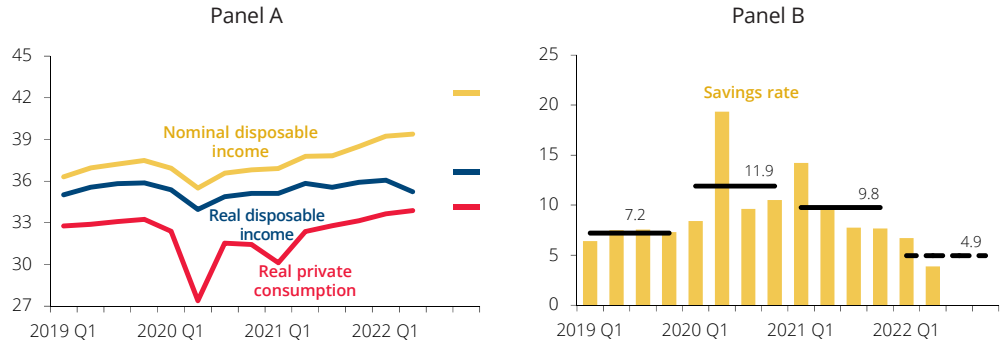
Real disposable income is projected to stagnate in 2022 (0.2%, after 2.2% in 2021), constrained by the marked profile of inflation. In nominal terms, this aggregate is projected to accelerate from 3.6% to 6.5%, reflecting wage developments — in a context of growth in employment and wages per worker — and domestic transfers. The measures announced by the Portuguese government in September are expected to contribute 1.4 p.p. to the rate of change of disposable income in 2022. Higher interest rates are expected to imply a slight increase in debt service in 2022, interrupting the downward path observed since 2012.

In 2022 the savings rate is projected to fall from 9.8% to 4.9%, allowing consumption to accelerate in a context of high inflation and stagnating real disposable income (Chart I.3.2 – Panel B). The decline in savings to levels below the historical average is consistent with some decrease in wealth accumulated by households during the pandemic. The deterioration of the short-term economic outlook and heightened uncertainty should justify an increase in precautionary savings, which will be facilitated by public measures to support household income.

Public consumption is expected to grow by 2% in 2022, decelerating from the previous year (4.6%). This growth reflects a slowdown in public employment, in line with that observed in the first half of the year (1.8% compared with 3% in 2021), in addition to an impact from the recovery

in hours worked to pre-pandemic levels. In turn, expenditure on goods and services is expected to remain stable. The fading-out of the temporary impact on expenditure related to spending on tackling the pandemic and the recovery in public sector sales are offset by the implementation of the RRP, despite being revised downwards, and by an increase in permanent expenditure, notably in the health sector.

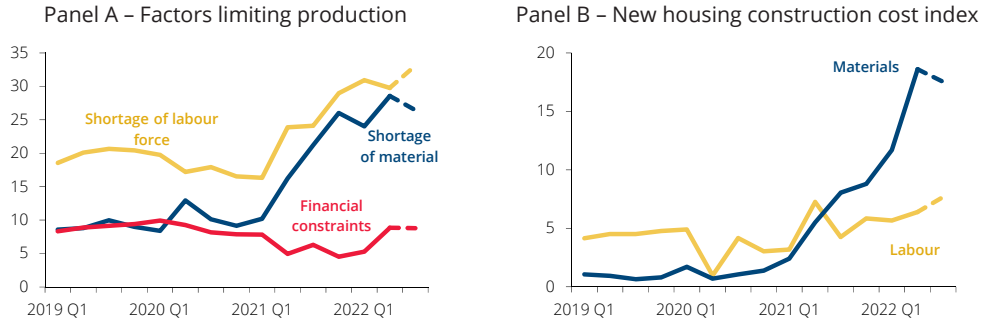
Chart I.3.2 • Private consumption, disposable income and savings rate | In billions of euros and in percentage



Sources: Banco de Portugal and Statistics Portugal. | Notes: (p) – projected. In panel A, the dashes in the fourth quarter correspond to projections. In Panel B, the lines correspond to the annual average, including the projection for 2022 (dashed line).

Investment is expected to slow down, growing only by 0.8% in 2022 (8.7% in 2021), against a background of supply constraints, rising production costs, worsening financing conditions, low implementation of RRP funds and high uncertainty. These factors are expected to hinder business investment growth, with a relative stabilisation expected in 2022, following a 7.1% change in the previous year and cumulative growth of almost 50% since 2015. Housing investment is also expected to slow down this year, reflecting the impact on demand of higher inflation and interest rates that adds to supply-side constraints. The same is true for public investment, reflecting a lower impact of the RRP than previously expected (Box 3). By asset type, the signs of deceleration extend to all components. Investment in construction, which accounts for almost half of the total, stands out, against the background of constraints related to the lack of skilled staff and materials and rising costs (Chart I.3.3).

Chart I.3.3 • Construction – Factors limiting production and construction costs | Number of firms and year-on-year rate of change, in percentage

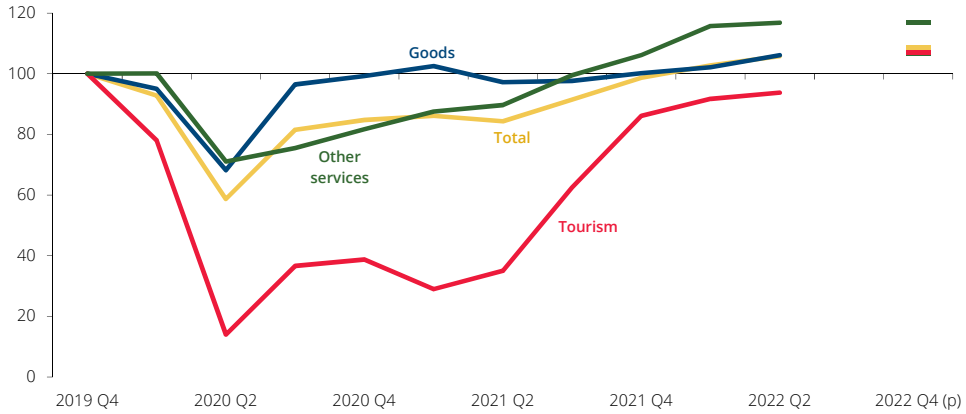


Sources: European Commission and Statistics Portugal. | Notes: In Panel A, the values for the third quarter of 2022 (dashed lines) correspond to the average of the July and August observations. In Panel B, the values for the third quarter of 2022 (dashed lines) correspond to the year-on-year rate of change in July.

Exports of goods and services are expected to remain buoyant in 2022 (17.9%, after 13.5%), growing above external demand, which implies additional market share gains. These developments were driven by exports of services, in particular tourism-related services. In 2022 tourism exports are projected to grow by around 86%, largely reflecting a carry-over effect associated with the momentum in the previous year. Throughout the year, tourism exports have continued to recover, but at a slower pace (Chart I.3.4). Developments in tourism exports continue to benefit from the gradual lifting of pandemic-related restrictions and the release of pent-up demand, despite some risks associated with the loss of purchasing power at the global level (Box 4). This aggregate is expected to exceed pre-pandemic levels in the third quarter of 2022.

Growth in goods exports is projected to decline in 2022 from 10.8% to 6% in a less favourable international environment. In the first half of the year, goods exports continued to grow robustly (in quarter-on-quarter terms), benefiting from increased demand for energy, in a post-pandemic environment, and the easing of disruptions associated with shortages of materials in the automotive industry. In the second half of the year, the deceleration in external demand, reinforced by the effects of the cut-off in Russian gas supplies to Europe, are projected to constrain developments in this aggregate, which is expected to register a relative stabilisation.

Chart I.3.4 • Exports of goods and services | Index 2019 Q4 = 100



Sources: Banco de Portugal and Statistics Portugal. | Notes: (p) – projected. The dashes in the fourth quarter correspond to projections.

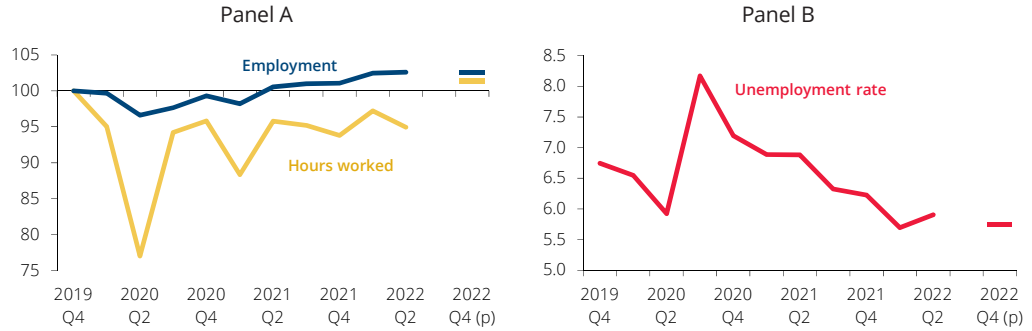
Total imports are expected to decelerate in 2022 (10.8%, after 13.3% in the previous year), in line with global demand weighted by import content. These developments extend to goods and services excluding tourism. Tourism imports are projected to accelerate in 2022, surpassing pre-pandemic levels in the third quarter.

The current and capital account surplus is expected to remain at 0.6% of GDP in 2022. The goods and services account deficit is projected to narrow in 2022 (from -2.7% to -1.9% of GDP), reflecting a positive volume effect related to the strong recovery in tourism, which is partly offset by a negative terms-of-trade effect, mainly due to higher energy prices. In contrast, the income and capital account surplus is expected to fall this year (from 3.2% to 2.4% of GDP), reflecting the increase in the payment of dividends abroad and the unwinding of a base effect associated with the reimbursement by the European Financial Stability Facility of amounts paid by Portugal under the Economic and Financial Assistance Programme. The low implementation of RRP projects in the first half of the year poses downside risks to the projection for net inflows of European funds in 2022.

4 Labour market and prices

The labour market maintains a remarkable performance, despite some signs of moderation throughout the year (Chart I.4.1). In 2022 employment is expected to accelerate from the previous year (2.3%, after 1.9% in 2021), reflecting developments in employees. Hours worked are expected to grow by 5.1% (3.1% in 2021), thus exceeding their pre-pandemic level by the end of the year. The participation rate is expected to increase, contributing to extend the sustained growth in labour supply in recent years. In intra-annual terms, following a 1.4% growth in the first quarter, employment remains stable until the end of the year. These developments are corroborated by the deterioration in employment expectations, which is broadly based across the main sectors.

Chart I.4.1 • Employment, hours worked and unemployment rate | Index 2019 Q4 = 100 and level, in percentage



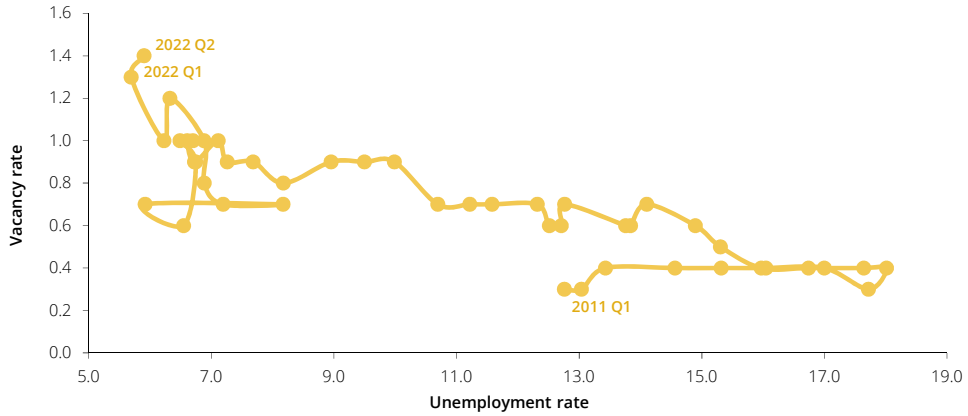
Sources: Banco de Portugal and Statistics Portugal. | Notes: (p) – projected. The dashes in the fourth quarter correspond to projections.

The reduction in labour market slack intensified in 2022. After having decreased to 6.6% in 2021, the unemployment rate is expected to decline further in 2022, to the historically low level of 5.8%. In quarterly terms, despite the slowdown in activity, the unemployment rate remains relatively stable throughout the year (Chart I.4.1 – Panel B). This behaviour may reflect the need for firms to retain their workers in a context of labour supply shortages. The number of non-employed individuals who want to work but do not actively seek work (discouraged individuals) reached record lows. The share of firms reporting difficulties in hiring skilled staff maintained its upward trend in the third quarter of 2022, with the increase being particularly noticeable in the services sector. At the same time, the number of job vacancies (i.e. newly created, unoccupied or about to become vacant) in each quarter has been increasing, reaching historically high levels in the second quarter. The Beveridge curve, which depicts the relationship between the job vacancy rate and the unemployment rate, shows that while the unemployment rate presented a relative stabilisation in the first half of 2022, the vacancy rate increased (Chart I.4.2). This relationship may signal mismatches between job demand and supply, which may help to explain the increase in long-term unemployment (around 55% of total unemployment in the second quarter of 2022, compared with 50% prior to the pandemic).

Compensation per employee in the private sector is expected to grow by 5.4% (4.9% in 2021), leading to a fall in real terms in the year, but maintaining real gains compared to 2019 (Chart I.4.3). This growth incorporates the 6% increase in the minimum wage at the beginning of the year and also reflects the likely buoyancy of wages across the whole distribution. Indeed,

developments in average wages, in the context of significant employment growth, are consistent with much higher changes in individual wages, given the presence of strong negative composition effects (the increase in employment is more concentrated in lower salary bands). The sudden and unanticipated rise in inflation over the year may justify low pressures on wages in 2022. In addition, around 80% of wages are set under collective agreements in Portugal, which may introduce an element of rigidity in the transmission of inflation to wages.

Chart I.4.2 • Beverige curve – unemployment rate and vacancy rate | In percentage



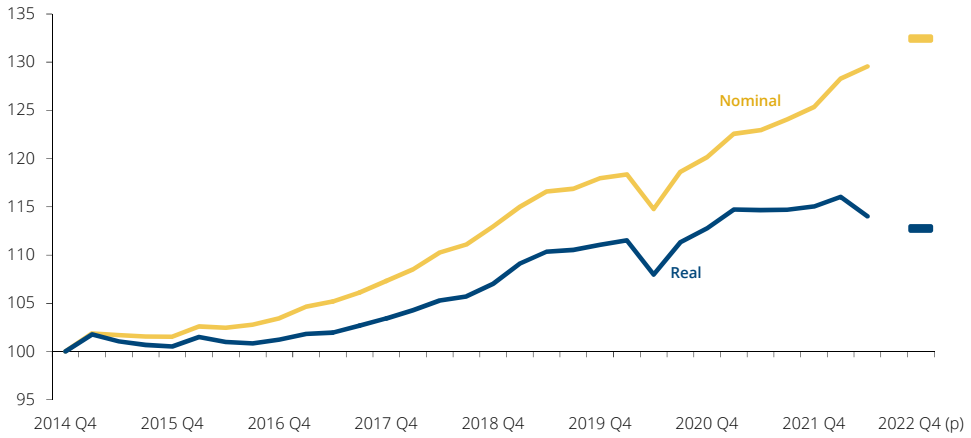
Sources: Ministry of Labour, Solidarity and Social Security and Statistics Portugal. | Note: The vacancy rate is the ratio between the number of vacant jobs and the total number of jobs (already filled or unfilled), multiplied by 100.

Inflation increases significantly throughout the year, standing at 7.8% in 2022 (0.9% in 2021). This is its highest level since 1993. Excluding energy, consumer prices are expected to grow by 6.4% in 2022 (0.4% in 2021). The differential vis-à-vis the euro area narrows, but remains negative (-0.4 p.p.), reflecting a less pronounced rise in energy prices in Portugal. However, excluding this component, the differential becomes positive (1.5 p.p.). This difference, which has been visible since the first quarter of the year, is associated with greater buoyancy in food prices in Portugal, their larger weight in the consumption basket (26% in Portugal compared with 21% in the euro area), and a more pronounced recovery in services prices, particularly those related to tourism.

In the first half of 2022, inflation in Portugal maintained the upward trend that started in mid-2021 (Table I.4.1). This profile is common to the goods and services components, despite the greater buoyancy in typically more volatile goods prices — food and energy. Measures of underlying inflation[2] show that the increase in inflation is broadly based — already extending to the most stable components of the HICP —, suggesting that the observed rises will be more persistent than anticipated.

2. For more details, see the box entitled "Measures of underlying inflation" in the May 2022 issue of the *Economic Bulletin*.

Chart I.4.3 • Compensation per employee in the private sector | Index 2014 Q4 = 100



Sources: Banco de Portugal and Statistics Portugal. | Notes: (p) – projected. The private consumption deflator was used to calculate compensation per employee in real terms. The dashes in the fourth quarter correspond to projections.

Table I.4.1 • HICP and components | Year-on-year percentage change, unless otherwise stated

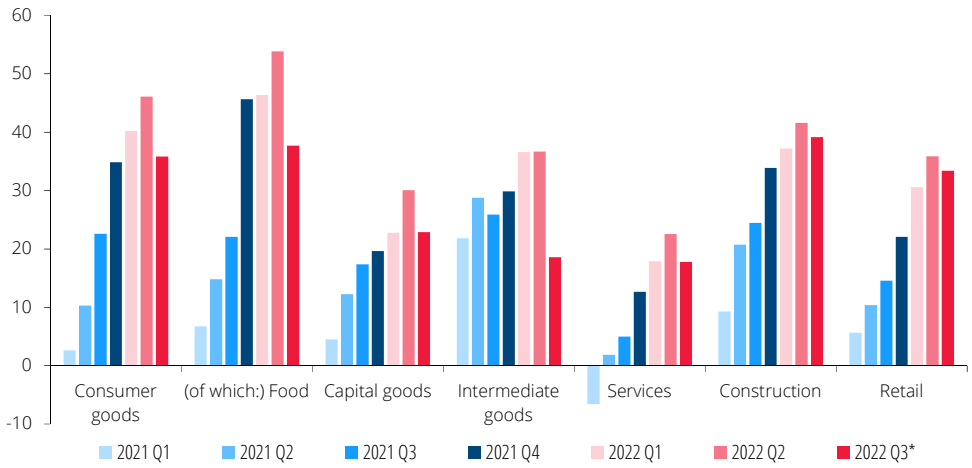
	2020	2021	2022 (p)	2021				2022	
				Q1	Q2	Q3	Q4	Q1	Q2
HICP	-0.1	0.9	7.8	0.2	-0.1	1.2	2.4	4.4	8.2
HICP excluding energy	0.3	0.4	6.4	0.3	-0.8	0.5	1.5	3.4	6.4
Food	1.8	0.8	10.2	0.8	0.0	0.7	1.5	4.7	10.4
Energy	-5.2	7.5	24.5	-1.8	9.4	9.8	13.2	15.9	28.9
Non-energy industrial goods	-1.3	0.8	4.8	0.4	1.3	0.7	0.8	3.0	4.2
Services	0.4	0.0	5.0	0.0	-2.4	0.4	2.0	2.9	5.3
Contribution to HICP (pp):									
Food	0.5	0.2	2.6	0.2	0.1	0.2	0.4	1.2	2.7
Energy	-0.4	0.6	2.0	-0.1	0.7	0.8	1.0	1.3	2.3
Non-energy industrial goods	-0.3	0.2	1.2	0.1	0.3	0.2	0.2	0.8	1.1
Services	0.2	-0.1	2.0	0.0	-1.1	0.1	0.8	1.2	2.1
Memo:									
IHPC – Euro area	0.3	2.6	8.2	1.1	1.8	2.8	4.6	6.1	8.0
HICP excluding energy – Euro area	1.0	1.5	4.9	1.2	0.8	1.5	2.4	3.0	4.6

Sources: Banco de Portugal and Statistics Portugal. | Note: (p) – projected.

Price developments reflect related and mutually reinforcing factors, with emphasis on external pressures. In the case of goods, supply-side constraints stand out, as well as a stronger (than in the past) pass-through of cost increases throughout the production chain to final prices and, to a lesser extent, the effects of the depreciation of the euro. The invasion of Ukraine intensified these effects, with a direct impact on energy and food prices, which subsequently influence other components. In the case of the energy component, in addition to buoyant oil, gas and electricity prices (partly mitigated by fiscal measures), refining margins have also increased. The rise in services prices reflects the effects associated with the reopening of the economy, the recovery in tourism and the increase in demand partly associated with the release of pent-up demand. Growth in the price of goods reinforces the upward pressure on the prices of some services when the former are relevant to the provision of such services. By contrast, the decline in labour market slack does not yet appear to have a significant impact on price developments, with unit labour costs making a moderate contribution to inflation.

Inflationary pressures are expected to remain high in the second half of the year, despite some signs of relief. Entrepreneurs' price expectations declined in the recent period (Chart I.4.4). Assumptions for the second half of the year point to further strong increases in gas prices, but to quarter-on-quarter falls in oil prices — despite remaining above the 2021 average. The slowdown in activity and the waning of disruptions in supply chains also contributes to dampen inflationary pressures. Against this background, inflation is expected to remain above 9% in the second half of the year, peaking in the third quarter (9.5%) and declining slightly at end of the year.

Chart I.4.4 • Selling price expectations over the next three months | Balance



Source: European Commission (Banco de Portugal calculations). | Note: * The values for the third quarter of 2022 correspond to the average of the July and August observations.

This buoyancy in prices in 2022 has an impact on household purchasing power. The acquisition cost of a basic food basket, calculated from selling prices on online platforms, is estimated to have increased by around 15% between October 2021 and August 2022 (Box 5). Inflation estimates for households in different income quintiles — which take into account the differences in the consumption basket — are very similar, but the source of the price increase is different, with the contribution of essential goods prices being predominant in lower-income households (Box 6).

The GDP deflator is expected to grow by 4.4% in 2022 (1.4% in 2021), reflecting a stronger increase in the domestic demand deflator, partly mitigated by a loss in terms of trade (the deflator of imports of goods and services is expected to grow by 18%, more than 3 p.p. above that of exports). These developments in the GDP deflator — which proxy domestic price pressures — are associated with a recovery in corporate profit margins.

5 Final remarks

The Portuguese economy is expected to grow by 6.7% in 2022 amid a recovery from the pandemic crisis. The negative effects of the Russian military aggression to Ukraine have intensified throughout the year, implying a relative stabilisation of economic activity from the second quarter onwards. These effects will be more noticeable in 2023, with a significant deceleration being anticipated compared to 2022, first of all by the effect of the reduction in the carry-over effect from 3.9 p.p. to 0.5 p.p.

The deterioration in the short-term outlook for the Portuguese economy is linked to the repercussions of the invasion of Ukraine — the need for energy rationing in Europe during the winter, the maintenance of high prices of energy commodities and increased uncertainty. At the same time, broad-based and persistent inflationary pressures have led to a global tightening of monetary policy. The more unfavourable external and financial environment and the shock to households' purchasing power imply more adverse GDP developments in the coming quarters.

In this context, it is urgent to promote the effective and efficient use of the RRP funds and accelerate the implementation of reforms under the programme. This will help to reverse the recent deceleration in private and public investment and sustain economic activity in the short and medium term.

The cumulative loss in the terms of trade of the Portuguese economy in 2021 and 2022 is unprecedented since the adoption of the euro, implying a loss of real income for the economy, which must be shared by all agents. Against this adverse background, inflation indexation mechanisms should be reassessed, taking into account the importance of anchoring agents' expectations to the ECB's medium-term objective.

The coordination of agents to preserve the low inflation regime will avoid the materialisation of increases in corporate profit margins and wages that may generate persistent price pressures. The policy response in these circumstances is well established. The normalisation of monetary policy will proceed at the pace necessary to contain inflationary pressures. Fiscal policy should take into account the fact that price shocks do not affect all households or firms/sectors of activity in the same way. Thus, temporary and targeted measures to cushion their impact on the most vulnerable segments may be necessary, in particular in a reversal of the business cycle.

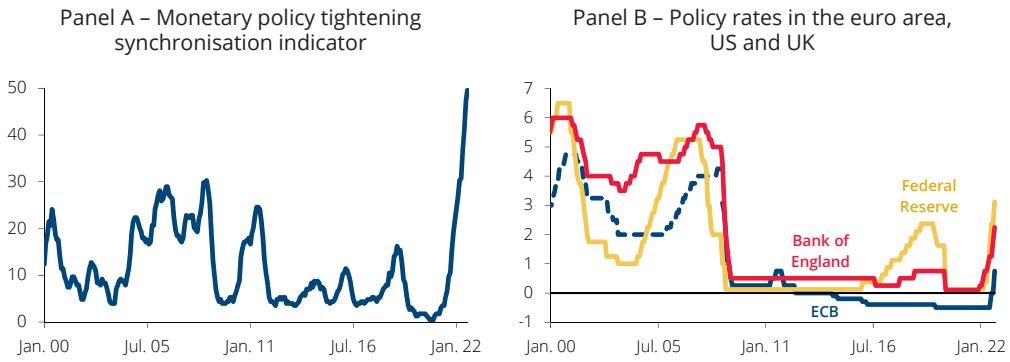
Box 1 • Changes to the monetary policy stance in 2022

Monetary policy of major central banks changed fundamentally in 2022. Over the past decade, monetary policy has generally maintained a very accommodative stance. In an environment of low inflation and low real interest rates, central banks kept nominal interest rates near their lower bound and adopted an unprecedented, broad set of quantitative balance sheet easing measures. The sudden and persistent increase in inflation since the second half of 2021 led major central banks to withdraw accommodation and, in some cases, to tighten monetary and financial conditions.

The pandemic crisis and the invasion of Ukraine have significantly increased macroeconomic volatility and changed the protracted low inflation environment. The forced and abrupt fall in activity following the outbreak of the pandemic initially had an inflation-reducing effect. However, as economies reopened, supported by significant fiscal support and very favourable monetary and financial conditions, the increase in global demand faced various supply-side constraints, which resulted in the largest hike in inflation worldwide over the past 40 years, to close to 10% in many advanced economies.

Most central banks have raised policy interest rates from the lows observed in recent years. After several years when central banks mainly used non-standard monetary policy instruments, in 2022 they once again conducted their monetary policy primarily by changing key interest rates. The current cycle of interest rate hikes is highly synchronised. In a sample of 38 central banks, 32 increased their rates during the first eight months of 2022 and, on average, nearly half of the central banks decided each month to raise rates (Chart C1.1, Panel A). Most notable among these are the Federal Reserve and the Bank of England, which had increased their policy rates by more than 2 percentage points by September, to a range of between 3% and 3.25% and to 2.25% respectively (Chart C1.1, Panel B).

Chart C1.1 • Monetary policy tightening synchronisation indicator and Policy rates in the euro area, US and UK | In percentage



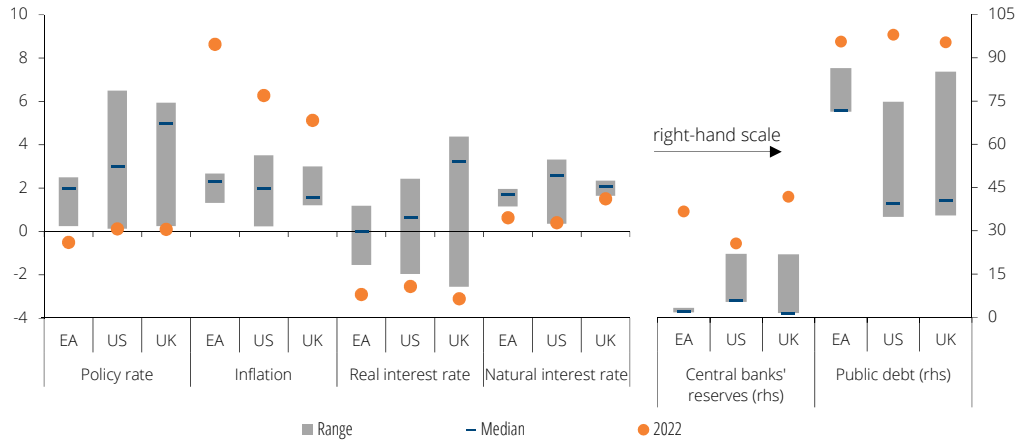
Sources: Bank for International Settlements, European Central Bank, Federal Reserve System and Bank of England (Banco de Portugal calculations). | Notes: monetary policy tightening synchronisation indicator – share of central banks that have increased the policy rate in each month (6-month moving average), from a sample of 38 central banks from both advanced and emerging market economies. Policy rate – in the case of the ECB the rate of main refinancing operations (MRO) is considered until September 2008 (dashed line) and the deposit facility rate (DFR) is considered from October 2008, when the ECB introduced the fixed-rate full-allotment procedure (FRFA) and excess liquidity surpassed €100 billion. In the case of the Federal Reserve System, the target for the fed funds rate is considered until November 2008 and the midpoint of the target interval for the fed funds rate is considered from December 2008. In the case of the Bank of England, the Bank rate is considered. Last observations: Panel A – August 2022; Panel B – September 2022.

In the euro area, the ECB raised its policy rates in July and September, following successive upward revisions to projected above-target inflation. The time lag of the increase in inflation in the euro area compared with other advanced economies, together with anchored inflation expectations

and the absence of effects on wages, prompted the ECB to maintain an accommodative policy for longer. In June, however, given the evidence of more intense and broad-based inflationary pressures and the indication that inflation would remain high for longer (projections pointed to 2.1% in 2024), the Governing Council announced that the conditions were in place to warrant interest rate hikes, in line with the previously announced forward guidance. This was confirmed by two consecutive increases, by 50 and 75 b.p., at the July and September meetings respectively.

The starting point of the current cycle of policy rate hikes is different from those seen in other recent episodes (Chart C1.2). In the current case, the rate rise follows a very significant increase in inflation, unprecedented during the period when central banks guided the conduct of monetary policy by adopting explicit inflation targeting.[3] In an environment where the rise in inflation largely stems from supply-side constraints, a more prudent and gradual policy response tends to be preferable. However, if demand-side pressures also influence the surge in prices, a faster rate hike reducing the risks that inflation will remain too long above the target may prove necessary. Central banks are now faced with this choice, in an environment of high uncertainty about the composition and persistence of shocks affecting inflation and where the natural interest rate (the real interest rate that prevails in the absence of transitory shocks or nominal rigidities) is significantly lower than that observed in previous cycles.

Chart C1.2 • Comparison of the beginning of the current monetary policy tightening cycles in the euro area, US and UK with other episodes observed since the 1980s | In percentage



Sources: European Central Bank, Federal Reserve System, Bank of England, Eurostat, Federal Reserve Economic Data (FRED), Federal Reserve Bank of Philadelphia and Federal Reserve Bank of New York (Banco de Portugal calculations). | Notes: Range and median – minium, maximum and median for each variable in the month/quarter prior to the beginning of previous tightening cycles. The sample includes tightening cycles observed since the creation of the ECB (3 episodes) and after the beginning of the period known as "great moderation" in the case of the Federal Reserve (1984) and after the adoption of an explicit inflation targeting by the Bank of England (1992) (5 episodes in each case). Policy rate – in the case of the ECB the rate of main refinancing operations (MRO) is considered until September 2008 and the deposit facility rate (DFR) is considered from October 2008. In the case of the Federal Reserve System, target for the fed funds rate is considered until November 2008 and the midpoint of the target interval for the fed funds rate is considered from December 2008. Inflation – year-on-year percentage change of the HICP (euro area), the private consumption deflator (US) and the CPI (UK). Real interest rate – difference between the policy rate and 1-year ahead expected inflation from the survey of professional analysts (euro area and US) and of external analysts (UK). Natural interest rate estimated by Holston, Laubach e Williams (2017). For the current cycle, the last value estimated by these authors for the 2nd quarter of 2020 is considered. Central banks' reserves and public debt – in percentage of GDP in the year ending in the corresponding quarter.

3. In the case of the Federal Reserve, the explicit inflation target was only adopted in 2012. However, the literature has associated the period of significant reduction in US macroeconomic volatility that became known as "great moderation" (which started in the mid-1980s) with the conduct of monetary policy aimed at guaranteeing low inflation (see Stock, J. and Watson, M. (2003), "Has the Business Cycle Changed and Why?", *NBER Macroeconomics Annual 2002,* Vol. 17, pp. 159-230).

The structural decline in the natural interest rate over recent decades suggests that the current cycle of policy rate hikes may end at a lower level than in previous episodes. Given the inflation target of 2% common to the three central banks considered herein, a natural interest rate of around 0% (as estimated for these economies)[4] would imply a neutral interest rate (policy rate consistent with a neutral monetary policy stance, and equal to the sum of the natural interest rate and the inflation target) of around 2%. Current market expectations suggest that the policy rate will continue to rise in the coming months, temporarily remaining above its neutral level in the United States and the United Kingdom and possibly also exceeding that level in the euro area.

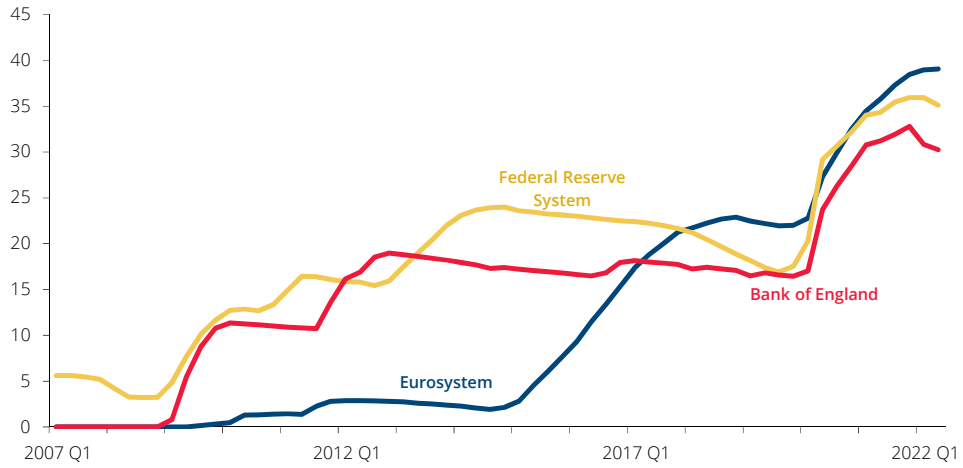
The current environment of excess liquidity poses additional challenges to monetary policy conduct. Contrary to most previous episodes, central banks now operate in a high excess reserve regime that was set up to underpin the quantitative stimulus programmes via the purchase of assets and financing operations of the banking system (Chart C1.2). The pass-through of the policy rate hike to the various market segments may be more uncertain, warranting ongoing monitoring of the impact of the policy shift.

Most central banks have ended their asset purchase programmes, in some cases launching a process of gradually reducing portfolio securities (Chart C1.3). The Federal Reserve ended its net purchases of securities for monetary policy purposes in March 2022, which was also when the first rate hike took effect. At its May meeting, it announced its intention to reinvest only partially the amount of securities maturing each month from June onwards, thereby accelerating the process to reduce portfolio securities from September onwards. The Bank of England ended net purchases still in 2021 and announced the end of reinvestments in February 2022, most recently signalling its intention to sell government bonds in the secondary market after its September meeting.[5] In the euro area, the ECB ended its net asset purchases at the end of June, but remained committed to reinvesting, in full, the principal payments from maturing securities purchased under the pandemic emergency purchase programme (PEPP) and the asset purchase programme (APP). In addition, it further incorporated flexibility in PEPP reinvestments, making it possible for the payments from maturing securities in one jurisdiction to be reinvested in another jurisdiction, if warranted by market conditions.

In July, the ECB announced a new Transmission Protection Instrument (TPI), to ensure a smooth transmission of monetary policy across all euro area countries. Under this instrument, the Eurosystem will be able to make secondary market purchases of securities issued in jurisdictions experiencing a deterioration in financing conditions not warranted by country-specific fundamentals, subject to fulfilling criteria to ensure that sustainable fiscal and macroeconomic policies are pursued in these jurisdictions. This instrument underlines the ECB's commitment to act as a backstop in the provision of liquidity in the sovereign debt market, which minimises the occurrence of expectation-driven crises and ensures the singleness of monetary policy, a necessary condition for the fulfilment of the ECB's price stability objective.[6]

4. The natural rate of interest is an unobservable variable which is difficult to estimate accurately. The literature proposes different approaches which do not necessarily coincide as to level but generally agree that a sustained downward path has been followed since the 1980s. For the euro area, the latest estimates point to between -1% and 0%, i.e. somewhat lower than estimated for the United States and the United Kingdom (see Brand, C., Bielecki, M., and Penalver, A. (eds.) (2018). The natural rate of interest: estimates, drivers, and challenges to monetary policy. *ECB Occasional Paper Series , No 217).*
5. On 28 September, the Bank of England announced its intention to carry out temporary purchases of long-dated government bonds (with a residual maturity of more than 20 years) to restore orderly secondary market conditions and contain financial stability risks, while postponing the beginning of sales operations to the end of October.
6. See Cardoso da Costa, J. and Gomes, S. (2021). "Preserving the monetary policy transmission mechanism to achieve price stability", in Abreu, I. and Valle e Azevedo, J. (eds.), Perspectives on the ECB's monetary policy strategy review, Banco de Portugal, July 2021.

Chart C1.3 • Stock of assets purchased for monetary policy purposes in the euro area, US and UK | In percentage of GDP



Sources: European Central Bank, Federal Reserve System and Bank of England (Banco de Portugal calculations). Last observation: 2nd quarter 2022.

Box 2 • The impact of the rise in interest rates on the cost of bank financing for firms

The rising interest rates environment, from extremely low values, should have a material impact on corporate finance strategies associated with the inevitable increase in financing costs. Increases that cannot be absorbed by corporate margins will reduce credit demand, change corporate liquidity management and postpone investment projects. These adjustment mechanisms are justified by the end of the very low interest rate environment, ample liquidity and predictability of price developments that characterised previous years. In order to mitigate the impact of rising interest rates, firms' strategies may include adjusting their funding structure. These strategies must be adapted to the reality of each firm, in particular to their cash holdings to meet loan repayments (helping to reduce their indebtedness) and to the adjustment of liquidity management in light of recent years' practices.

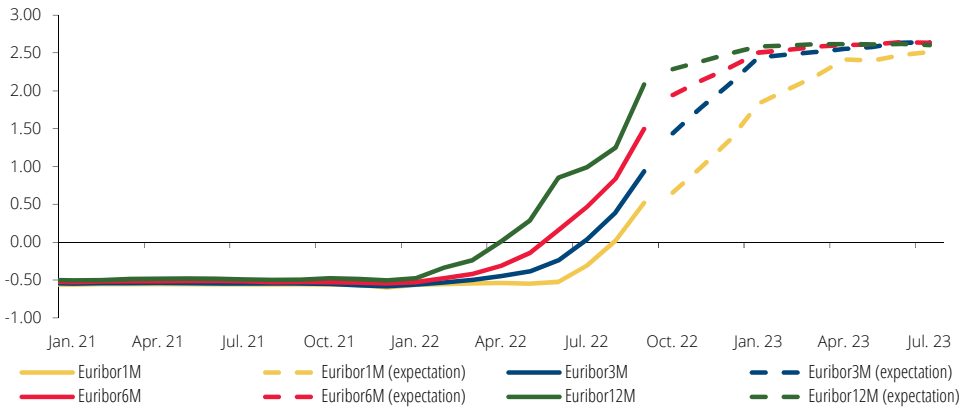
Chart C2.1 illustrates the upward trend in Euribor interest rates since the beginning of the year, and these are the reference rates usually used in bank loans in Portugal. In August, these rates averaged 0.02%, 0.39%, 0.84% and 1.25% for 1-, 3-, 6- and 12-month maturities respectively, compared to levels very close to -0.50% a year earlier. This rise in rates is reflected in the cost of bank lending to firms, both in terms of new loans and of existing loans with a variable or mixed rate, depending on the change in the reference rate and the frequency it is updated.

Over the past few years, interest rates on loans to non-financial corporations have been on a downward trend, reaching historic lows. With the start of monetary policy normalisation, this trend reversed in May 2022 (Chart C2.2). In July, loan interest rates stood at 2.23% (2.63% for new loans), 0.21 p.p. above the historical low recorded in April 2022 (0.78 p.p. for new loans over the same period).

Loan composition by rate type is relevant when assessing the impact of rising interest rates. In July, variable or mixed rate loans accounted for 83% of the overall amount and 61% of the number of loans (Table C2.1 – Panel A). Over the same period, fixed-rate loans represented 15% of the overall amount and 38% of the number of loans. The difference between the number and amount for fixed-rate loans can be explained by the fact that most of these loans are credit cards, current

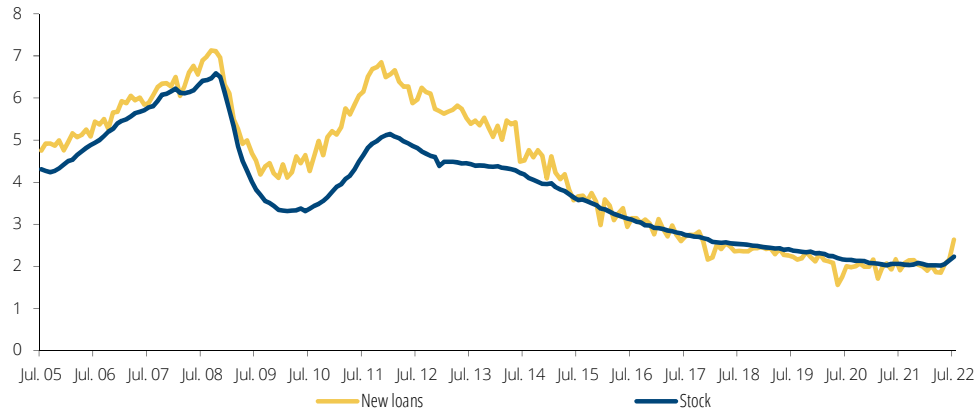
account credit facilities, overdrafts and discounts and on average, have lower amounts compared to the overall average. The residual maturity of fixed-rate loans is also relevant when assessing the time profile of the pass-through of market interest rates to interest rates on new loans. Around 23% of fixed-rate bank loans have a residual maturity of up to 1 year, corresponding to 4% of the overall amount (Table C2.1 – Panel B). The prevalence of variable rate loans and fixed rate short-term loans results in that the increase in money market interest rates tends to be reflected with a short lag in Portuguese firms' funding costs.

Chart C2.1 • Observed and expected Euribor interest rates | Monthly averages, percentage



Source: Refinitiv (Banco de Portugal calculations). | Notes: Expected 3, 6 and 12-month Euribor rates based on interest rates implied in 3-month Euribor futures contracts (Euribor 6M/12M: implied rate in 3M Euribor futures contracts, renewing 2/4 successive futures contracts); Expected 1-month Euribor rate based on Overnight Index Swaps. Last information relative to 09/22/2022.

Chart C2.2 • Interest rate on loans granted by resident banks to firms | Percentage



Source: Banco de Portugal. | Notes: The interest rate is the annualised agreed rate (AAR). The interest rate on new loans is the average of (new) loans granted in the month (flow). The interest rate on the stock is the weighted average of the stock of loans.

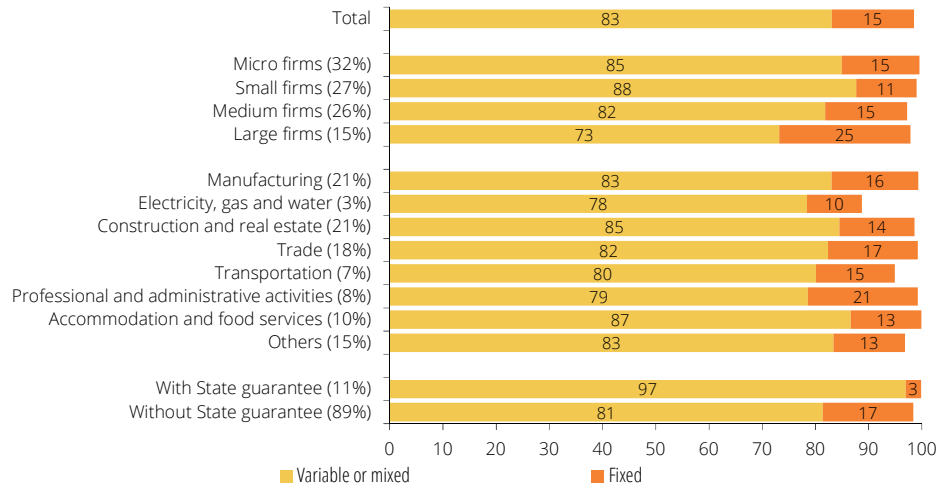
The type of rate shows some heterogeneity according to firms' size and sector of activity (Chart C2.3). The weight of fixed-rate loans tends to be greater in large enterprises and in firms operating in consultancy and administrative activities (25% and 21% of the total segment respectively). State-guaranteed loans granted between 2020 and 2021 are mostly at a variable rate (97%).

Table C2.1 • Type of interest rate on bank loans to firms by product and residual maturity
| Percentage of total amount and number of loans

	Amount	Number
Variable or mixed rate	83	61
of which: by product:		
Current account, overdrafts and discounts	7	8
Factoring and leasing	14	16
Financing to the corporate activity	58	33
Other credits	5	4
of which: by residual maturity:		
Undefined	9	7
Up to 1 year	9	12
From 1 to 5 years	34	32
Over 5 years	31	8
Fixed rate	15	38
of which: by product:		
Credit cards, current account, overdrafts and discounts	3	23
Factoring and leasing	2	6
Financing to the corporate activity	9	3
Other credits	2	7
of which: by residual maturity:		
Undefined	2	19
Up to 1 year	4	7
From 1 to 5 years	5	10
Over 5 years	5	2
Not reported	1	1

Source: Banco de Portugal. | Notes: Central Credit Registry data in July 2022, considering loans granted to non-financial corporations. Totals may not add up due to rounding. There are no credit cards associated with a variable or mixed rate. Variable rate is the interest rate that varies throughout the term of the contract, according to changes in the value of the respective index. Fixed rate is the interest rate agreed and known at the time of contracting, which remains constant throughout the duration of the contract. Mixed rate is the interest rate associated with the loan that combines fixed interest rate period(s) and variable interest rate period(s).

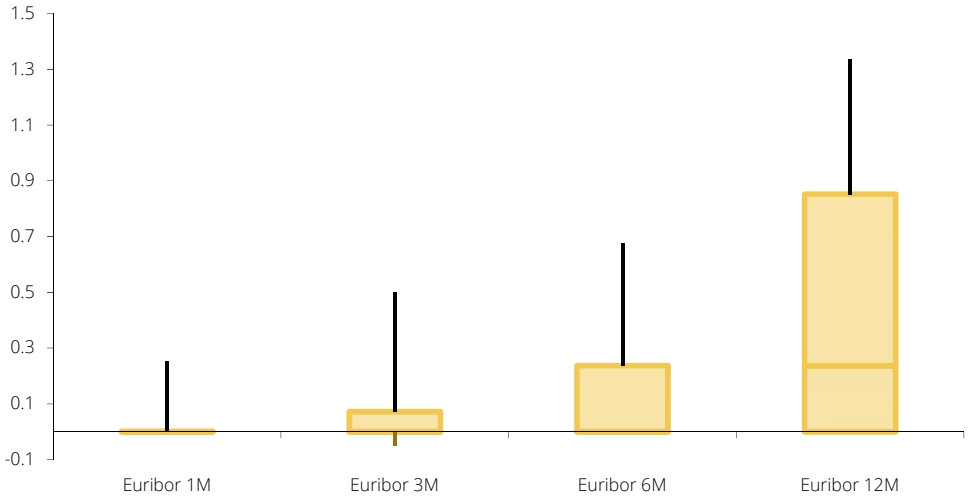
Chart C2.3 • Type of interest rate by firm size and sector of activity and by support measures
| Percentage of the total amount of each segment



Source: Banco de Portugal. | Notes: Central Credit Registry data in July 2022, considering loans granted to non-financial corporations. The percentages in parentheses correspond to the share of each segment for total bank loans. Totals may not add up to 100% when interest rate type is not reported. A State guarantee loan granted between January 2020 and December 2021 is considered as "With State guarantee".

The Euribor is the reference rate for variable or mixed rate loans to non-financial corporations, accounting for 89% of these loans. Of the latter, 43% are indexed to the 12-month Euribor rate, followed by loans indexed to the 6-month Euribor (37%). The frequency that the rate is updated tends to match the maturity of the reference rate. Notwithstanding the high weight of variable or mixed rate loans, the magnitude of the increase in the cost of bank lending to firms has been, to date, lower than that of market interest rates. This may be related to the relatively recent rise in Euribor rates and the time lag with which the Euribor rate is reflected in loan rates, which also depends on the frequency with which the rate is updated. However, the change in the nominal annual rate points to a distribution bias for positive changes, suggesting that loans have already started to incorporate Euribor rises (Chart C2.4). Reference rates with longer maturities that had risen earlier and by a greater magnitude are of particular note and reflect expectations of an increase in ECB interest rates (Chart C2.1).

Chart C2.4 • Distribution of the change in the nominal interest rate according to each index – July 2022 to July 2021 | Percentage points



Source: Banco de Portugal. | Notes: Central Credit Registry data in July 2021 and 2022. It considers loans granted to non-financial corporations by resident banks associated with a variable or mixed rate and indexed to an Euribor rate. In the chart, the rectangle (box) delimits the first and third quartiles, with a horizontal line across the box representing the median. The ends of the vertical lines represent the maximum and minimum.

It is difficult to simulate business strategies in scenarios of major changes in the cost of money. As already mentioned, firms will tend to adapt their cash and funding needs to higher interest rates, reflecting part of that increase in their selling prices, by reducing their exposure to credit where possible, in particular to variable rate loans, and postponing investment projects requiring external resources. The complexity of potential strategies cannot be captured in a simulation, therefore the impact of interest rate increases in the next exercise should be taken as an approximation.

The simulation exercise performed is very stylised and requires two variables only: the level and changes to the interest rate; the amount outstanding at the beginning and at the end of the period (see notes in Table C2.2). Interest rates applied to existing loans to non-financial corporations over the next 12 months (from August 2022 to July 2023) are estimated by using expectations implied by market instruments, in particular in OIS (Overnight Index Swaps) and 3-month Euribor futures (Chart C2.1).

The exercise compares the estimated interest expense over the next 12 months, based on expectations of rising market rates, with interest expenses over the past 12 months (year ending in July 2022). The estimate should be interpreted as a partial approach of the impact of rising interest rates on the financial position of firms, as it does not consider how the increase in interest rates, or the macroeconomic context driving it, may affect other relevant variables for firms and their decision-making.

Table C2.2 • Exercise to simulate the impact of the expected rise in Euribor rates on interest expenses on bank loans | Change in interest expenses between the year ended in July 2023 compared to the year ended in July 2022

	% of estimated anual interest expenses in July 2022	Change in interest expenses | M€	Interest rate change | pp
Loans			
Maturity over 1 year	76	1,007	1.76
of which:			
Variable or mixed rates	64	1,007	2.04
of which indexed to Euribor	58	884	2.04
Fixed rate	11	–	–
Maturity up to 1 year	14	181	1.80
Undefined	11	–	–
Total		1,188	1.58

Source: Banco de Portugal. | Notes: Central Credit Registry data between August 2021 and July 2022. The exercise simulates in a stylized way the potential impact on interest expenses of bank loans based on the following assumptions. It is considered that there are no changes in rates for both fixed rate loans with a residual maturity of more than one year and for loans with indefinite maturities. For the remaining loans, it is considered that there is no amortization of the principal outstanding in the horizon under analysis and that the loan conditions do not change (in particular, the spread remains constant). In loans with a residual maturity of more than one year, at a variable or mixed rate and indexed to a Euribor rate, Euribor futures are used to update the rate at the time of revision. Note that for loans whose update date is not reported, it is assumed that it coincides with the indexed Euribor frequency. For variable or mixed rate loans not indexed to a Euribor rate, the same percentage change in interest rate applies. The rate is revised based on the average Euribor of the previous month and applied to the loan in the month following the revision. Finally, for loans with a maturity of less than one year, it is assumed that they are renewed at the end of the contract and that the rate is updated in a similar way to variable or mixed rate loans. For the data on deposits it is considered the information on the 8 most significant institutions (G8) which represent around 90% of OMFI deposits. Given the availability of information, the rate of change corresponds to the change between December 2019 and March 2022.

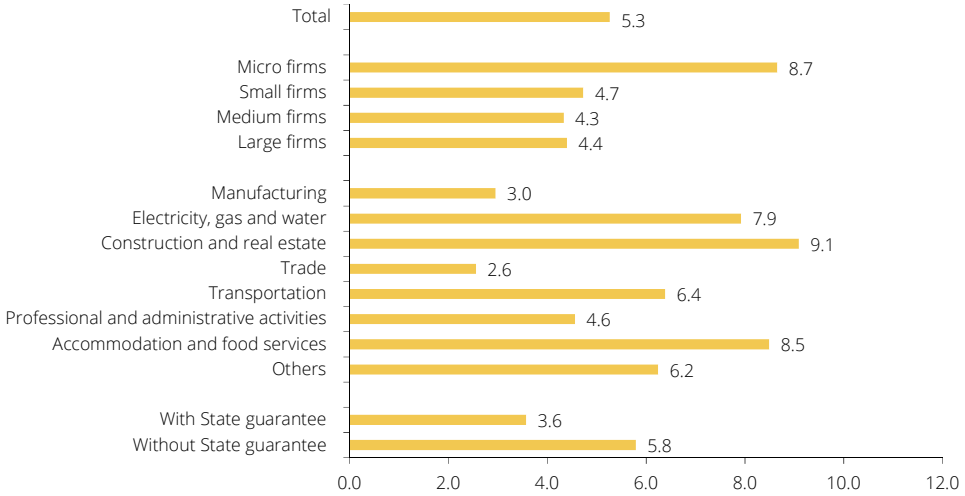
Under the conditions of this exercise, interest costs would increase by about €1,188 million over the year ending in July 2023 compared to estimates for the year ending in July 2022, corresponding to an increase in the implicit interest rate of 1.58 p.p. This interest rate value is similar to that in July 2015. By assuming the same rate change for the overall interest expenses, which includes the cost of funding sources other than bank loans, it implies a cost increase corresponding to 5.3% of 2019 EBITDA (Chart C2.5). The interest to EBITDA ratio would stand between the values registered in 2015 and 2016. By sector of activity, of note are firms in construction and real estate activities (ratio of 9.1%), accommodation and food service activities (8.5%) and electricity, gas and water (7.9%), for which the ratio was already very high compared to the overall figure. This increase is also explained by the relatively higher debt-to-EBITDA ratio in these sectors. The debt-to-EBITDA ratio was also higher in micro firms vis-à-vis the other size classes, which resulted in a higher increase in the interest to EBITDA ratio (8.7%). In contrast, firms with State-guaranteed loans granted between 2020 and 2021, although mostly with variable rate loans, had relatively low debt ratios and the change in their interest to EBITDA ratio is lower than that of the total (3.6%).

The magnitude of the rise in interest rates may lead firms to develop strategies to reduce their indebtedness. Such deleveraging strategies may involve the use of existing deposits to repay bank loans in full or in part. Other strategies that may be considered, such as the use of own funds, cannot

be simulated. In a supplementary simulation exercise, for illustration purposes only, it is assumed that firms use all the increase in deposits from 2019 to repay their loans. Firms repaying their loans in full will pay no interest and those that repay part of their loans will pay interest proportionally to the amount still outstanding. Between December 2019 and March 2022, about 53% of firms with bank loans increased their deposits and 16.7% would be able to fully repay their bank loans with accumulated deposits. However, the repayment corresponds to only 11% of the outstanding debt. If repayments are made in the first month of the beginning of the exercise, a €891 million increase in interest expense is estimated for the year ending July in 2023 (corresponding to 4% of 2019 EBITDA).

The exercises developed in this box focus on the year ending in July 2023. Throughout this period, the amount of interest paid by firms will tend to rise gradually, reaching peak levels at the end of the horizon under review.

Chart C2.5 • Change in total interest expenses as a percentage of EBITDA by firm size and sector of activity and by firms that benefited from Sate guarantees | Percentage points



Source: Banco de Portugal. | Notes: Results obtained based on the simulation exercise. The information for 2019 is used since the 2020 EBITDA is distorted by the impact of the pandemic crisis, and the 2019 data are considered to be more representative of the firms' activity in the current period. The change in the interest rate on the total debt for each segment is assumed to be equal to the simulated change in the rate on bank loans in the respective segment. The variation in EBITDA is considered to be zero.

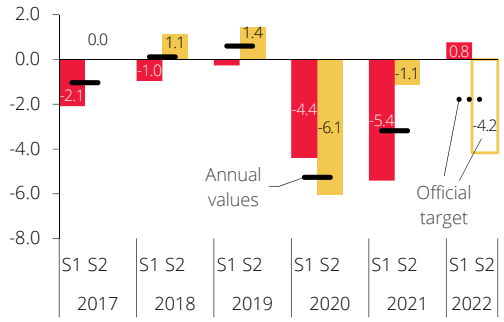
Box 3 • Fiscal developments in 2022

Strong economic recovery and the surge in prices have boosted tax collection, while a significant part of primary expenditure reacts in a lagged manner to inflation and grows in a subdued manner, conditioned by the twelfths system until the 2022 State budget entered into force. Therefore, the current context favours the budget balance and public debt improvement as a percentage of GDP. However, in the medium term, the increase in interest expenditure, the cooling of the economy and the fading out of the higher-than-usual growth of the GDP deflator will make deficit and debt ratio reductions more demanding.

The budget balance in the first half of the year was 0.8% of GDP. Adjusted for temporary measures, this indicator improved by 6.2 p.p. year on year (Chart C3.1). This development was primarily due to the increase in the primary balance (5.6 p.p.), about one-third of which explained by the reduced impact of measures to address the pandemic and the increase in prices (Chart C3.2). The reduction in interest expenditure contributed 0.6 p.p. to this improvement.

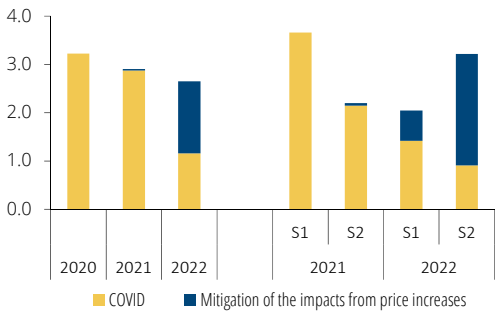
Total revenue increased by 12.4% in the first half of the year, driven by buoyant revenue from taxes and social contributions (16%), partially offset by a decline in other revenue (-4.2%), associated with a lower absorption of European funds. Developments in major taxes and social contributions (increases of 24.8% in VAT, 12.3% in personal income tax and 7.9% in social contributions) were driven by growth in macroeconomic bases and their elasticities, in some cases usually greater than one.[7]

Chart C3.1 • General government budget balance excluding temporary measures
| In percentage of GDP



Sources: Statistics Portugal and Banco de Portugal. | Notes: Figures for each half of the year are in percentage of the GDP of the semester. For 2022, figures consider the official estimate included in the State Budget for 2022, and GDP forecast for the second half of the year from this bulletin. In line with the Eurosystem definition, in the second half of 2022 the impact of a court decision (which deteriorates the balance by 0.1% of GDP) is considered as a temporary measure. For further details on operations considered up to 2021, refer to previous Banco de Portugal publications.

Chart C3.2 • Budgetary impact of measures
| In percentage of GDP



Sources: Ministry of Finance, Statistics Portugal and Banco de Portugal. | Notes: Values corresponding to the magnitude of the measures in each period, net of EU-funds financing. Values for 2022 estimated by Banco de Portugal. Figures for each half-year in percentage of the GDP of the semester.

Current primary expenditure decreased by 1.1%, reflecting a contribution of around -5.1 p.p. from the lower impact of measures to tackle the pandemic, in particular from subsidies to firms. Compensation of employees grew by 3.3%, with a 1.8% increase in the number of civil servants and a 0.9% impact from wage updating, plus the effects of the increase in the minimum wage and career updating and

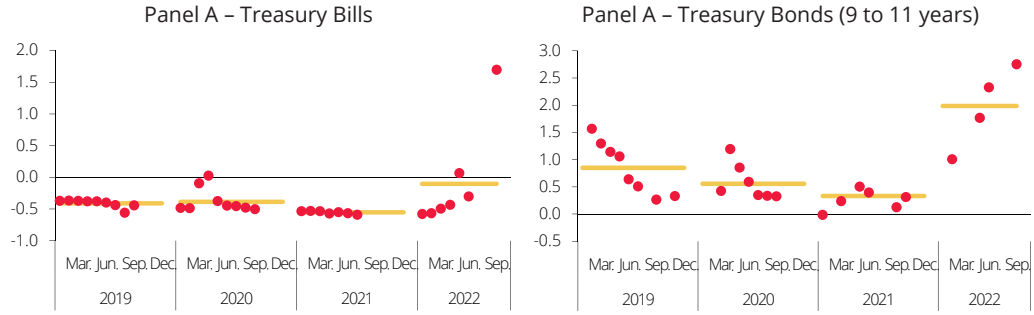
7. For more details on elasticities and macroeconomic bases of revenue from taxes and social contributions in Portugal, see Braz et al. (2019), "The new ESCB methodology for the calculation of cyclically adjusted budget balances: an application to the Portuguese case", *Banco de Portugal Economic Studies, Vol. V, No 2, April 2019.*

upgrading. The growth in intermediate consumption (8%) and social benefits in kind (19%) was partly linked to vaccination against COVID-19 and diagnostic testing. Social benefits in cash grew 1.5%, despite the drop in unemployment benefits expenditure (with a contribution of -1.2 p.p.). The trend in social benefits in the first half of the year does not reflect the increase in prices in 2022, given that the rule for updating pensions and other social support considers inflation until November 2021. This trend also does not reflect measures approved in the 2022 State budget, in particular the extraordinary increase in pensions, nor the large majority of those intended to mitigate the impact of rising prices on households.

Investment maintained its upwards trend (+12.6% in nominal terms), with particular emphasis on the increase of about 50% in the transportation sector. Nevertheless, the Recovery and Resilience Plan (RRP) presented, in the first half of the year, an execution rate rather below the annual estimate in the 2022 State budget, and regular EU funds decreased year on year.

As in most euro area economies, interest rates on Portuguese government debt issues have increased in 2022. In short-term debt, the average interest rate up to September stood at -0.1% (0.4 p.p. more than in 2021), reaching 1.7% in most recent issues (Chart C3.3A). In longer maturities, the rate at which the debt is placed on the market averaged 2%, compared to values close to zero in the previous year (Chart C3.3B). The pass-through of the increase in interest rates on new issues to interest expenditure is gradual, taking into consideration the average residual maturity of debt of around 7.5 years, as well as the implicit interest rate on debt of around 2%. These factors explain the 11.4% decrease in interest expenditure in the first half of the year.

Chart C3.3 • Yields on public debt auctions | In percentage



Source: IGCP. | Note: The horizontal lines correspond to the average yield on public debt auctions in each period, weighted by the respective allotment amounts.

The achievement of the official target for the budget balance outlined in the 2022 State budget (-1.9% of GDP) implies a year-on-year deterioration of 3.0 p.p. in the second half of the year, excluding temporary measures (Chart C3.1). Coupled with pandemic-related costs, the measures to mitigate the effects of price increases have an impact on the 2022 balance that is slightly lower than in 2020 and 2021 — around 3% of GDP (Chart C3.2) — and are more concentrated in the second half of the year. In the context of a favourable background for tax revenue developments, even considering the budgetary impact of these policy measures estimated at around 3.2% of GDP in the second half of the year, there is sufficient margin to meet the official target.

The public debt ratio stood at 123.4% of GDP at the end of the semester, 2.1 p.p. lower than at end-2021. This decline was mainly caused by the denominator effect as the debt stock increased in line with the accumulation of general government deposits. If the 1.9% official target for the budget deficit and the projection for GDP growth presented in this bulletin were to be accomplished, that would lead, in the absence of deficit-debt adjustments, to an 11 p.p. decrease in the debt ratio vis-à-vis the end of 2021, to 114.5% of GDP, the lowest ratio since 2011.

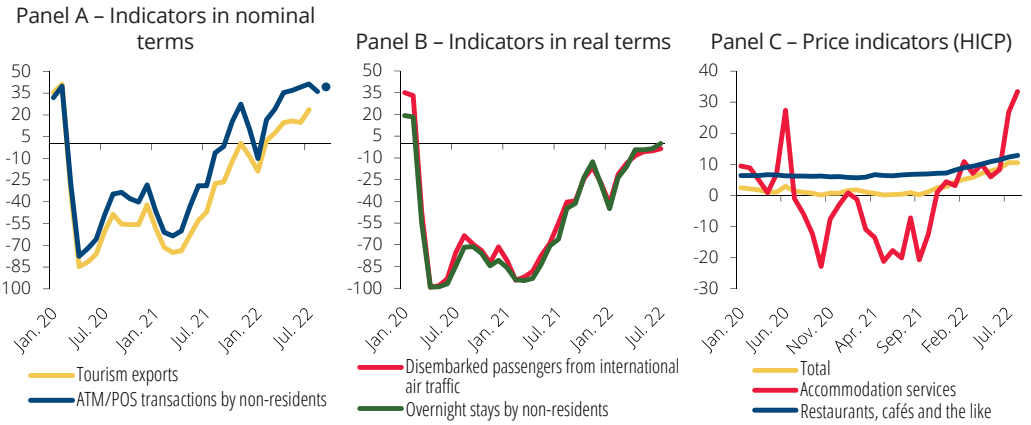
Box 4 • The recovery of tourism exports in 2022

Tourism exports continued to rebound in 2022, to about 4% below pre-pandemic levels, in real terms, in the second quarter. Their share in GDP, relatively high by European standards, dropped from 8.1% in 2019 to 3.7% in 2020, rebounding to 7.9% in the first half of 2022.[8]

This strong recovery was prompted by households' consumption habits returning to normal, as well as by the pent-up demand built-up during the health crisis. Household savings accumulated over the past two years have fuelled this trend.

Foreign tourists' expenditure in Portugal, in July, was around 25% and 40% above pre-pandemic levels[9] respectively, in the case of travel exports in nominal terms and ATM/POS transactions with non-resident cards. This growth is stronger than suggested by volume indicators — as non-resident overnight stays only reached pre-pandemic levels in July — in a context of strong in price increases in the sector (Chart C4.1). In particular, consumer prices for accommodation services grew by 33% above pre-pandemic levels in August 2022 and those of restaurants and cafés by 13%, compared with 10% for total HICP.

Chart C4.1 • Tourism exports – monthly indicators | Triennial rate of change, in percentage



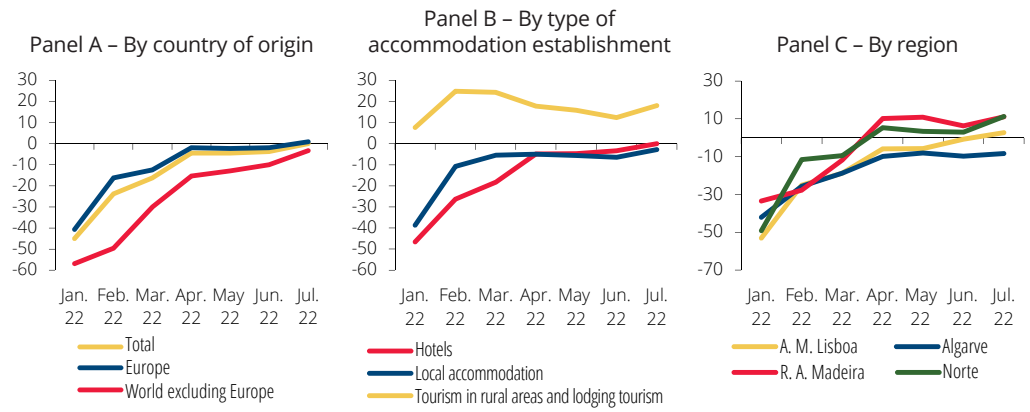
Sources: Banco de Portugal, Eurostat, Statistics Portugal and SIBS. | Notes: In Panel A, the figure for ATM/POS transactions in September is an estimate based on partial information for the month.

Recovery in international tourism has been uneven, by country of origin and by segment of tourism supply (Chart C4.2). Overnight stays in tourism accommodation by non-residents from the nearest European countries, which concentrate the largest share of tourism demand for Portugal — United Kingdom, Germany, Spain, France, Netherlands and Italy accounted for 60% of this tourism in 2019 — have resumed their pre-pandemic values. The same is not true for long-distance markets; in particular Brazil and Asia, where overnight stays in July were still around 30% below the level of the corresponding month of 2019. The USA is an exception, with a number of overnight stays 40% above pre-pandemic levels. Recovery in hotels occurred later, by contrast with accommodation facilities that allow for greater isolation, such as local accommodation and tourism in rural areas and lodging tourism. The Algarve and Área Metropolitana de Lisboa, with the highest share of overnight stays and high population

8. For more details on the importance of the tourism sector, see "The impact of the pandemic on the tourism sector", *Economic Bulletin October* 2020.
9. The pre-pandemic level corresponds to the value of the corresponding month in 2019, as the box refers to non-seasonally-adjusted data.

density in some areas, have also experienced a slower recovery in international demand. In July, the number of overnight stays in Norte and Madeira was around 11% higher than pre-pandemic, while in the Algarve it was still 8% lower. In the Lisbon area, the pre-pandemic level was only reached in July, which may partly reflect its greater exposure to business tourism, a segment where recovery remains highly incomplete. Against this background of ongoing recovery, no assessment can yet be made as to whether these composition changes are structural in nature.

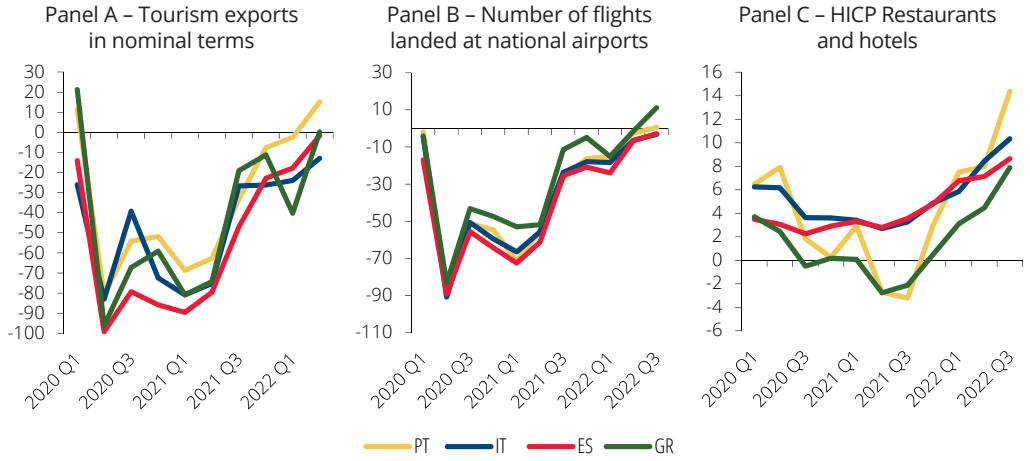
Chart C4.2 • Composition of overnight stays by non-residents in 2022 | Triennial rate of change, in percentage



Source: Statistics Portugal. | Notes: In panel B, the local accommodation indicator refers to establishments with more than 10 beds. In panel C, only the four regions with the highest weight in overnight stays are presented.

The recovery in tourism exports is common to other countries highly exposed to the sector, in particular the Mediterranean countries, direct competitors of Portuguese tourism (Chart C4.3). In the second quarter of 2022, the rate of change for real and price indicators versus the 2019 comparable period was relatively close for the countries under review. Preliminary figures for the third quarter show that the prices of most tourism-related services in Portugal are more buoyant than those of its competitors.

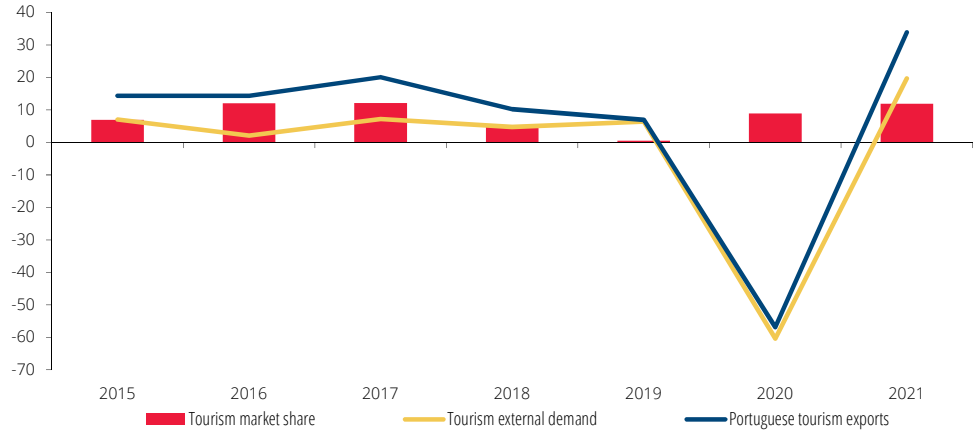
Chart C4.3 • Tourism: international comparison | Triennial rate of change, in percentage



Sources: Eurocontrol and Eurostat. | Note: The figures for 2022 Q3 are an estimate based on the average evolution in July-August.

Over the past two years, tourism exports in Portugal have gained market share in nominal terms, extending the sector's good performance in pre-pandemic years (Chart C4.4). In the first quarter of 2022, available information suggests significant market share gains vis-à-vis the same period in 2019, broad based across countries.

Chart C4.4 • Tourism exports, external demand and market share, in nominal terms | Annual rate of change, in percentage



Sources: Banco de Portugal, Eurostat, IMF and Statistics Portugal (Banco de Portugal calculations). | Notes: Exports refer to the set of countries included in the external demand indicator, which represent on average around 87% of nominal tourism exports in the period presented. Note, however, that the Asian market, which is the farthest one from the pre-pandemic level of overnight stays, is not represented.

The fast recovery in demand has led to some supply side constraints, perceptible for example in the increased percentage of firms in the accommodation sector reporting shortage of labour force as a factor limiting business (to 16% on average in the first three quarters of 2022, up from around 6% in 2019). These supply constraints are not likely to be related to the installed capacity level. The number of tourism establishments in July 2022 was 4% higher than in July 2019. The percentage of those establishments that are closed or with no guest flow has remained slightly above pre-pandemic levels (in July 2022, 12.8% of establishments, compared to 9.8% in July 2019), signalling a latent capacity margin. The net bed-occupancy rate also reached pre-pandemic levels only in July 2022.

The inflation spike and subsequent undermining of real disposable income in the main countries of origin — together with the direct impact of energy prices on transportation costs — will affect tourism developments in the short term. In this sector, the impact of the loss of purchasing power may be greater than for other types of consumption, as consumption of these services is more sensitive to changes in disposable income. In this context, the most recent indicators point to a moderation in the growth rate of travel exports until the end of the year (Chart C4.1).

Nevertheless, market share gains over the past few years suggest the maintenance of key non-price competitiveness factors in Portuguese tourism in the current context, which may justify its resilience, in a market where consumption has a significant loyalty level that stabilises demand. Some segments, such as business or event tourism, may not yet have completed their post-pandemic adjustment process, and are also a potential dynamic factor for tourism exports.

Box 5 • Developments in e-commerce prices of a basket of basic food products

The recent economic situation has been characterised by a strong and generalised increase in the price of goods and services, albeit more pronounced in energy and food. These goods are essential, and demand for them is therefore not very sensitive to price changes, which may cause hardships to lower-income households. Under these conditions, monitoring the cost of a basket of basic food items that meets basic individual needs increases the level of information available to consumers. It also helps to promote transparency and coordination in the functioning of markets in contexts of greater uncertainty and in situations of market power concentration in the value chain, which is common in the case of food products.

The box shows recent trends in the cost of purchasing a basket of foodstuffs — corresponding to the basic needs of individuals of different ages — based on prices set on online platforms of major food retailers operating in Portugal. The analysis shows a very significant price dispersion, even in narrowly defined markets. The cost of baskets made up of the highest priced variety of products is approximately two and a half times higher than that of baskets made up of the lowest priced varieties. Between October 2021 and August 2022 — a period when prices are available — the average growth in the cost of the basket was around 15%, with some products varying more than 20% in price and others showing negative price changes.

Computing the acquisition price of the basic food basket requires two pieces of information. The first is the identification of specific products and recommended consumption quantities, based on the food basket of the Operational Programme to Support the Most Deprived People, published by the Directorate-General for Health and drawn up in the National Programme for the Promotion of Healthy Eating. A basket made up of 25 products was considered and the recommended monthly consumption quantities are typified by age group: children (2 and 9 years), teenagers (14 years), adults (+-40 years) and the elderly (over 60 years) (Table C5.1). Given that the recommended quantities for the elderly are close to those for adults and that 9-year old children consume quantities that are between those of 2-year olds and teenagers, the results for these types of individuals are not presented.

The second piece of information required is the price of these food products, obtained from prices displayed on online platforms of major food retailers operating in Portugal. The Banco de Portugal collected these data on a daily basis by using a webscraping procedure. Data collected became available in a harmonised manner from the end of September 2021 onwards, just before the outbreak of price hikes. Although the products contained in the basket are well specified in terms of their features, there are different varieties available in each retailer. This stems from the existence of different ranges and brands, some of which exclusive to the retailer, which gives rise to a price distribution for each product. This analysis considers prices per litre or kilo. Prices tend to be strongly affected by marketing campaigns, but this tends to be diluted on a monthly basis and across retailers. Online prices may differ from in-store prices, even beyond home delivery charges.

Between October 2021 and August 2022 price developments were significantly different for each of the products in the basket (Chart C5.1). Increases in cereals and meat were high on average, in many cases exceeding 20%. Dairy products and vegetables registered smaller increases over this period, but still above 10%. Note that some of the products with the highest price increases are those towards which demand is geared in periods of economic distress, because they are substitutes within their class.

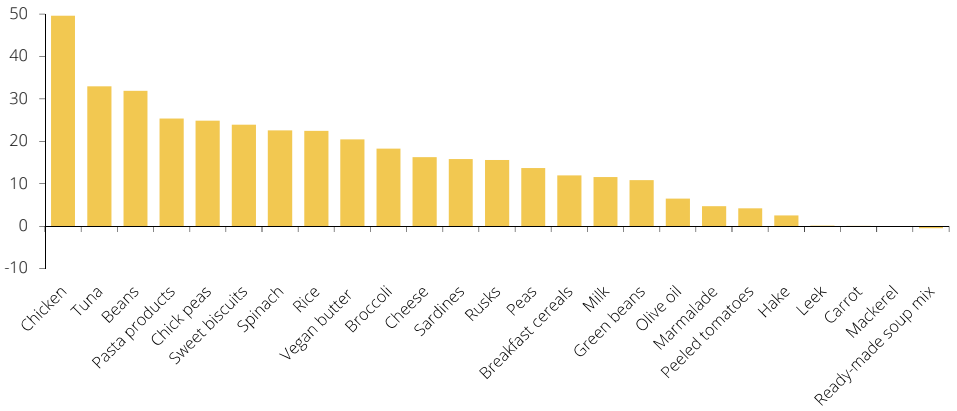
The cost of the basic food consumption basket was calculated for average, median and 10th and 90th percentile prices. The 10th and 90th percentiles reflect the cost of consumer basket in scenarios where individuals systematically purchase the cheapest or most expensive products, both in terms of product range and retailers. In cumulative terms, over the period October 2021 to August 2022, the average growth in the basket price was around 15% for the different age groups.

Table C5.1 • Recommended monthly consumption quantities by age group

Product	Unit	+-40 years	>60 years	2 years	9 years	14 years
Milk	liter	11.3	11.3	11.3	15	15
Cheese	kg	1.4	1.4	1.4	1.4	1.4
Rice	kg	3.7	3.7	2.1	2.1	3.7
Pasta products	kg	3.1	3.1	2.1	2.1	3.7
Breakfast cereals	kg	1	0	1.8	1	1
Rusks	kg	0.45	0.45	0	0.45	0.45
Sweet biscuits	kg	0.8	0.8	0	0.8	0.8
Beans	kg	1.6	1.6	1.6	1.6	2.4
Chick peas	kg	1.6	1.6	1.6	1.6	2.4
Peas	kg	0.8	0.8	0	0.8	1.6
Chicken	kg	1.9	1.9	1	1.9	1.9
Hake	kg	1.2	1.2	0.85	1.2	1.2
Tuna	kg	1.2	1.2	0	0.495	1.2
Sardines	kg	0.6	0.6	0	0	0.6
Mackerel	kg	0.6	0.6	0	0	0.6
Peeled tomatoes	kg	0.78	0.78	0.78	0.78	0.78
Ready-made soup mix	kg	2	2	2	2	2
Broccoli	kg	2	2	2	2	2
Spinach	kg	1.5	1.5	1.5	1.5	1.5
Green beans	kg	1.5	1.5	1.5	1.5	1.5
Carrot	kg	1.5	1.5	1.5	1.5	1.5
Leek	kg	1.5	1.5	1.5	1.5	1.5
Olive oil	liter	0.75	0.75	0.3	0.5	0.75
Vegan butter	kg	0.225	0.225	0	0.225	0.225
Marmalade	kg	0.3	0.3	0	0.3	0.3

Source: Directorate-General for Health. | Note: The product pairs "sardines-mackerel", "ready-made soup mix-broccoli", "spinach-green beans" and "carrot-leek" are identified as substitutes. In the analysis, it was assumed the consumption of half of the quantities originally indicated for each of the products in each pair, which gave rise to the information shown in the table. The consumption of fresh fruits was not considered due to comparison difficulties.

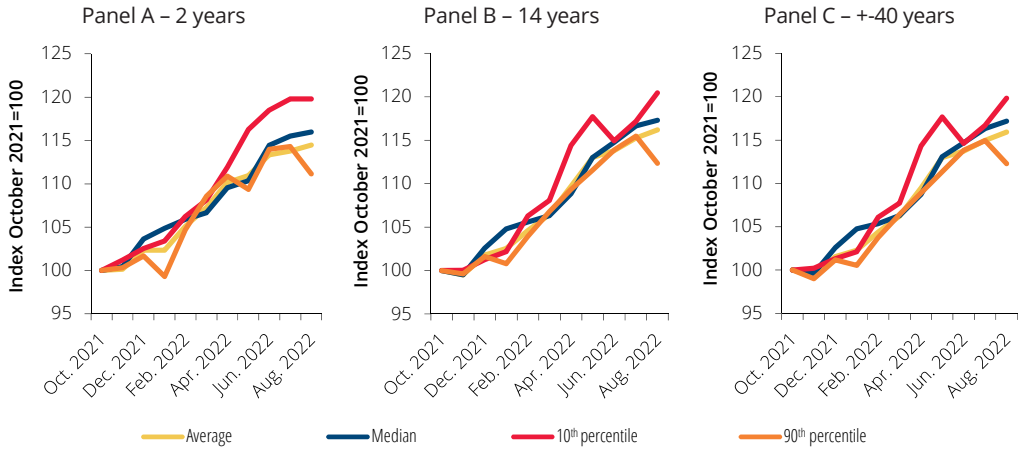
Chart C5.1 • Accumulated change in average prices of the products in the basic food basket between October 2021 and August 2022 | In percentage



Source: Banco de Portugal.

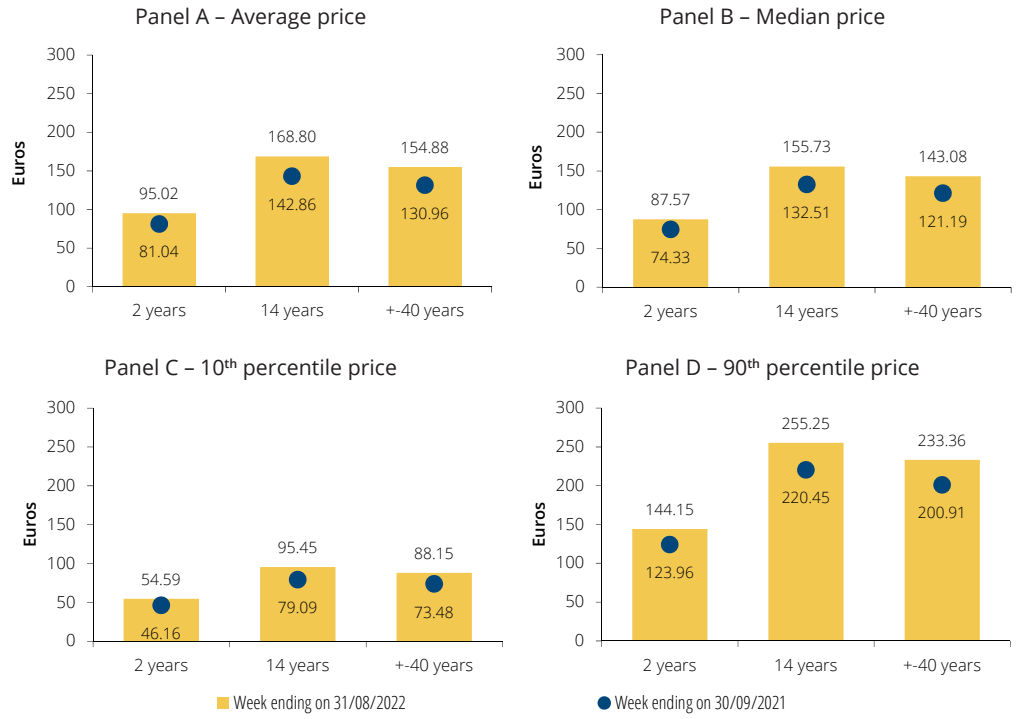
Considering the average prices for the week ending 31 August 2022, the value of the basket was higher for the teenagers' group (€168.80) and lower for two-year-olds' (€95.02) (Chart C5.3). An adult consumer basket has an intermediate average value of €154.88. This pattern is also evident when considering the median and the 10th and 90th price percentiles. The cost of baskets made up of the highest priced variety of products is approximately two and a half times higher than that of baskets made up of the lowest priced varieties. The change in the average value of basic consumer baskets for 2-year-old children, teenagers and adults between the weeks ending 30 September 2021 and 31 August 2022 was €13.98, €25.94 and €23.92 respectively.

Chart C5.2 • Accumulated price change of the basic food consumption basket by age group between October 2021 and August 2022 | Index October 2021=100



Source: Banco de Portugal.

Chart C5.3 • Price of the basic food consumption basket by age group | In euros



Source: Banco de Portugal.

The evidence provided highlights the importance of market price information for optimal consumer choices in a context of budget constraints. Maximising consumer surplus, defined as the fraction of welfare generated in a market that accrues to the consumer, requires the existence of informed agents that react to price changes so as to capture a larger share of that surplus. A different price trend for a similar good and the price dispersion in the market point towards potential gains from using this information.

Box 6 • Inflation estimates by income level and age group

The recent inflation hike may have an uneven impact on households, reflecting different price developments for the various goods and services and their weight in each household's consumption basket. Inflation estimates by household characteristics shown in this box are relevant for assessing the distributional effects of price increases and may be useful to inform public policies aimed at mitigating cost-of-living increases.

Inflation measured by changes in the Consumer Price Index (CPI) is a comprehensive measure of changes in prices of goods and services commonly consumed by households, based on the average expenditure structure of the population.[10] However, this indicator may not be representative of the inflation rate experienced by specific households, as each household has a unique consumption profile that mirrors its characteristics, life circumstances or preferences. Micro-data from the 2015 Household Budget Survey (HBS) unveils sharp differences in the weights of CPI expenditure classes for households with different income levels and age group (Chart C6.1).

Table C6.1 • Household's expenditure composition by disposable income quintile and age group | In percentage of the total household's expenditure

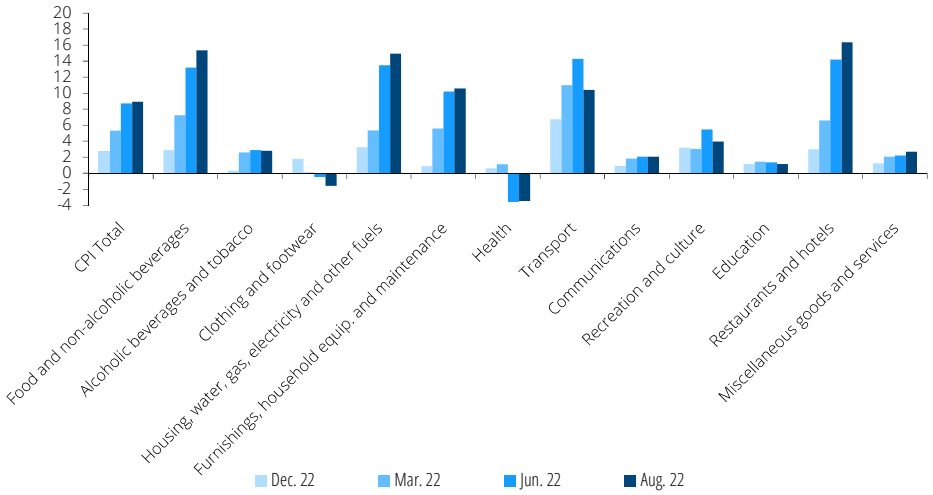
	Food and non-alcoh. bever.	Alcohol. bever. and tobacco	Clothing and footw.	Housing, water, gas, elect. and other fuels	Furnish., household equip. and maintenan.	Health	Transp.	Communi.	Recreat. and culture	Educat.	Restaur. and hotels	Miscellan. goods and services
	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12
Disposable income quintile												
Q1	21.7	2.6	2.8	22.8	4.3	9.7	13.6	5.0	3.5	1.6	4.3	8.0
Q2	21.1	2.1	3.4	20.1	4.1	8.8	16.1	4.7	4.0	1.8	5.1	8.7
Q3	19.2	2.1	3.9	17.7	4.6	8.0	17.5	4.6	4.6	2.2	6.7	8.9
Q4	18.0	2.1	4.5	14.9	5.0	7.6	18.6	4.4	5.5	2.5	7.9	9.0
Q5	14.2	1.6	5.3	12.3	7.0	6.6	19.6	3.4	6.9	3.1	10.6	9.4
Age group												
Age ≤ 34	21.7	2.6	2.8	22.8	4.3	9.7	13.6	5.0	3.5	1.6	4.3	8.0
34 < age ≤ 44	21.1	2.1	3.4	20.1	4.1	8.8	16.1	4.7	4.0	1.8	5.1	8.7
44 < age ≤ 54	19.2	2.1	3.9	17.7	4.6	8.0	17.5	4.6	4.6	2.2	6.7	8.9
54 < age ≤ 64	18.0	2.1	4.5	14.9	5.0	7.6	18.6	4.4	5.5	2.5	7.9	9.0
Age ≥ 65	14.2	1.6	5.3	12.3	7.0	6.6	19.6	3.4	6.9	3.1	10.6	9.4
Total	17.8	2.0	4.3	16.2	5.4	7.8	17.8	4.2	5.3	2.5	7.8	9.0

Sources: Statistics Portugal – Household Budget Survey 2015 (Banco de Portugal's calculations). | Notes: The values presented correspond to the monetary expenditure (per equivalent adult) by monetary income quintile and by household respondant age group. The monetary expenditure excludes self-consumption, self-supply, owner-occupied housing or notional rents (estimated value of housing rent when the household is owner or has free accommodation), wages paid in goods and other non-monetary transfers. Expenditure values correspond to household and adult equivalent data. Adult equivalent values are calculated based in the modified OECD equivalence scale, which gives a weight of 1.0 to the first adult in the household, 0.5 to the other adults and 0.3 to each child (individuals with less than 14 years old).

10. CPI weights are obtained from the Household Budget Survey, carried out by Statistics Portugal every five years and updated on an annual basis using data from National Accounts and other sources. The CPI was used as it represents the consumption structure of the population living in Portugal, while the HICP covers the consumption structure in the country (therefore including tourists).

The inflation hike in 2022 reflected stronger price increases in CPI classes where the greatest differences in household spending structure are concentrated (Chart C6.1). The main categories are "food and non-alcoholic beverages", "housing, water, electricity and gas", "transport" (which includes petrol and diesel but also the purchase of motor vehicles and the costs of the different types of public transport) and "restaurants and hotels".

Chart C6.1 • CPI – total and classes | Year-on-year rate of change, as a percentage



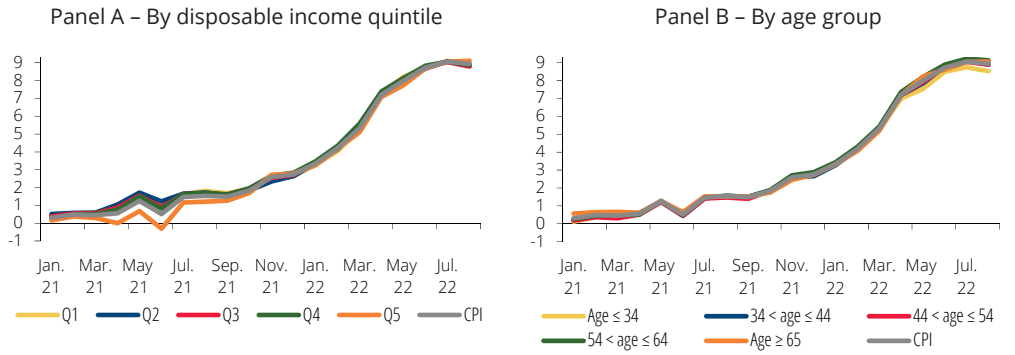
Source: Statistics Portugal.

This box presents inflation estimates for different households by quintile of disposable income per equivalent adult and by age group of the head of household. These estimates were obtained by using the expenditure structure calculated based on micro-data from the Household Budget Survey, i.e. the weights of the different goods and services in each household's total expenditure. These weights were updated to replicate the most recent CPI structure, by adjusting the information from different households in a proportionate manner. Inflation estimates by disposable income quintile and by age group result from multiplying these weights by the price changes in the 225 CPI items at the COICOP 4 level. Estimates presented must be seen as indicative of changes in the cost of living across different types of households. However, as with the CPI, these estimates do not track any change in expenditure composition in response to relative price changes, which are likely in a context of high inflation such as the current one.

In the first eight months of 2022, inflation estimates for the various household groups are quite similar (Chart C6.2). However, the classes of goods and services whose price changes trigger inflation dynamics are very different for each group.

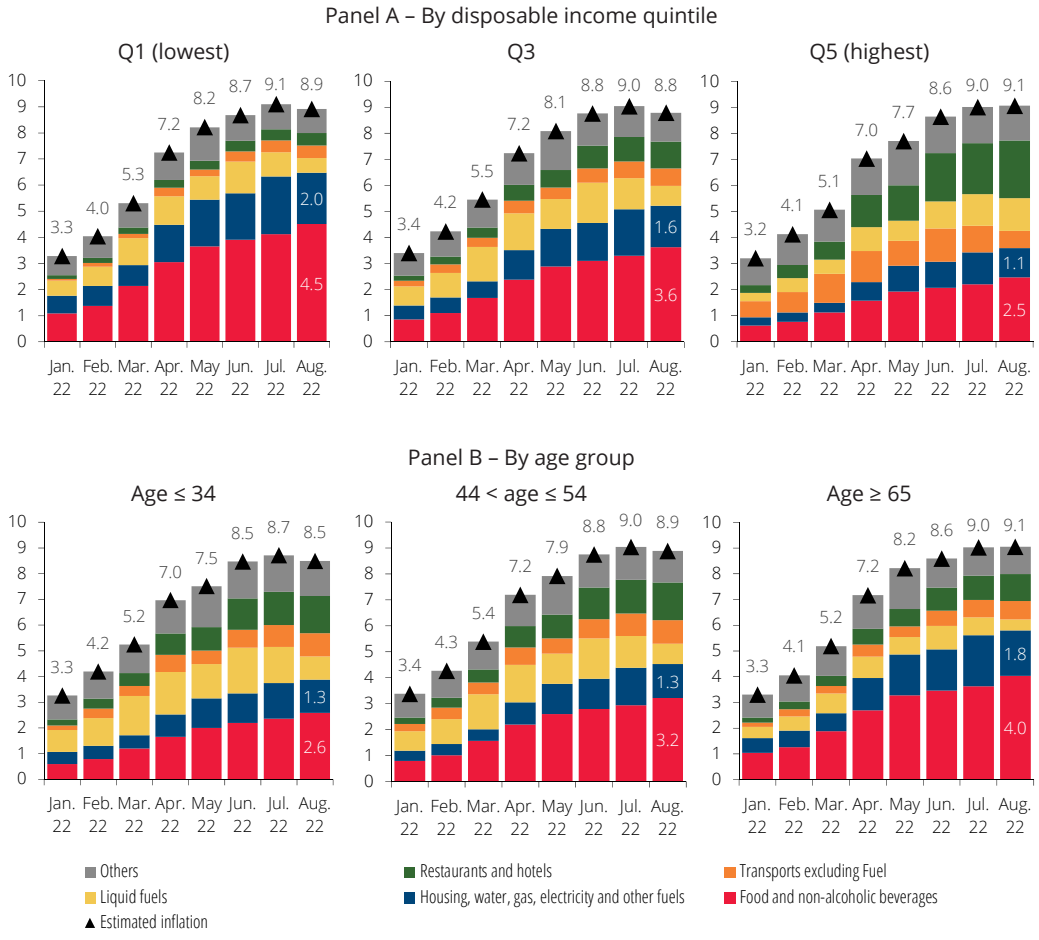
In the case of households in the lowest disposable income quintile, estimated inflation is largely the result of price increases in essential goods and services. The contribution of food and housing costs (where energy is included) explains 73% of the change in the cost of living of these households in August 2022 (Chart C6.3). By contrast, for the highest disposable income quintile, the contribution of price changes of these essential goods for estimated inflation stood at 40%, while the contribution of rising prices in restaurants and hotels represents almost 25%. Despite the weight of expenditure on petrol and diesel not differing significantly across income levels, households in the intermediate disposable income quintiles are slightly more affected by price increases in these goods. Other expenses included in transport, in particular the purchase of motor vehicles, weight more heavily in higher-income household spending.

Chart C6.2 • Estimated inflation by disposable income quintile and age group | Year-on-year rate of change, as a percentage



Source: Banco de Portugal calculations. | Notes: Inflation estimates for the different groups of households were calculated using the expenditure structure using HBS – 2015 microdata. The weights used resulted of a proportional adjustment of the HBS weights and the recent CPI weights. The estimates use information of the price changes of the 225 CPI items at a COICOP 4 level.

Chart C6.3 • Estimated inflation for selected disposable income quintiles and age groups – contribution of main goods and services classes | Year-on-year rate of change, as a percentage, and contributions, as pp



Source: Banco de Portugal calculations. | Notes: Inflation estimates for the different groups of households were calculated using the expenditure structure using HBS – 2015 microdata. The weights used resulted of a proportional adjustment of the HBS weights and the recent CPI weights. The estimates use information of the price changes of the 225 CPI items at a COICOP 4 level.

By age bracket, inflation estimates up to August 2022 are also similar — differences vis-à-vis CPI changes do not exceed 0.5 p.p. — but they are associated with different contributions by class of goods/services. Contributions from prices of food and housing, water, electricity and gas rise with the age of the head of household (Chart C6.3). The contribution of these essential goods to estimated inflation in August is 46% in young households, rising to 64% in older households. By contrast, the contribution of fuel (and other transport costs) is lower for the age group 65 and over.

The fact that the high inflation estimated for lower-income households results predominantly from price developments in essential goods, with inelastic demand, has more severe implications than the same inflation for higher-income households, which reflects a higher contribution of goods and services for which consumption can be more easily replaced or postponed. Besides these composition effects, in the presence of a negative shock to their purchasing power, lower-income households are less able to smooth consumption, as their savings rate and wealth are lower.

II Special issues

Distributional effects on households of recent economic developments

Accumulation of production factors by Portuguese firms

Distributional effects on households of recent economic developments[1]

Introduction

The Portuguese economy is experiencing an overlapping of economic shocks of considerable magnitude. The economic recovery in the post-pandemic environment and the invasion of Ukraine have caused a spike in inflation at a global level, which has caused major central banks to start a cycle of rising interest rates. This combination of events has a differentiated impact on households, depending on their socioeconomic characteristics. This Special issue aims to analyse the heterogeneity underlying the evolution of income and wealth of Portuguese households in the first half of 2022 based on a simulation exercise. This analysis is important for understanding developments in the economy, as well as for the design and evaluation of policy responses.

Households are broken down by wealth quintiles,[2] income quintiles, education and work status. This analysis combines information on recent developments in the labour market, bank interest rates, fiscal policy measures, asset prices and inflation and relates it with developments in the income and wealth of different household groups, both in nominal and real terms.

Household disposable income is estimated to increase by 5.1% year on year in the first half of the year. Labour income accounts for 4.4 p.p. of this change. Growth in disposable income shows a downward profile with wealth and, mainly, with disposable income per equivalent adult. This means inequality in income distribution has been reduced. Households in the first income quintile, with only 6.8% of aggregate income overall, show much stronger growth in their disposable income than the other quintiles.

As for wealth, simulation results point to a 12.1% increase. The increase in wealth was driven by a 10.9% positive valuation of assets and 1.3% of debt. The significant increase in assets value is common to all groups considered and mainly reflects a buoyant real estate market and a high weight of real estate in total assets.

This is a necessarily partial exercise that makes no assessment of what would happen if alternative measures were adopted, usually referred to as the counterfactual scenario. It is therefore not intended to assess the optimality of policies adopted.

Moreover, it is important to recognise that some databases, due to their structural nature, do not always reflect the most recent reality of the Portuguese economy. This calls for the adoption of assumptions that affect the ability to fully capture the different paths of economic agents.

1. Prepared by Nuno Alves, João Amador, Sónia Costa, Luísa Farinha, Carlos Melo Gouveia, Cristina Manteu, Fernando Martins, Luís Martins, Sara Riscado, Domingos Seward and Lara Wemans.
2. Quintiles of a variable consist of five groups each with 20% of households sorted by the values of that variable. For example, the first quintile of net wealth includes the set of 20% of households with the lowest net wealth values, i.e. households with a net wealth value below the 20th percentile. Percentiles divide the population into 100 equal groups in ascending order of data.

The exercise presented here was developed for the first half of 2022. In accordance with projections published in this *Economic Bulletin*, the second half of the year will be characterised, in comparative terms, by lower job creation, higher inflation, higher interest rates and fiscal transfers targeted at larger households, and within a different scope than usual.[3] Therefore, results now reported cannot be extrapolated to 2022 as a whole.

Architecture of the exercise

This Special issue assesses how major changes in the economy have affected the disposable income and wealth of different types of households in the first half of 2022. Given the lack of information on developments in income and wealth distribution over this period, a simulation exercise was performed. To this end, having information on the characteristics of households and household members is key, together with information on the various income and wealth components.

The 2020 Portuguese Household Finance and Consumption Survey (ISFF), which is the latest edition available, was the anchor for this exercise. Note that income data are from 2019 and wealth data refer to the time of the interview (between October 2020 and February 2021). Data used should preferably refer to the year 2021, the starting point for the simulation exercise. The use of data for an earlier period does not, however, preclude the conclusions obtained since differences in income and wealth composition across different types of households are structural in nature. The results obtained with the ISFF sample are extrapolated to all households residing in Portugal.

In the exercise performed, each income and wealth component varies per household or individual, in magnitudes that reflect the information available in the first half of 2021 and 2022. The calibration is based on information from several sources and, where possible, it considers the characteristics of households or individuals. In this context, microeconomic data from the Labour Force Survey, the Household Expenditure Survey (IDEF) and the Survey on Income and Living Conditions (EU-SILC) were used, as well as other data published by Statistics Portugal and the Banco de Portugal.

The exercise was based on a few simplifying assumptions. First, changes arising from the passage of time only were ignored. In the case of income, this means that changes in the labour market associated with ageing are not included, i.e. it was considered that there are no workers who retire or students who join the labour force. In the case of wealth, changes in real assets value due to depreciation were not considered, nor were changes in outstanding amounts of debt due to principal repayments. Second, it was considered that individuals did not make decisions on the composition of their assets and liabilities. Thus, in most cases, changes in the assets value, liabilities and their associated income and costs only reflect changes in prices and not in quantities. There are exceptions. In the case of the labour market, given the increase of around 3% in employment in the period under review, transitions between employment, unemployment and inactivity were considered. In the case of public transfers (excluding pensions and unemployment benefits), the reduction in State spending, as a result of the decrease in the number of eligible households in a context of favourable labour market developments, was considered. The simplifying assumptions contribute to the fact that results obtained do not accurately reflect the changes observed in macroeconomic data.

3. The increase in fiscal transfers in the second half of the year will be associated, inter alia, with the implementation of "Families First" package, presented at the beginning of September.

Heterogeneity in the evolution of real household disposable income

For simulation purposes, the disposable income of each household was broken down by employee income, self-employment income, pensions paid by public social protection schemes and private pension plans, unemployment benefits, other benefits from the public sector, regular private transfers, real estate income (including imputed rents), income from financial investment (broken down by interest received and other), interest paid, business income, and from other sources reported by the household (e.g. severance payments).

Changes in labour market-related income

To simulate the changes in labour market-related income, all individuals aged 16 years, or more, were classified in one of the following categories: employees, self-employed, unemployed, retirees, students, other inactive individuals aged between 18 and 65 years and other inactive individuals. These classifications were made taking into account the main source of income of individuals reported in the ISFF. This means that all individuals classified as workers reported labour income and all the retirees reported pension income. The unemployed include individuals who reported unemployment benefits and those who classified themselves as unemployed. Finally, the remaining inactive individuals correspond to individuals who did not report any of these income sources, and they were considered to be students where they classified themselves as such.

Changes in employees' net wages were obtained based on Labour Force Survey micro-data, which is available until the second quarter of 2022, and allow for the implementation of a differentiated calibration in accordance with individuals' characteristics. The year-on-year rates of change in net wages in the first and second quarters of 2022 were calculated for each of the employees in the Labour Force Survey. Subsequently, individuals were classified by age cohort (16-24 years, 25-34 years, 35-54 years and 55 years or over) and within each age cohort by education (lower than secondary education, secondary education and tertiary education). In each of the 12 groups, the average of the year-on-year rates of change in the first and second quarters of 2022 was calculated. In this calculation, extreme values of individual year-on-year rates of change were excluded. The average rates of change obtained were used to update the wages of employees of the same age and education group in the ISFF sample. These rates have a downward profile by both age and education, ranging from around 8.5% in the two lowest age cohorts and below secondary education to 4.5% in the two highest age cohorts and tertiary education. The downward profile of wage changes with schooling is in line with the fact that there is a significant percentage of individuals receiving the minimum wage with lower schooling and that the updating of the minimum wage was higher than the increase in average earnings per worker in the economy.

For the self-employed, information regarding compensation is scarcer and there are no microdata on the evolution of this income in 2022. In this case, the aggregate of operating surplus/mixed income (excluding housing rents) divided by the number of self-employed workers, obtained based on National Accounts data, was assumed as a proxy for income per worker. Self-employed compensation was updated based on the year-on-year rate of change in the first half of 2022 (4%).

In addition to changes associated with variations in income per individual, labour market dynamics were also considered. In particular, transitions between employment, unemployment and inactivity reported in the Labour Force Survey microdata were taken into account. For each of the twelve age and education groups, the year-on-year transitions in the first and second quarters of 2022 were calculated between employment and unemployment, employment and inactivity and unemployment

and inactivity, considering a concept of inactivity that excludes retirees and students. The average of these transitions, as a percentage of the number of individuals in the starting group, was randomly applied to the ISFF sample, for the corresponding age/education/labour market status groups. In the case of the inactive, the selection of individuals to move into unemployment or employment was made only in the group of the other inactive individuals (inactive excluding students and retirees) aged 18-65. Data used implies a year-on-year increase in the number of employed persons by 2.4% and decreases in the number of unemployed and inactive persons by 14.4% and 12.6% respectively. The percentage of unemployed or inactive individuals moving into employment is much higher in the two youngest age groups than in the others, and in these age groups it is cross-cutting to the different education levels.

Transitions have an impact on income. When individuals move from unemployment to employment they are assumed to cease receiving unemployment benefits. These individuals, as well as those who move from inactivity to employment, start receiving as labour compensation the median labour compensation in the first half of 2022 (income reported in the ISFF, updated with the compensation shock described above). The use of the median allows to take into account that entry-level wages are typically lower than average wages. The median values were calculated for each of the 12 age/education groups and differentiating between labour income for employees and self-employed workers. For each person moving into employment, an 85% probability is assumed that this transition occurs for employees and a 15% probability for self-employed, in line with the employment structure.

Conversely, when individuals move from employment to unemployment or inactivity they are deemed to no longer receive labour income.

Individuals who become unemployed are considered to have a certain probability of receiving unemployment benefits. Individuals who were employees before becoming unemployed are considered to have a higher probability of receiving unemployment benefits than those who were self-employed (60% versus 35%, as outlined in the Labour Force Survey). The unemployment benefit is assumed to be 65% of labour income, in line with prevailing rules, and the amount received is within the limits set for this benefit.

Finally, individuals moving from unemployment to inactivity will no longer receive unemployment benefits and individuals moving from inactivity to unemployment will see no change in their income.

Table 1 presents the estimated year-on-year changes in net labour income and unemployment benefits received by households in the first half of 2022. Households were grouped in accordance with their features at the starting point of the exercise. The groups considered are the quintiles of disposable income per equivalent adult (i.e. adjusted for household composition),[4] wealth quintiles and classes of education and work status of the reference person.[5] [6]

Net labour income increased by 7.2%, showing a positive change in all groups. The strongest increases occurred in households in the lowest income and wealth classes in 2021, as well as in those where

4. Household disposable income was divided by the number of equivalent adults in each household according to the OECD-modified equivalence scale, which assigns a weight of 1 to the first adult in the household, 0.5 to the remaining adults and 0.3 to each child.
5. The reference person was selected among household members according to Canberra definition (United Nations, 2011). In most cases it corresponds to the person with the highest income in the household.
6. In this Special issue results are not displayed by age classes for two reasons. First, the 2020 ISFF underwent methodology changes due to the pandemic, which mainly resulted in a lower representativeness by age group. Second, the simplifying assumptions adopted in this exercise, in particular the exclusion of movements in the labour market associated with the entry of students and the exit of retired workers, make the results by age different from those observed in reality.

the reference person had a lower level of education or was unemployed or inactive. In these groups, a higher share of individuals without employment is typical, which explains why they have larger income increases when employment increases. In fact, when labour market transitions are not considered, the increase in labour income is smaller (5.5%) and less heterogeneous across the different groups of households (column 2 of Table 1). These results still show larger increases in labour income in lower classes of disposable income and wealth than in higher classes. This largely stems from the fact that there is a positive correlation of income and wealth with education and age and that wage increases have been higher in the lower education classes and at younger ages.

The uptrend in the labour market accounts for the 10.6% decline in the aggregate amount of unemployment benefits. This decrease is common to all groups and is overall more significant in groups with a higher share of households receiving unemployment benefits in the baseline period. Households with a member receiving unemployment benefits are more concentrated in the lowest or intermediate income and wealth classes, while the share of households receiving labour income increases with wealth and income.

Table 1 • Evolution of labour income and unemployment benefits | Percentage

	yoy rate of change in the first half of 2022			Memo (data in the base period)			
	Labour income	Labour income (without transitions in the labour market)	Unemployment benefits	Weight of the households receiving labour income in each class	Weight of the households receiving unemployment benefits in each class	Weight of labour income in disposable income	Weight of unemployment benefits in disposable income
Total	7.2	5.5	-10.6	68.1	5.9	61.4	0.9
Net wealth percentile							
<=20	10.7	6.3	-11.8	55.4	6.3	58.5	1.5
20-40	7.1	5.7	-11.2	66.8	6.1	69.2	1.2
40-60	7.3	5.7	-13.2	69.4	7.0	62.7	1.2
60-80	7.3	5.5	-10.7	71.2	5.4	62.5	0.9
>80	6.0	4.9	-6.1	77.9	4.5	57.3	0.5
Disposable income per equivalent adult percentile							
<=20	23.8	5.9	-12.2	43.9	5.2	38.9	1.8
20-40	9.6	6.1	-11.5	65.6	6.8	59.1	1.5
40-60	7.7	5.9	-11.6	70.8	8.2	60.5	1.6
60-80	6.5	5.6	-10.5	79.7	5.9	67.0	0.9
>80	5.1	5.0	-6.2	80.4	3.3	63.0	0.3
Education of the reference person							
Lower than secondary	10.0	6.4	-8.0	45.4	5.1	47.6	0.9
Secondary	6.9	5.6	-12.7	83.2	7.3	67.2	1.3
Tertiary	5.9	4.7	-9.5	86.1	5.0	66.7	0.6
Work status of the reference person							
Employee	6.8	5.6	-8.3	100.0	7.4	82.3	0.9
Self-employed	5.9	4.6	-6.9	100.0	1.8	72.3	0.2
Unemployed	63.5	6.2	-16.0	42.8	67.6	29.0	29.7
Retired	12.4	5.7	-11.2	16.6	2.3	9.0	0.5
Other not working	93.2	6.2	0.0	6.9	0.0	18.5	0.0

Source: Banco de Portugal and INE – Portuguese Household Finance and Consumption Survey 2020 (Banco de Portugal calculations). | Notes: The net wealth and income quintiles, as well as education level and work status of the reference person refer to the base period of the simulation exercise. The data presented correspond to simulation results and does not intend to replicate the results of the National Accounts.

Changes in pension income and other public transfers

Public pensions (granted by Social Security or Caixa Geral de Aposentações) were updated according to 2022 regular updating rules.[7] These rules determine declining increases along with pension value, with a maximum of 1%. The extraordinary update that guarantees minimum growth of €10/month compared to the previous year and that applies only to the lowest pensions[8] was also taken into consideration. Net increase in pension income was calculated using the 2022 marginal personal income tax rate. In the case of private pensions, typically associated with corporate pension funds and accounting for only around 3% of total pensions in the ISFF data, they were assumed to be updated with the 2021 inflation rate (1.3%).

The development of some of the remaining public sector benefits, in particular the family allowance, the social integration income and the solidarity supplement for the elderly, is related to households' financial standing. Despite the fact that all these benefits have been updated in 2022, public sector spending on them decreased in the first half of 2022. The simulation for households that no longer have access to these benefits in 2022 is a complex exercise that is not accounted for in this Special issue, given the small weight of these benefits for these groups and their small changes.[9] Therefore, to simplify, it was assumed that all households receiving these benefits in the baseline period had a year-on-year change in these benefits equivalent to the decline in aggregate State expenditure with these benefits in the first half of 2022 (-3.3%, -5.5% and -2.4%, in the cases of family allowance, social integration income and the solidarity supplement for the elderly respectively).[10] The simulation exercise for other public transfers also considered the Extraordinary Support for the Most Vulnerable Families due to rising prices of basic foodstuff. The first tranche amounting to €60 was paid during the first half of 2022. To simplify, these €60 were added to the public transfers of the 1.07 million households with lower gross income per equivalent adult, as eligible conditions are associated with access to the social electricity tariff or to minimum social benefits.

Simulation results point to a 1.3% year-on-year increase in the net value of pensions and other public transfers received by households in the first half of 2022 (Table 2). As with labour income, increases are diminishing with household income and wealth, as well as with schooling. Households receiving pensions and other public transfers are, unlike labour income, more concentrated in lower quintiles of income and wealth. In the first wealth quintile, in the first two quintiles of disposable income per equivalent adult and in the lowest education group, 70% or more of the households had some member receiving this type of income, which compares to 60% for all households (46.3% of households receive pensions and 16.8% receive other public transfers). These incomes are of the utmost importance for households with retired people (76.2% weight in disposable income) and have also a much higher weight than the average in households in the first quintiles of disposable income per equivalent adult and of wealth (44.9% and 39.8% respectively, compared with 24.1% in all households).

7. Public pensions include old age (retirement) or retirement pensions (in the case of the Caixa Geral de Aposentações) as well as survivors' and disability pensions.
8. This pension update was not paid until the second half of 2022, but it was considered in this simulation exercise since it was backdated to January 2022.
9. ISFF values for these public transfers represent about 50% of their value determined based on the EUROMOD microsimulation model (using EU-SILC survey data).
10. In the ISFF, data on these public transfers are collected in aggregate form. For households that received this type of income in the baseline period, the same composition of these benefits in the ISFF as in EUROMOD data (in terms of family allowance, social integration income, solidarity supplement for the elderly and other social benefits) was imposed for each age group broken down by income deciles.

Table 2 • Evolution of income from pensions and other public transfers | Percentage

	yoy rate of change in the first half of 2022	Memo (data in the base period)	
	Income from pensions and other public transfers	Weight of households receiving	Weight in disposable income
Total	1.3	60.0	24.1
Net wealth percentile			
<=20	1.9	70.9	39.8
20-40	1.8	65.7	22.8
40-60	1.5	59.4	23.5
60-80	1.2	53.4	22.4
>80	0.8	50.7	20.9
Disposable income per equivalent adult percentile			
<=20	3.5	72.4	44.9
20-40	2.0	74.1	29.3
40-60	1.3	60.7	24.9
60-80	0.9	47.6	19.7
>80	0.5	45.6	21.1
Education of the reference person			
Lower than secondary	1.9	77.1	39.2
Secondary	1.1	55.8	19.4
Tertiary	0.6	35.6	16.3
Work status of the reference person			
Employee	1.6	38.2	5.0
Self-employed	1.9	37.6	5.9
Unemployed	1.5	60.6	22.1
Retired	1.3	100.0	76.2
Other not working	6.5	20.5	14.9

Source: Banco de Portugal and INE – Portuguese Household Finance and Consumption Survey 2020 (Banco de Portugal calculations). | Notes: The net wealth and income quintiles, as well as education level and work status of the reference person refer to the base period of the simulation exercise. The data presented correspond to simulation results and does not intend to replicate the results of the National Accounts.

Changes in other income

The other income analysed in this subsection includes interest received less interest paid, income from financial investments other than interest (e.g. dividends from listed shares), distributed profits from businesses, rents (actual rents received and imputed rents), regular private transfers, and income from other sources.

The year-on-year change in interest received in the first half of 2022 was calculated by multiplying the change in the interest rate on household deposit balances, obtained using data from the Banco de Portugal's Monetary and Financial Statistics, by the value of saving accounts in the ISFF less a 28% tax rate. For interest paid, the ISFF includes information that allows differentiating developments per household. In particular, it is possible to identify the value of the interest rate for each loan, whether it was taken out at a fixed or floating rate, and, in the case of a floating rate, which reference rate is used. This allowed the change in interest paid to be calculated on a loan-by-loan basis, by multiplying the outstanding balance by the change in the average reference rate (Euribor at 1, 3, 6 and 12 months) between the first half of 2021 and the first half of 2022. Both the interest rate on deposits and the interest rates on loans remained at a very low level in the first half of 2022 and marginally lower than in the first half of 2021. On average, in the first half of 2022 the interest rate on deposits was 0.02 p.p. lower than in the first half of 2021 and Euribor rates used in this period as reference rates for maturities of 1, 3, 6 and 12 months dropped by 0.01 p.p., 0.02 p.p., 0.03 p.p. and 0.13 p.p. respectively.

Income from financial investments (other than interest) and distributed business profits have been updated with the year-on-year rate of change in the first quarter of 2022 of the National Accounts

data on distributed corporate income received by households (8.3%). Actual and imputed rents were updated with the year-on-year rate of change in the rent price index in the first half of 2022 (2.4%).[11] Regular private transfers were updated with the 2021 inflation rate (1.3%), as this is the rule for updating alimony payments, which form an important part of these transfers. This rate was also used to update income from other sources reported by the household (e.g. severance payments).

Around 75% of households benefit from this other income excluding interest, and their weight in disposable income is 14.6% in the baseline period (Table 3). The weight of this income is increasing with wealth quintiles, rising from 1.6% in the first quintile to 21.9% in the last one, which reflects the fact that this income is largely associated with asset ownership. By income quintiles, the weight in disposable income shows much less variability. The slightly higher weight in the first income quintile stems from imputed rents and, in the last quintile, from actual rents, income from financial investments and business income.

Table 3 • Evolution of other income | Percentage

	yoy rate of change in the first half of 2022			Memo (data in the base period)				
	Other income	Of which: Other income excluding interest paid and received	Of which: Interest received less interest paid	Weight of households receiving other income excluding interest	Weight of households that have saving accounts	Weight of households that have loans	Weight of other income excluding interest in disposable income	Weight of interest received less interest paid on disposable income
Total	3.2	2.8	1.7	75.3	47.1	43.6	14.6	-1.0
Net wealth percentile								
<=20	24.1	2.1	1.2	15.1	19.2	25.9	1.6	-1.4
20-40	3.3	2.2	2.7	75.1	42.1	48.9	8.4	-1.6
40-60	3.8	3.2	2.6	94.2	48.7	48.1	13.8	-1.2
60-80	2.8	2.5	1.5	96.5	58.2	48.6	15.1	-0.9
>80	3.1	3.0	-0.3	95.8	67.5	46.4	21.9	-0.6
Disposable income per equivalent adult percentile								
<=20	3.0	2.5	1.4	56.3	27.2	21.7	16.3	-1.9
20-40	3.0	2.4	1.1	65.2	33.6	44.9	11.8	-1.7
40-60	3.2	2.8	2.4	76.9	48.0	40.3	14.0	-1.0
60-80	3.0	2.6	2.5	86.6	59.4	57.6	13.5	-1.1
>80	3.3	3.2	0.9	91.3	67.1	53.0	16.2	-0.6
Education of the reference person								
Lower than secondary	3.0	2.8	0.7	68.1	36.8	25.4	13.0	-0.8
Secondary	3.0	2.7	1.8	76.2	46.8	54.6	13.2	-1.1
Tertiary	3.4	3.0	2.1	87.0	66.2	59.4	17.5	-1.1
Work status of the reference person								
Employee	3.3	2.7	2.5	78.7	51.0	63.1	13.0	-1.2
Self-employed	4.3	3.9	2.1	88.0	48.9	58.0	23.2	-1.5
Unemployed	2.4	2.3	0.1	73.6	31.2	26.3	20.1	-0.8
Retired	2.4	2.6	-13.0	67.9	42.3	12.6	14.4	-0.2
Other not working	2.5	2.3	2.1	63.4	29.0	18.7	70.7	-4.1

Source: Banco de Portugal and INE – Portuguese Household Finance and Consumption Survey 2020 (Banco de Portugal calculations). | Notes: The net wealth and income quintiles, as well as education level and work status of the reference person refer to the base period of the simulation exercise. The data presented correspond to simulation results and does not intend to replicate the results of the National Accounts.

11. Imputed rents are not part of ISFF data. Values used correspond to 2.4% of the value of the main residence of each owner household. This percentage allows total imputed rents to have a weight in disposable income equal to that in the National Accounts data in 2019, i.e. in the period to which the ISFF data refer.

Other income as a whole (including interest received less interest paid) increased by 3.2% year-on-year in the first half of 2022. Growth rates are relatively similar across household groups, which is due to the fact that it was not possible to include assumptions on the change of each of the components differentiated by household type. In the first wealth quintile these incomes show a high growth rate but their weight in disposable income is small. The decline in the interest rates contributed to this high growth, as in this wealth quintile the weight of interest paid compared to interest received is much higher than in the other quintiles.

Interest paid and interest received fell by 3.2% and 32.2% respectively, resulting in a 1.7% increase in net interest (interest received minus interest paid). Net interest increased in almost all groups considered. In the last wealth quintile and in households where the reference person was unemployed in the baseline period they remain quite stable. In households where the reference person is retired they fall by 13%, due to the low percentage of households with loans. The percentage of households with saving accounts is slightly higher than the percentage with loans (47.1% and 43.6% respectively). However, in the ISFF, loan amounts are much higher, which together with higher levels of interest rates on loans leads to a negative weight of net interest on household disposable income (-1%). In the lowest income and wealth classes this negative weight is slightly higher. This means that households in these groups with floating-rate debt are potentially hit hardest by rising interest rates from the second half of 2022.

Changes in nominal and real household disposable income

The change in income described above resulted in a 5.1% year-on-year increase in household disposable income in nominal terms in the first half of 2022 (Table 4). Labour income contributed 4.4 p.p. to this change, unemployment benefits made a marginally negative contribution (-0.1 p.p.), pensions and other public transfers contributed 0.3 p.p. and other income 0.4 p.p. The higher contribution of labour income reflects the weight of this income in disposable income (61.4%) as well as the fact that this is the component with the sharpest increase across these income groups.

By household groups, the growth of nominal disposable income shows, like in labour income, a downward profile with wealth and, mainly, with disposable income per equivalent adult. This means that inequality of the income distribution declined. Households in the first income quintile, which together have only 6.8% of aggregate income, show much higher growth in disposable income than those in the other quintiles. This mainly reflects a higher contribution from labour income, but also from pensions. The significant contribution of labour income in this class stems mainly from favourable developments in employment and, to a lesser extent, from higher growth in earnings of employees with lower education. The positive impact of labour market dynamics on disposable income is also illustrated by a sharp increase in this income for households where the reference person was unemployed or inactive in the baseline period.

Against a backdrop of a significant rise in the inflation rate, it is important to analyse its distribution effects on household real disposable income. Based on the methodology described in Box 6 "Inflation estimates by income and age group level" of this *Economic Bulletin*, the year-on-year rates of change in the Consumer Price Index in the first half of 2022 were calculated by deciles of disposable income per equivalent adult, broken down by age classes of the head of household.[12] These rates were used to deflate each household's disposable income.

12. For the purposes of matching ISFF data with IDEF data, the age of the household's head (the person appointed as such by the household) was used, as the concept is identical in both surveys. The household's head may differ from the reference person used to calculate the data contained in the tables of this Special issue, which generally corresponds to the person with the highest income in the household.

Table 4 • Evolution of nominal and real disposable income | Percentage, unless otherwise stated

	yoy rate of change in the first half of 2022		Contributions to the change of nominal disposable income (pp)					Memo (data in the base period)		
	Real disposable income	Nominal disposable income	Labour income	Unemployment benefits	Income from pensions and other public transfers	Other income	Year-on-year inflation rate in the first half of 2022	Weight of households in the total population	Distribution of nominal disposable income	Mean nominal disposable income per household (thousands, euros)
Total	-1.0	5.1	4.4	-0.1	0.3	0.4	6.2	100.0	100.0	23.9
Net wealth percentile										
<=20	0.7	6.9	6.3	-0.2	0.7	0.0	6.2	20.0	11.0	13.1
20-40	-0.7	5.4	4.9	-0.1	0.4	0.2	6.1	20.0	15.7	18.7
40-60	-0.9	5.3	4.6	-0.2	0.4	0.5	6.2	20.0	17.5	21.0
60-80	-1.0	5.2	4.6	-0.1	0.3	0.4	6.2	20.0	21.7	25.9
>80	-1.7	4.3	3.5	0.0	0.2	0.7	6.1	20.0	34.1	41.0
Disposable income per equivalent adult percentile										
<=20	4.5	11.0	9.2	-0.2	1.5	0.4	6.2	20.0	6.8	8.2
20-40	0.2	6.4	5.7	-0.2	0.6	0.3	6.1	20.0	12.7	15.2
40-60	-1.0	5.2	4.6	-0.2	0.3	0.4	6.2	20.0	16.8	19.9
60-80	-1.5	4.8	4.3	-0.1	0.2	0.4	6.4	20.0	22.9	27.4
>80	-2.0	3.8	3.2	0.0	0.1	0.5	6.0	20.0	40.8	48.7
Education of the reference person										
Lower than secondary	-0.4	5.8	4.8	-0.1	0.7	0.4	6.2	41.6	29.0	16.7
Secondary	-1.1	5.1	4.6	-0.2	0.2	0.4	6.2	35.4	36.4	24.6
Tertiary	-1.5	4.5	3.9	-0.1	0.1	0.6	6.1	23.0	34.6	36.0
Work status of the reference person										
Employee	-0.1	6.0	5.6	-0.1	0.1	0.4	6.2	53.6	62.6	27.9
Self-employed	-0.8	5.3	4.3	0.0	0.1	0.9	6.2	8.0	9.9	29.8
Unemployed	7.9	14.5	18.4	-4.7	0.3	0.5	6.2	1.4	0.8	13.6
Retired	-3.5	2.4	1.1	-0.1	1.0	0.3	6.1	35.4	26.4	17.9
Other not working	13.0	19.9	17.3	0.0	1.0	1.7	6.1	1.7	0.3	4.1

Source: Banco de Portugal and INE – Portuguese Household Finance and Consumption Survey 2020 (Banco de Portugal calculations). | Notes: The net wealth and income quintiles, as well as education level and work status of the reference person refer to the base period of the simulation exercise. The data presented correspond to simulation results and does not intend to replicate the results of the National Accounts. The real growth rate of disposable income is obtained with the following formula: (1+nominal growth rate) / (1+inflation rate) - 1.

Inflation in the first half of 2022, based on the ISFF household structure, accounted for 6.2%, which determines a 1% year-on-year decline in real household disposable income.[13] In line with the findings in Box 6 "Inflation estimates by income and age group level" of this *Economic Bulletin*, the inflation rate shows very little variability across the household groups presented in Table 4, standing between 6.0% and 6.4%. This Box details the reasons underlying this outcome. Given the low variability of the inflation rate across households, those with lower nominal income increases are also those with the greatest decrease in income in real terms: -3.5% in households where the reference person is retired, and between -2% and -1.5% in the highest quintiles of income and wealth and in households where the

13. The inflation rate was measured based on the CPI as this is the price index that reflects the consumption structure of the population living in Portugal and which allows inflation estimates for different groups of households. The year-on-year change in real disposable income of all households in the first half of 2022 calculated on the basis of the private consumption deflator would be higher (0.4% instead of -1%)) as the private consumption deflator has a lower growth rate in this period than the CPI (4.7% instead of 6.2%).

reference person has tertiary education. In households with higher increases in nominal income, real income grew in the first half of the year: 4.5% in the first income quintile, 0.7% in the first wealth quintile, 7.9% in households where the reference person was unemployed in 2021 and 13% in households where the reference person was inactive, excluding retirement.[14] When labour market transitions are excluded all households groups experience a real decline in their disposable income. This highlights the importance of labour market dynamics for the growth of disposable income over this period.

Heterogeneity in net wealth developments

The wealth simulation exercise seeks to assess how changes in asset market prices would affect net wealth developments (i.e. the difference between total assets and total debts) of different groups of households between June 2021 and June 2022, against a background of invariant portfolios.

Assets have been broken down by real estate (main residence and other real estate properties), motor vehicles, businesses, valuable goods, sight accounts, saving accounts, investment funds, debt securities, listed shares, voluntary pension schemes, private loans granted by any household member, assets held by households in accounts managed by banks or investment firms, or any other financial asset not already account for in the preceding headings (e.g. financial derivatives or patents). Liabilities have been broken down by loans secured by real estate properties owned by the household (the main residence or other) and other debts.

The main residence was valuated differently by geographical location (NUTS 2), based on year-on-year rates of change in June 2022 of the median value of bank appraisals on housing per square metre published by Statistics Portugal.[15] The other real estate properties were valuated with the change in this indicator for the country as a whole (15.8%). For the remaining assets, the same price changes were considered for all households, due to the lack of information to implement heterogeneous changes. Motor vehicles and valuable items were valued at June 2022 inflation rate (8.7%), which is in line with the assumption that there is no real assets depreciation. Businesses were valued with the year-on-year rate of change in the Financial Accounts data for unquoted shares and other equity held by households for the first quarter of 2022 (1.5%). Listed shares were valued with a weighted average of the year-on-year rates of change in stock price indices in Portugal and the euro area as at June 2022 (11.9%). The weight was calculated based on households' responses in the ISFF about holding shares in foreign firms. Bonds were valued with the weighted average of June 2022 year-on-year rates of change in Bloomberg bond indices for the value of government, non-financial corporate and financial corporate bonds in the euro area (-12.7%). The weight was calculated based on households' responses in the ISFF on the type of bonds owned. Mutual funds were valued with a weighted average of the valuation of real estate, listed shares and bonds, which took into account the type of funds reported by households in the ISFF (4.7%). Deposits increased by the value of interest accrued in the year ending in June 2022, using data from the

14. The group of households where the reference person is inactive but not retired represents only 1.7% of the households in Portugal and corresponds to a small number of households in the ISFF sample, therefore caution should be exercised when interpreting these data.

15. The rates of change considered were: 15.1% in the North; 13.1% in the Centre; 16.9% in Área Metropolitana de Lisboa; 12.1% in the Alentejo; 20.4% in the Algarve; 6.5% in the Autonomous Region of the Azores and 12.7% in the Autonomous Region of Madeira.

Banco de Portugal's Monetary and Financial Statistics for interest rates on household deposit balances (0.079%). This interest rate was also used to update the value of the remaining financial assets. In the case of debt, it was assumed the refinancing of debt maturing in the period including interest for the period. In this calculation, the average value between July 2021 and June 2022 of interest rates on outstanding amounts of loans for housing and consumption and other purposes from the Banco de Portugal's Monetary and Financial Statistics was used (0.9% and 6.1% respectively). Finally, to deflate each household's net wealth, the year-on-year inflation rate of June 2022 was used, calculated by deciles of disposable income per equivalent adult, broken down by the age cohort of the head of household.

Table 5 • Evolution of nominal and real wealth | Percentage, unless otherwise stated

	yoy rate of change in the first half of 2022					Contributions to the change in nominal net wealth (pp)			Year-on-year inflation rate in the first half of 2022	Memo (data in the base period)			
	Net wealth in real terms	Net wealth in nominal terms	Of which: Assets	Of which: Real estate properties	Of which: Debt	Of which: Assets	Of which: Real estate properties	Of which: Debt		Debt over assets ratio	Share of real estate properties in total assets	Distribution of nominal net wealth	Mean nominal net wealth per household (thousands, euros)
Total	3.1	12.1	10.9	15.3	1.3	12.3	10.2	-0.2	8.8	11.3	66.4	100.0	197.0
Net wealth percentile													
<=20	37.6	49.5	10.1	15.2	2.2	60.3	8.1	-10.8	8.7	83.3	53.4	0.2	1.6
20-40	10.1	19.6	12.4	14.9	1.4	20.6	11.5	-0.9	8.7	39.9	77.3	4.3	42.1
40-60	6.4	15.6	12.6	15.0	1.4	16.0	12.0	-0.4	8.7	21.0	80.2	10.1	100.1
60-80	4.7	13.9	12.3	15.0	1.3	14.0	11.7	-0.2	8.7	12.7	78.1	18.4	180.8
>80	1.6	10.5	10.0	15.6	1.1	10.6	9.3	-0.1	8.8	8.1	59.5	67.0	662.4
Disposable income per equivalent adult percentile													
<=20	3.0	11.9	10.6	14.8	1.6	12.1	10.0	-0.2	8.6	12.2	67.5	7.8	77.4
20-40	4.9	14.0	11.9	14.9	1.6	14.4	11.3	-0.3	8.7	17.3	75.4	9.1	89.9
40-60	3.7	12.8	11.3	15.2	1.3	13.0	10.6	-0.2	8.8	13.2	69.7	13.8	134.9
60-80	4.8	13.9	12.0	15.3	1.3	14.2	11.4	-0.2	8.7	15.5	74.3	18.6	182.9
>80	1.9	10.9	10.2	15.6	1.2	11.0	9.4	-0.1	8.8	10.8	60.3	50.7	498.2
Education of the reference person													
Lower than secondary	2.6	11.5	10.8	14.8	1.6	11.6	10.2	-0.1	8.7	7.2	68.8	25.7	121.9
Secondary	3.0	12.1	10.6	15.4	1.4	12.3	9.8	-0.2	8.9	13.5	63.7	33.0	183.6
Tertiary	3.5	12.5	11.1	15.6	1.2	12.7	10.5	-0.2	8.7	11.9	67.2	41.3	353.5
Work status of the reference person													
Employee	4.2	13.4	11.4	15.3	1.3	13.7	10.7	-0.3	8.8	16.8	69.7	50.4	185.5
Self-employed	0.9	9.8	9.0	15.5	1.3	9.9	8.0	-0.1	8.8	9.0	51.9	16.9	417.4
Unemployed	6.1	15.6	14.2	15.6	1.5	15.7	13.7	-0.2	8.9	9.9	87.9	0.7	90.6
Retired	2.2	11.1	10.9	15.3	1.7	11.2	10.4	0.0	8.7	2.2	67.7	31.1	173.2
Other not working	5.1	14.3	12.8	15.3	1.6	14.5	12.1	-0.2	8.8	11.9	78.9	1.0	113.3

Source: Banco de Portugal and INE – Portuguese Household Finance and Consumption Survey 2020 (Banco de Portugal calculations). | Notes: The net wealth and income quintiles, as well as education level and work status of the reference person refer to the base period of the simulation exercise. The data presented correspond to simulation results and does not intend to replicate the results of the National Accounts. The real growth rate of net wealth is obtained with the following formula: (1+nominal growth rate) / (1+inflation rate) - 1.

The combined simulation of these changes led to a 12.1% increase in wealth, in nominal terms, and 3.1% in real terms, underlying an 8.8% inflation rate (Table 5). The increase in wealth reflects a 10.9% increase in assets value and 1.3% in debt value. The significant increase in assets value is common to all the groups considered and mainly reflects a buoyant real estate market and the high share of real estate in total assets. In accordance with ISFF 2020 data, real estate properties represents 66.4% of total household assets and, in all the groups considered, corresponds to more than half of the total assets value.

When the assets value increases significantly, and across household types, the inequality in the wealth distribution drops. In fact, under these circumstances, households with a higher debt-to-asset ratio are those with higher percentage increases in net wealth (leverage effect).[16] This effect explains the huge growth rates of net wealth in the lowest quintile of this variable (where debt represents more than 80% of assets value) as well as the downward profile of these rates as net wealth increases (i.e. as leverage declines). It is important to bear in mind that households in the first wealth quintile hold only 0.2% of the overall wealth and, therefore, even with a very significant increase in percentage terms, these households' wealth remains very small compared with the other households.

By quintiles of disposable income per equivalent adult, debt-to-assets ratios show less heterogeneity, and are only slightly higher in the three intermediate classes. In the bottom and top income classes, net wealth growth is further restrained by lower asset valuations, which largely derive from real estate properties lower share. In the highest income class, as well as in the highest wealth class, asset composition is more diversified than in the others. In particular, businesses which have appreciated less than real estate properties, have a higher weight in these classes.

Conclusions

The simulation exercises illustrate how valuable analysing the underlying heterogeneity of macroeconomic data can be, in particular against a background as this one, characterised by overlapping shocks of significant magnitude.

Labour market dynamics are the key element determining the heterogeneity of household income developments. Just as important as analysing the evolution of compensation per worker is understanding the dynamics of labour market flows, namely the dynamics in employment recruitments and terminations resulting in net job creation. The first half of the year was marked by strong job creation and a significant decrease in unemployment in year-on-year terms. In a scenario of already high labour market participation, this evolution favoured lower income and wealth households. Minimum wage increases above the distribution average also boosted this outcome.

Overall, simulations suggest that inequality of income and wealth distributions dropped in the first half of the year. In the case of income, this outcome is anchored in labour market dynamics and in higher wage increases for the lowest wages. In the case of net wealth, decreases in inequality reflect the combination of two effects: on the one hand, house price buoyancy, which brought

16. The percentage change in net wealth is given by the following formula, where A represents the value of Assets, D the value of debt and Δ the change:

$$\frac{\Delta(A-D)}{A-D} = \frac{\Delta A}{A}\frac{A}{A-D} - \frac{\Delta D}{D}\frac{D}{A-D} = \frac{\Delta A}{A}\frac{1}{1-\frac{D}{A}} - \frac{\Delta D}{D}\frac{1}{\frac{A}{D}-1}$$

In a context where the change in debt is very small compared to the change in assets, the first term of the last equality is the one that controls the result, i.e. the change in net wealth will essentially depend on the percentage change in assets ($\frac{\Delta A}{A}$) and on a factor that depends positively on the leverage degree ($\frac{D}{A}$).

about a strong increase in assets value across different population segments; on the other hand, the so-called leverage effect, which implies that households with a higher debt-to-asset ratio — typically young households and lower-wealth households — are those with the highest percentage increase in net wealth.

It is important to stress that this analysis focused on developments in the first half of 2022 and cannot be extrapolated into the future. The economic shocks mentioned are still unfolding, in some cases they are expected to worsen and their effects on households will propagate in a lagged manner. The near future will be characterised by high inflation, ongoing interest rate hikes, a slowdown in economic activity, less dynamism in the labour market, as well as the adoption of additional measures to support households. In this demanding environment, further in-depth analysis will be a priority.

Accumulation of production factors by Portuguese firms[1]

Introduction

The analysis of production factors' accumulation and utilisation is of great relevance to understand economic growth in the long term. In the production process, firms combine labour and capital, and therefore such process should be characterised using data covering the various production factors. This Special issue provides joint evidence on the use of labour and capital by Portuguese firms, taking advantage, in particular, of the recent availability of consistent economic series of stocks and flows of tangible assets in Gouveia and Pereira (2022). The use of microeconomic data makes it possible to cover the heterogeneity of businesses in the economy and expand analytical tools. This analysis adopts a sectoral perspective, covering most sectors producing goods and non-financial market services, for the period 2006-2020.

The first part of this Special issue presents a set of structural stylised facts, in particular on complementarity in the use of capital and labour and the relationship between firm size and the dynamics of production factors' accumulation. The second part examines the trend of capital and labour from 2006 to 2020, in the context of the cyclical developments of the period.

Data

Capital series are from Gouveia and Pereira (2022), who have taken as their starting point the accounting information reported by firms in the Informação Empresarial Simplificada (IES). These authors use the perpetual inventory method, whereby the capital stock obtains as an accumulation of capital flows, starting from an initial capital and deducting depreciation in the period. Such series cover tangible assets only — note, however, that throughout the text one makes reference to capital without this qualification. Calculations were carried out separately by asset type, using asset — and sector-specific depreciation rates and asset-specific deflators. This Special issue focus on firms' total capital, adding up all asset categories.[2]

Labour data have been taken directly from IES, which includes two sorts of information: the number of full-time and part-time employees, and the wage bill of firms reported in the profit and loss account. This second variable (in real terms) has the advantage of reflecting differentiation in the quality of labour captured by the wage, and also allows for better measurement of its quantity, in terms of number of hours worked. The labour input was thus proxied by the wage bill, valued, like capital, at 2020 constant prices. Note that both indicators lead to similar results in many of the analyses presented throughout the text. Furthermore, in the analysis of the relationship between technological intensity and workers' skills, the ratio between wage bill and employment was used as a workforce quality indicator.

1. Prepared by Manuel Coutinho Pereira.
2. Gouveia and Pereira (2022) present some results broken down by type of asset. The investment series compiled under this project were subject to analysis in Special issue "A microeconomic analysis of Portuguese firms' investment from 2006 to 2017", published in the December 2019 *Economic Bulletin* of the Banco de Portugal.

Eight sectors of activity have been considered: (i) agriculture and fishing, (ii) manufacturing and mining, (iii) electricity, gas and water, (iv) construction, (v) trade and repair, (vi) accommodation and food services, (vii) transportation and storage and (viii) communication, administrative and consultancy services. The financial and insurance sectors have been excluded as have those sectors producing, in whole or in part, non-market services, such as general government, health and education and the real estate sector, where capital flows are difficult to measure. Agriculture was taken on board, notwithstanding the fact that IES covers only a part of the activity in this sector, encompassing large firms only (a similar phenomenon occurs to a lesser extent in other sectors, such as construction). In fact, while it remains less representative than the average, in terms of the labour and capital held, this is the sector with the strongest growth in the number of firms in the 2006-2020 period (see below). Firm creation as measured from IES data covers the establishment of new companies, but may also take place when already active sole proprietors reach a turnover threshold (currently €200,000) that requires them to have an organised accounting system. Firms with zero capital, zero wage bill and zero sales throughout the sample period were excluded from the database; following this exclusion, the database contains 587,633 firms.

The capital stock of three sectors — electricity, gas and water, construction, and transportation and storage — was greatly affected by the reclassification as intangible in the Sistema de Normalização Contabilística (SNC) of assets used by firms under concessions, which in the Plano Oficial de Contas (POC) were recorded as tangible in the concessionaire's balance sheet (Gouveia and Pereira, 2022). Thus, for such sectors, only the period following the SNC implementation in 2010 was considered. Moreover, under these circumstances, the stock of tangible assets provides a particularly incomplete picture of capital used by firms. More generally firms may use capital assets under an operational leasing, a case also not covered by the capital stock measure here used.

Table 1 • Number of firms, employment and salaries paid, by sector | Percentage

	Number of firms		Proportion	
	Proportion	Growth	Employment	Wages
Agriculture and fisheries	3.9	118.5	2.5	1.7
Manufacturing and mining	12.1	3.1	25.9	25.5
Electricity, gas and water	0.5	26.6	1.3	2.1
Construction	12.6	6.6	11.6	10.8
Trade and repair	31.9	12.1	23.5	23.5
Accommodation and food services	12.8	52.5	9.7	6.4
Transportation and storage	5.4	20.6	5.4	7.5
Communic., admin. and consult. serv.	20.8	85.8	20.0	22.5
Total	100	28,9	100	100

Source: Banco de Portugal calculations based on IES. | Note: Accumulated growth in the number of firms in the period from 2006 to 2020, except for the electricity, gas and water, construction, and transportation and storage sectors, in which this period begins in 2010.

Table 1 illustrates the sectors' weight in terms of number of firms, employment and labour input. Table 2 contains similar information for the capital input, broken down by asset categories. In these tables, percentages are calculated on the basis of averages per firm.

As far as employment and the wage bill are concerned, manufacturing, trade and repair, and communication, administrative and consultancy services represent each between a fifth and a quarter of the total (Table 1). Manufacturing has the largest weight in total capital stock, around 30 per cent, while the remaining sectors weighs from 5 to 15 per cent each (Table 2). The capital

stock as a whole consists mostly of buildings and other constructions and machinery, each of these assets weighing around one third. Growth in the number of firms in the period under review was particularly strong in agriculture and some service sectors such as accommodation and food services and communication, administrative and consultancy services (Table 1).

Table 2 • Capital, by sector and asset type | Percentage

	Land	Build., const.	Machinery	Mater. transp.	Transp., equip.	Other assets	Work progr.	Prop. sector
Agriculture and fisheries	34.4	30.9	18.8	4.7	0.3	4.6	6.3	4.7
Manufacturing and mining	9.0	36.9	39.6	3.9	1.4	4.0	5.2	29.7
Electricity, gas and water	2.4	22.9	61.4	0.8	0.6	2.7	9.1	11.4
Construction	14.6	26.2	40.9	9.5	0.9	1.7	6.2	7.9
Trade and repair	11.2	49.6	17.8	10.5	3.6	4.6	2.7	16.0
Accommodation and food services	14.4	60.7	11.3	1.7	0.9	2.3	8.8	10.2
Transportation and storage	6.4	43.6	33.2	11.0	1.1	1.6	3.1	6.8
Communic., admin. and consult. serv.	3.5	20.4	54.3	9.1	5.1	2.2	5.5	13.3
Prop. asset type	9.8	36.8	36.3	6.0	2.0	3.4	5.7	100

Source: Banco de Portugal calculations based on Gouveia and Pereira (2022).

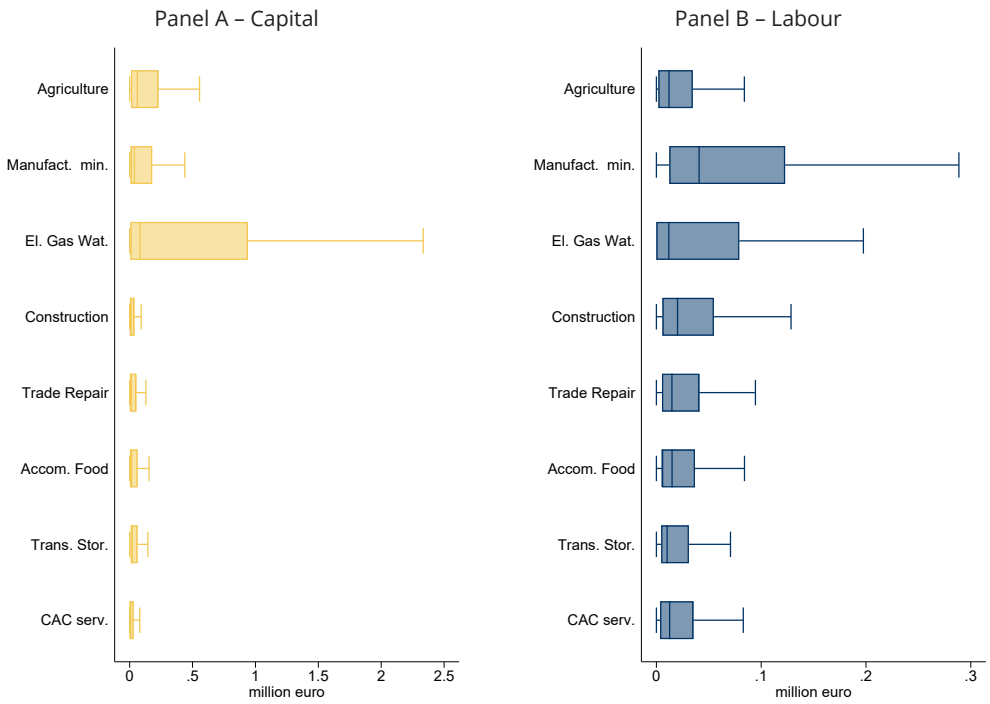
Capital and labour distributions

The box plot in Chart 1 shows the distributions of capital and labour by sector, based on average values per firm. A prevailing feature of capital distributions is a positive skewness, with the median close to the first quartile and the minimum. Labour distributions share this characteristic, but to a lesser extent. Moreover, there is a large number of firms with a low or zero value for labour and/or capital. The percentage of firms with nil capital stands at 9 per cent in manufacturing and 18 per cent in services, the latter a sector comprising trade and repair, accommodation and food services, and communication, administrative and consultancy services. The corresponding percentages for labour are 7 and 11 per cent.

Firms in manufacturing and electricity, gas and water sectors, but also in agriculture, hold more capital than firms in the remaining sectors, particularly those in the upper half of distributions. The agriculture sector holds a major share of capital in the form of land, and the data are particularly biased to encompass the subset of larger firms. The relative dispersion of capital (measured by the ratio of the interquartile range to the median) does not differ much across sectors, except in the case of electricity, gas and water, where it is clearly higher. Compared to capital, the distribution of labour is closer across sectors and has a lower relative within-sector dispersion. Firms in manufacturing stand out for using more labour, and those in the electricity, gas and water sectors for a greater relative dispersion.

Another feature of these distributions is the high concentration of production factors in the firms at the top, originating a long right tail (Chart 2).

Chart 1 • Distribution of capital and labour, by sector | Million euro, 2020 prices



Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: Box plots, in which the central box shows the values from the 25th percentile to the 75th percentile (interquartile range) and the horizontal line corresponds to the median of the distribution (50th percentile). The plot excludes outliers i.e. values lower than the difference between the 25th percentile and 1.5 times the interquartile range, or higher than the sum of the 75th percentile and 1.5 times the interquartile range.

The distribution of capital is highly concentrated. In most sectors, firms above the 95th percentile hold between 80 and 90 per cent of overall capital. Such proportion is somewhat lower in trade and repair (75 per cent) and agriculture (60 per cent). The concentration of labour is also high, albeit somewhat lower than that of capital. Firms above the 95th percentile hold around 80 per cent of overall labour in electricity, gas and water, transportation and storage, and communication, administrative and consultancy services, and between 40 and 50 per cent in the remaining sectors.

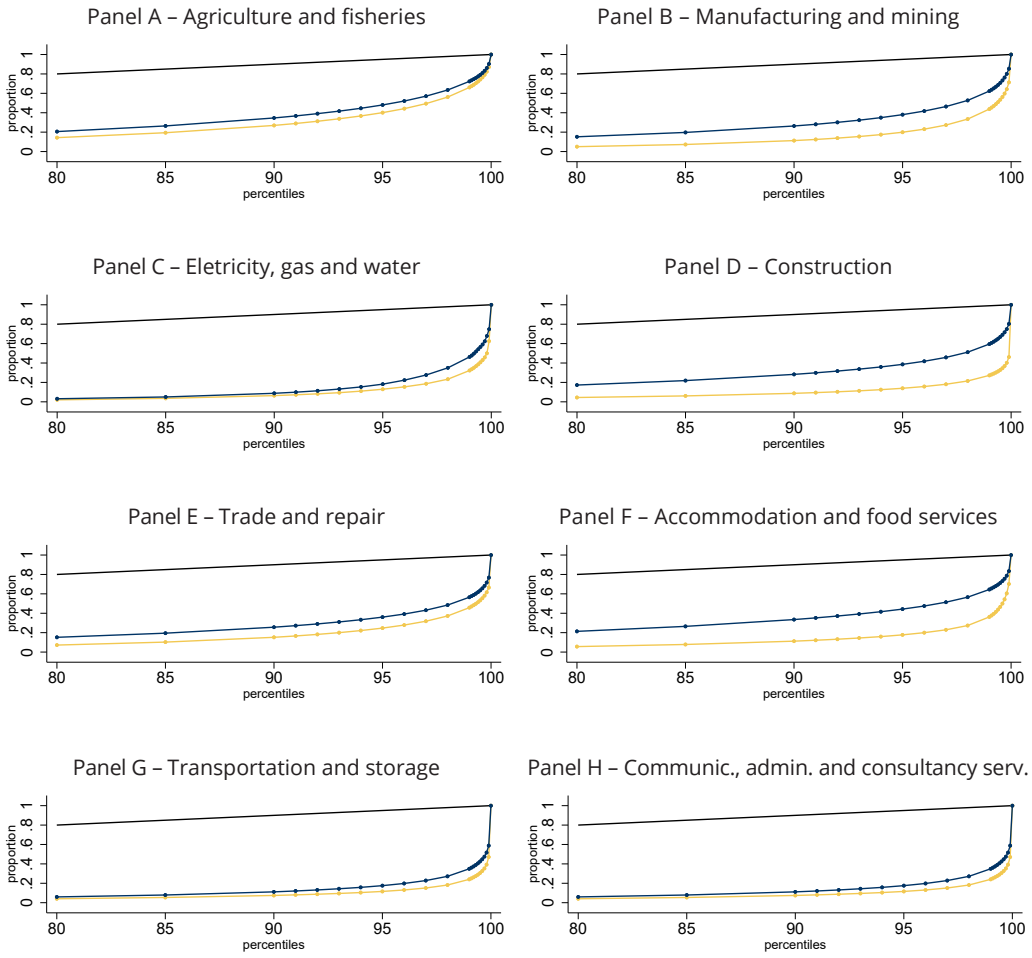
Complementarity of production factors

The various inputs enter simultaneously the production function of firms and the economic theory has questioned the extent to which there is substitutability or complementarity among them. In particular, this discussion has focused on how the adoption of new technologies, leading to a greater input of capital, impacts on the use of labour. The benchmark assumption — which dates back to Griliches (1969) — is the so-called capital-skill complementarity, which posits that unskilled labour is more easily substitutable for capital than skilled labour. A formal analysis of this assumption requires the calculation of factor elasticities of substitution, which falls outside the scope of this Special issue. However, it is possible to present informal evidence on this matter by relating an indicator of technological intensity to an indicator of human capital skills, by firm. The former is calculated as capital per worker and the latter as the average wage (Chart 3).

Manufacturing, electricity, gas and water, and transportation and storage services have a relatively higher capital intensity. The same applies to agriculture, which can be explained by the fact that employment is

highly seasonal, in addition to the volume of capital held by firms in this sector (Chart 1). The remaining sectors show a lower capital intensity. The electricity, gas and water sector stands out for its greater relative dispersion. The average wage captures the wage differentiation associated with qualifications and other aspects such as the worker's experience and specific human capital. The median of the indicator is highest in electricity, gas and water and lowest in accommodation and food services.

Chart 2 • Lorenz curves for capital (in yellow) and labour (in blue), by sector | Percentiles of distributions of the production factors and proportions

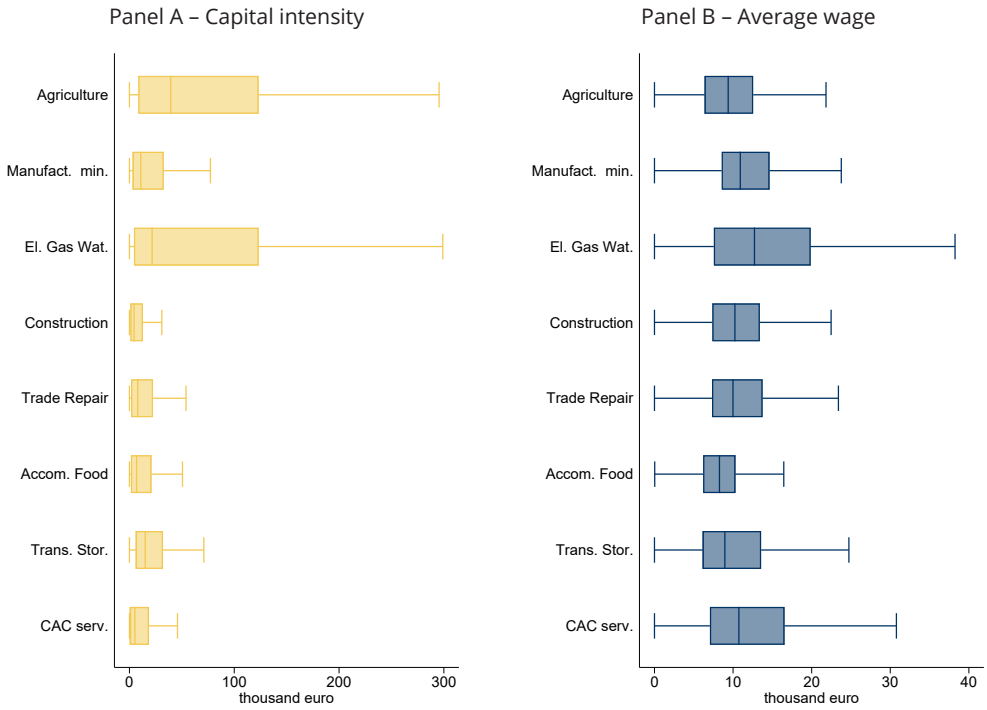


Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: Lorenz curves start at the 80th percentile of the distributions of labour and capital.

Chart 4 shows a positive association between capital intensity and average wage, which is in line with the capital-skill complementarity hypothesis, on the assumption that a higher average wage reflects more skilled workers. This evidence is in line with studies such as Bergstrom and Panas (1992), Krusell et al. (2006) and Correa, Lorca and Parro (2019). Moreover, the curve shown in Chart 4 has a non-linear shape, suggesting that successive increases in capital intensity are associated with smaller increases in workers' skills. The relationship between the two variables has a similar profile in manufacturing and services, but the average wage in the latter sector is lower than in manufacturing, for a given value of capital intensity. In order to study composition effects, capital was split into two components: one with a higher technological content, including machinery

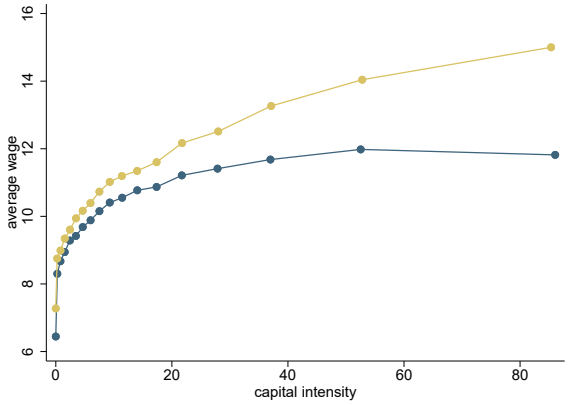
and other equipment; and another with a more elementary content, including land, buildings and transport equipment. The profiles of association between the average wage and each of the capital categories proved to be close to that for overall capital.

Chart 3 • Distribution of capital intensity (capital per worker) and average wage, by sector | Thousand euro, 2020 prices



Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: Box plots, in which the central box shows the values from the 25th percentile to the 75th percentile (interquartile range) and the horizontal line corresponds to the median of the distribution (50th percentile). The plot excludes outliers i.e. values lower than the difference between the 25th percentile and 1.5 times the interquartile range, or higher than the sum of the 75th percentile and 1.5 times the interquartile range.

Chart 4 • Relationship between capital intensity and average wage, in manufacturing (in yellow) and services (in blue) | Thousand euro, 2020 prices



Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: The graph is constructed by dividing capital intensity (values below the 95th percentile) into bins with an equal number of firms and calculating the medians of capital intensity and average salary (in industry and services) in such bins, represented by the dots.

Relationship between firm size and dynamics in factor accumulation

In the process of acquiring labour and capital, the industrial organisation theory has studied the relationship between firm size and growth rate. There are several theories on this, notably the so-called Gibrat's law that posits that firms' growth — in proportional terms — is roughly independent of their size, i.e. large and small firms grow at similar rates. Theoretical models, such as Lucas (1978), assume the validity of this law, while others, such as Jovanovic (1982), imply it. Empirically, studies based on samples of large firms tend to support Gibrat's law, while studies focusing on smaller firms have found unfavourable evidence, indicating that for this type of firms there is an inverse relationship between size and growth (e.g. Hart and Prais, 1956, Hall, 1987, and Evans 1987). Empirical literature has mainly relied on regressions of the growth rate on size, using employment as the reference variable. The analysis that follows uses capital and the real wage bill.

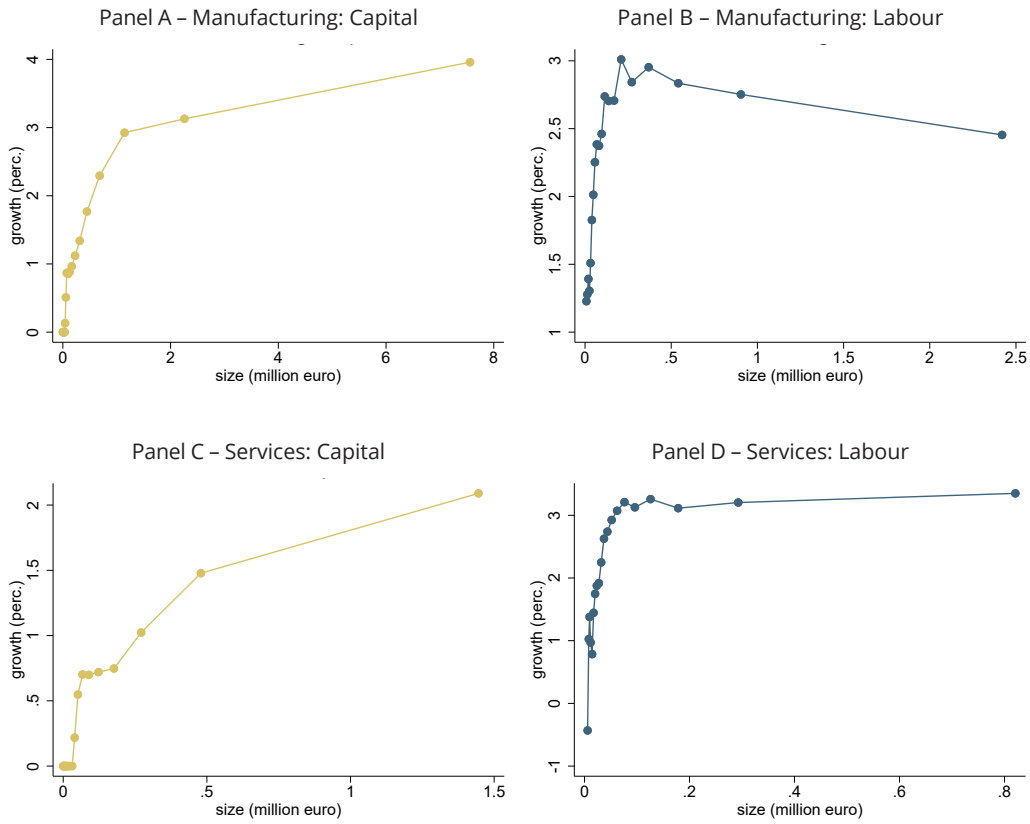
For capital, growth has been measured by the investment rate, equal to the ratio of investment in the period to capital in the previous period, instead of change in capital. However, in the discussion of results, the implications of using change in capital (which roughly corresponds to net investment, but also includes other changes in volume) are noted. The data here used offer the advantage of covering a large spectrum of firms, and so conclusions are less affected by the shortcomings of some previous studies. In this sample, there is a large number of firms with nil or negative rates of change — around 44 and 51 per cent for capital and labour, respectively. The evidence on the association between firm size and pace of factor accumulation based on all observations (Chart 5) is complemented by an analysis confined to positive changes in inputs (Chart 6). As in the previous section, results are presented for manufacturing and services as a whole.

Chart 5 shows a positive association between firm size and the dynamics of factor accumulation. For instance, considering capital, large firms tend to invest proportionally more than small firms. Furthermore, this is a non-linear association, insofar as there is a profile of rapid increase of the investment rate with firm size for small firms and a relative stabilisation of this rate for larger ones. Curves in the plots are similar for capital and labour as well as for manufacturing and services.

In Chart 6, confining the sample to positive changes in inputs, a negative relationship emerges between the variables.[3] Large firms now show proportionally smaller increases in capital and labour. This should reflect the higher frequency of negative or zero changes in inputs in the lowest size brackets. When such changes are excluded, there is a stronger increase in the median in those brackets, which reverses the relationship presented in Chart 5. In the case of capital, small firms invest less frequently than large firms, however, when they do so, their investments tend to be proportionally larger — and this holds for increases in labour input as well.[4]

3. In the case of the labour input, barring from the initial section of the curve comprising the smallest firms in the sample, where growth rates show a somewhat erratic behaviour.
4. When capital growth is measured by its overall change (instead of investment), the shape of the relationship between size and growth remains very similar. However, in the plot corresponding to Chart 5, a downward shift of the curve occurs, as zero or marginally positive values of investment turn into negative changes in capital, when depreciation is considered.

Chart 5 • Relationship between firm size and production factors' growth in manufacturing and services | Million euro, 2020 prices, and percentage



Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: The graphs are constructed, respectively, on the basis of the capital stock at the end of year t and the investment rate in that year; and the wage bill for year t and its growth rate vis-a-vis the previous year (values above the 10th percentile). The levels of production factors are divided into bins with an equal number of firms; the medians of the variables in such bins are depicted.

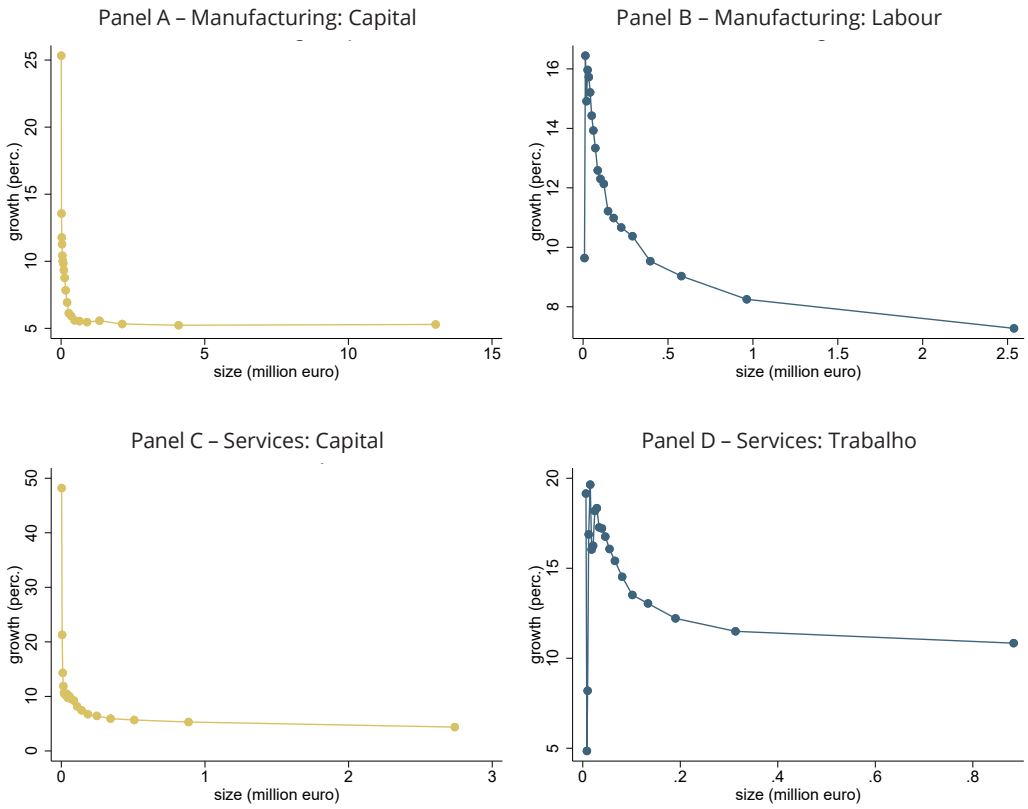
Note, finally, that in the two samples considered, the charts suggest a dependence between firm size and growth and, therefore, the non-verification of Gibrat's law. Furthermore, Chart 5 also diverges from the literature that finds a negative relationship for small firms. Nevertheless, the fact that the curve becomes progressively horizontal when a certain size threshold is reached is in line with the evidence of a weaker association between the two variables in that region.

Evolution over time of factor accumulation

The previous sections have addressed structural aspects of capital and labour accumulation. Now, one considers the evolution of factor accumulation during the decade and a half ending in 2020, and its interaction with the business cycle. In this exercise, two groups of firms were taken into account: the firms that remained active during the whole period under review, referred to as incumbents, and the firms that in this period were in their first five years in business, referred to as new.[5] New firms face specific challenges related to barriers to entry, namely of a financial and market access nature, giving rise to particular sensitivity to the cyclical position of the economy.

5. Firms established in 2006, or in the five immediately preceding years, and which remained active until 2020 are in both groups.

Chart 6 • Relationship between firm size and production factors' growth in manufacturing and services, positive changes in factors | Million euro, 2020 prices, and percentage



Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: The graphs are constructed, respectively, on the basis of the capital stock at the end of year t and the investment rate in that year; and the wage bill for year t and its growth rate vis-a-vis the previous year. Only positive changes in factors are considered. The levels of production factors are divided into bins with an equal number of firms; the medians of the variables in such bins are depicted.

Incumbent firms

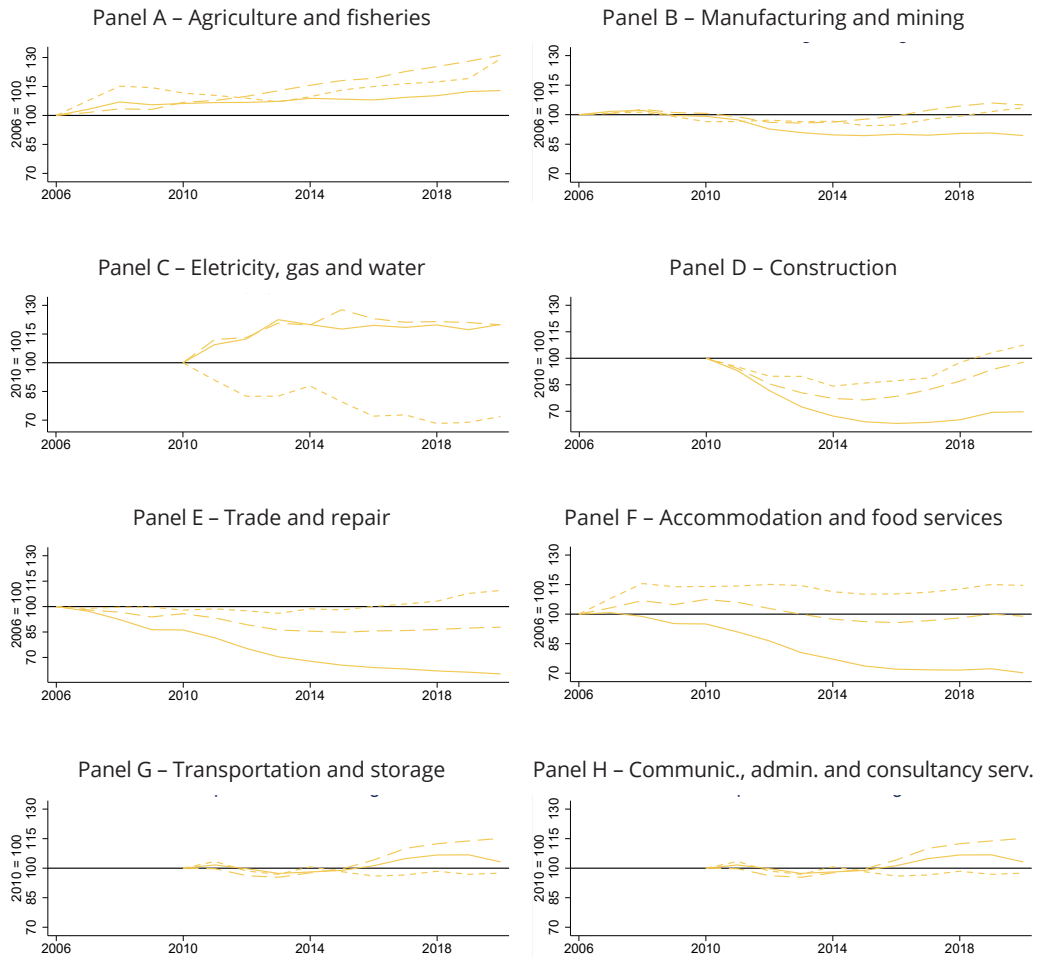
The group of incumbent firms broadly comprises firms located at the upper end of capital and labour distributions, which are particularly stable and resilient (given the length of the period considered). This group holds, on average, between 72 and 90 per cent of capital and between 65 and 90 per cent of labour, depending on the sector. Chart 7 and 8 show the path of factor accumulation at the 50th, 75th and 99th percentiles. To make the results easier to read, the curves have been standardised with reference to the first available value (2006 or 2010, depending on the sector) in each percentile. Results are broken down for the eight sectors. Note that an important part of the capital used by the electricity, gas and water, construction, and transport and storage sectors is classified as intangible, not being captured by the evolution of tangible assets here analysed.

Results show heterogeneity across sectors and throughout the distribution. Incumbent firms' capital began to show a negative trend in some sectors already at the outset of the sample period, in the wake of the financial crisis, particularly in the lower segments (Chart 7). With the outbreak of the sovereign debt crisis, this trend became widespread. For labour, such an evolution shows up only in the wake of this second crisis, but the negative inflection is slightly more pronounced than for capital

(Chart 8). In the case of capital, the impact materialises via the reduction in investment, leading to a gradual erosion of the capital stock through depreciation. In the case of labour, the reaction tends to be swifter and takes place notably through the decline or re-composition of the labour force and the decrease in hours worked.

In the upswing of the economy until 2019, the recovery of capital acquisition occurred mainly in the higher segments of distribution, being quite moderate and allowing capital to approximately recoup the levels at the beginning of the sample. Around the median, the recovery was rather subdued and, in some sectors, virtually non-existent. The path of labour input in the upswing was much more buoyant, in particular in the upper percentiles of distributions where, in 2019, several sectors clearly exceeded the level at the beginning of the sample. Besides a quantity effect, a quality effect may be implicit in this last development, with the entry into the labour market of more skilled workers, namely university graduates.

Chart 7 • Capital trajectory for incumbent firms, percentiles 50 (solid line), 75 (dashed line) and 99 (dotted line) | Index, 2006=100 or 2010=100, depending on sectors

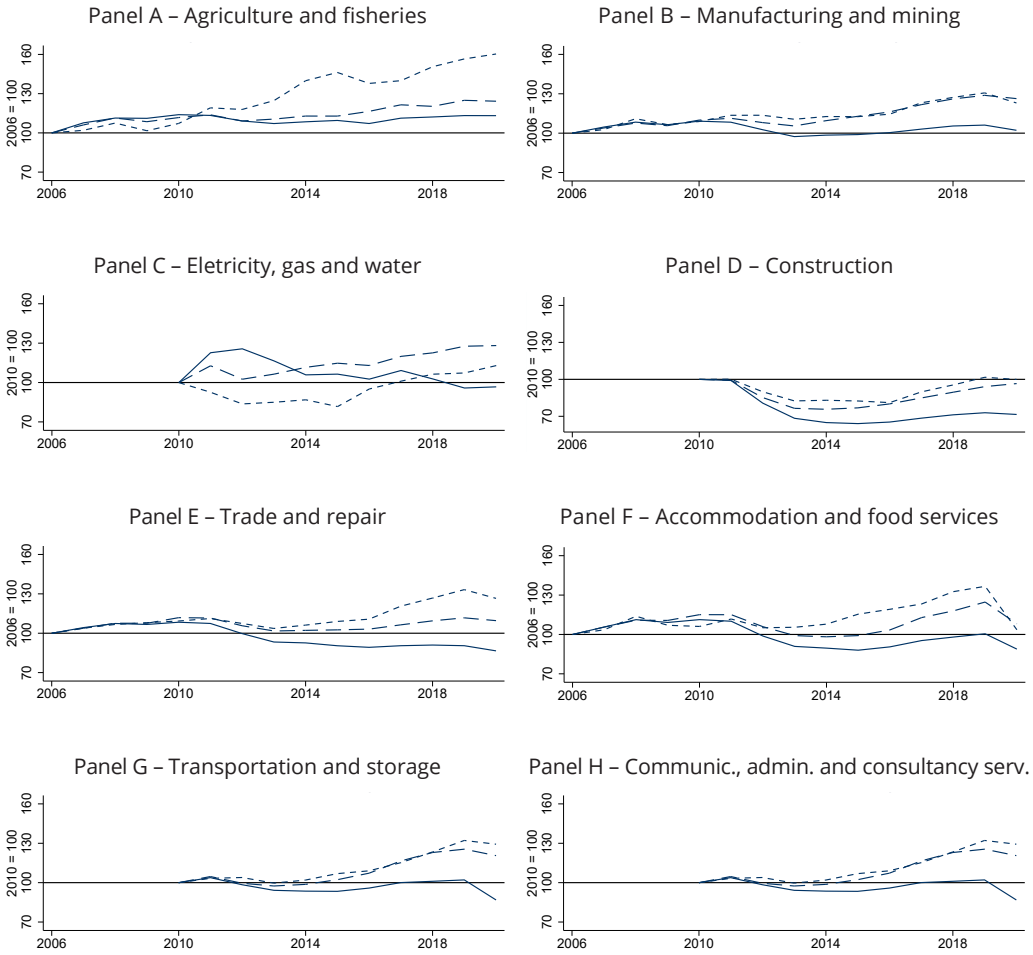


Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022).

Retraction in the use of labour caused by the pandemic in the following year affected most sectors, in particular accommodation and food services. The different recovery profile between inputs in the

pre-pandemic period is partly related to their distinct nature. Raising capital requires investments which — in particular for larger firms — typically entail a certain time lag between planning and implementation.

Chart 8 • Labour trajectory for incumbent firms, percentiles 50 (solid line), 75 (dashed line) and 99 (dotted line) | Index, 2006=100 or 2010=100, depending on sectors



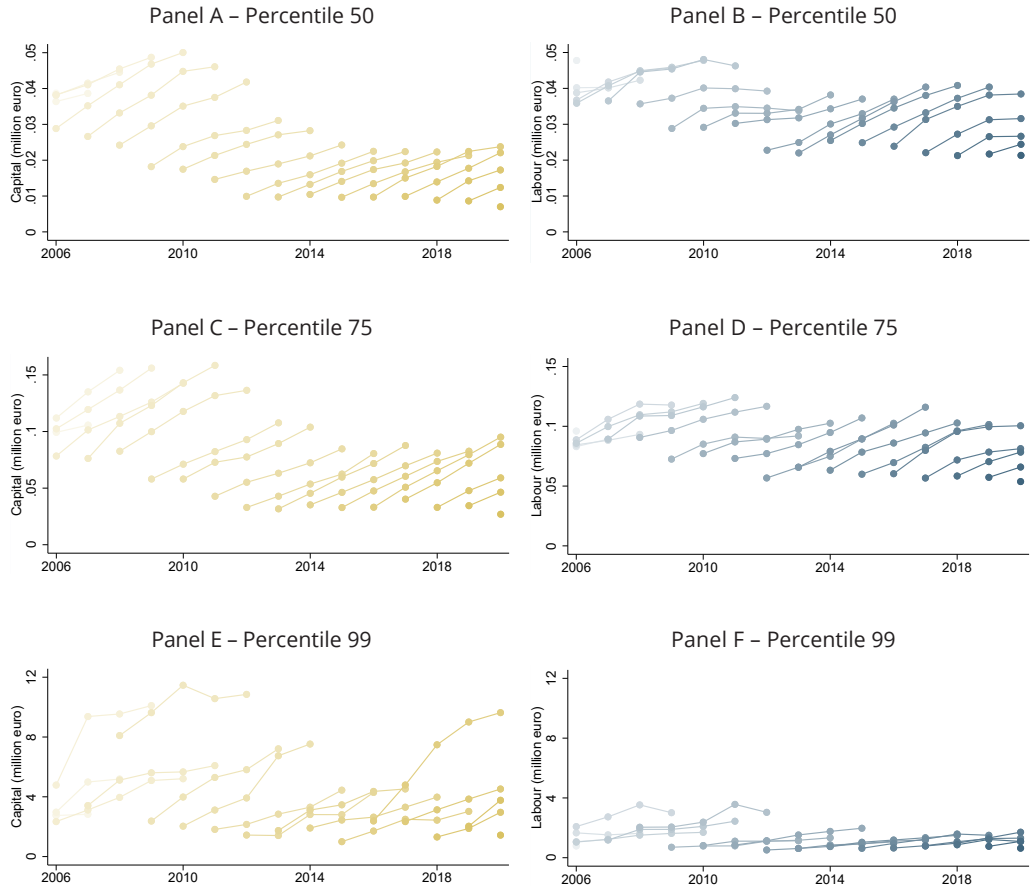
Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022).

New firms

Market entry of firms is more relevant in services, where on average 39 per cent of firms are five years old or younger, than in manufacturing, where the corresponding figure is 28 per cent. The figures presented in Table 1 indicate that the number of firms in manufacturing did not change significantly between the beginning and the end of the sample, and therefore exits will have approximately equalled entries. By contrast, entries in services consistently outpaced exits, increasing the number of firms by 38 per cent over the fifteen years of the sample. Charts 9 and 10 plot the trend in labour and capital during the first five years of firms in manufacturing and services at the 50th, 75th and 99th percentiles.

The accumulation of inputs by new firms dropped during the economic downturn in the post-2008 period. Capital in fifth year of firms in business, around 2014, was around half of the one at the beginning of the sample. This decrease was similar in manufacturing (Chart 9) and services (Chart 10), and did not differ much across the considered percentiles of the distribution of the variable as well. In the economic upturn, until 2019, the capital trajectory of firms created in the meantime did not recover to pre-recession levels (even though observations up to the fifth year are only available for firms created at the beginning of the recovery phase). There was also no significant differentiation across distribution segments in this respect. This evidence suggests the persistence of factors holding back investment of start-up firms in the recent period, and points to the importance of policies to change this situation. Moreover, such results are in line with the feeble capital accumulation trend of smaller incumbent firms in several sectors.

Chart 9 • Capital (in yellow) and labour (in blue) of firms in manufacturing in the first five years in business, percentiles 50, 75 and 99 | Million euro, 2020 prices

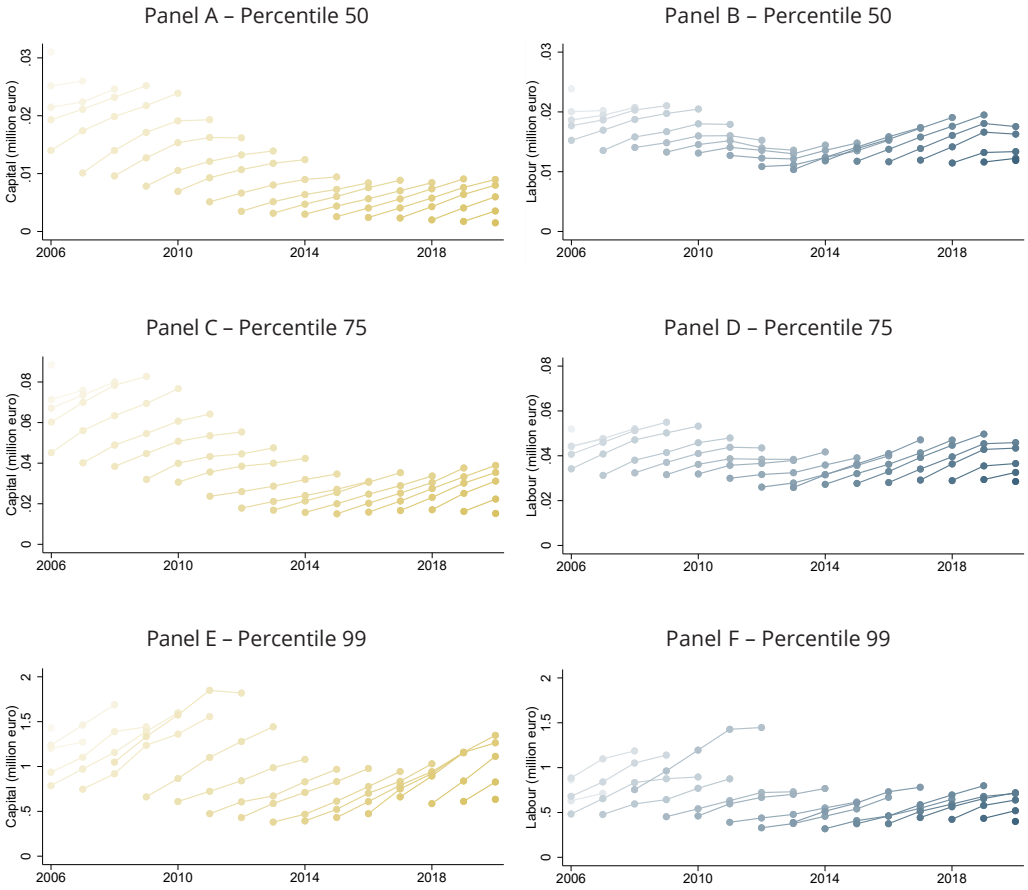


Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: The year the company was created has been excluded.

As regards labour, the impact of the recessionary episodes is also evident, although assuming a smaller extent. Labour input used by five-year-old firms was cut down by about a quarter during those episodes, compared to the beginning of the period. Such a result is broadly based across manufacturing and services and the various segments of the distribution. In the median and third quartile of the distribution, the recovery during the expansionary phase was more evident than

for capital. At the top of the distribution, on the contrary, recovery was more subdued. The values for the year 2020 reflect the downfall in economic activity caused by the pandemic, most visible for firms in services in the lowest percentiles.

Chart 10 • Capital (in yellow) and labour (in blue) of firms in services in the first five years in business, percentiles 50, 75 and 99 | Million euro, 2020 prices



Source: Banco de Portugal calculations based on IES and Gouveia and Pereira (2022). | Note: The year the company was created has been excluded.

The evidence in this section does not suggest an increase in the size of firms created over the period under analysis. The adverse legacy of the recessionary episodes from 2008 to the early years of the following decade is still apparent. The small size of firms is a repeatedly mentioned shortcoming in structural analyses of the Portuguese economy. As far as the firms that have been set up more recently are concerned, such a weakness has not been overcome. Positive developments in this field have mainly been the strong rate of net creation of firms in certain sectors in services.

This Special issue presents joint evidence on capital and labour accumulation by Portuguese firms from a structural perspective, as well as on developments between 2006 and 2020. Such an evidence can be summarised as follows.

- Distributions of capital and labour share several features, notably a negative skewness, with a large share of firms with low or zero values, and a high concentration at the top.

- There is complementarity between capital and skills, in that firms with higher capital intensity tend to employ more skilled workers. This relationship is non-linear insofar as it tends to weaken when higher levels of capital intensity are reached.
- Firm size is positively associated with the dynamics of capital and labour accumulation. In fact, small firms have increases in production factors less frequently, although these increases tend to be proportionally larger.
- The trend in labour and capital accumulation showed a downturn during the recessionary episodes which affected the Portuguese economy from 2008 to the early years of the following decade, affecting both new and incumbent firms. In the upswing up to 2019, the resumption of an upward trend in the acquisition of inputs was more evident for labour than for capital and, in the case of incumbent firms, it occurred mainly at the upper end of distributions.

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